APPENDIX A
DRAFT AGENDA
BOARD OF DIRECTORS SPECIAL MEETING
FRIDAY, AUGUST 9, 2013 @ 9:00 a.m.
SSCAFCA Headquarters
1041 Commercial Dr., S.E.
Rio Rancho, New Mexico 87124-3511

A. Call to Order.................................................................Donald Rudy

B. Roll Call of Directors......................................................Donald Rudy

C. **Announcements:**
   Due to the serious nature of all Board Meetings, we ask that you turn off your cell phones, pagers or any device that may distract participants or disrupt the meeting. The Public is advised that public comment may be taken at the end of each meeting. Additional comments may be taken for each agenda item after presentation of the item. Because of time constraints, the public is asked to keep their comments to three minutes or less.

D. Pledge of Allegiance.....................................................Donald Rudy

   “I pledge allegiance to the flag of the United States of America and to the republic for which it stands, one nation under God indivisible, with liberty and justice for all.”

E. Approval of Agenda.....................................................Donald Rudy

F. Action/Approval of the minutes of July 19, 2013. (m/o)*

G. Public Forum

H. Staff Reports

   • Executive Engineer.....................................................Charles Thomas

   1. Action/Acceptance to proceed with property exchange with City of Río Rancho.
   2. Action/Acceptance of Resolution 2013-14 Sponsorship for a Transportation Alternatives Program Application and Maintenance Commitment. (m/o)*
   3. Action/Acceptance of Resolution 2013-15 of Sponsorship for a State Transportation Program Application and Maintenance Commitment. (m/o)*
5. Action/Acceptance of Resolution 2013-17 Authorizing the Assignment of Official Representatives and Signatory Authorities. *(Lomitas Negras Water Quality Structure and Park) (m/o)*
6. Action/Acceptance of contract renewal with Orilla Consulting, LLC for Education Outreach with no requests for changes. (m/o)
7. Personnel Update.
8. Development Status Update. (m/o)

- **Field Services Director**
  2. Field Highlights.

- **Environmental Services Director**
  1. Lower Montoyas Alternatives Analysis Presentation. *(Wilson & Co.)*
  2. Watershed Based MS4 Permit Update.
  3. Open annual report on MS4 Permit for public comment.

**I. Chairman’s Report**

**J. Board of Director’s Comments**

**K. Committee Reports**

**L. Attorney’s Report**

**M. Property Matters**

**N. For Your Information**

  1. Albuquerque Journal article, “Charges in roaming cows case”, (m/o)
  2. Corrales Comment article, “Montoyas Arroyo Flooding Problem Will Be Attacked This Fall, SSCAFCA Says”, *(7/20/2013)*, (m/o)
  3. Rio West article, “Under Water!” and “Proposals OK’d for Stonegate”, *(7/27/2013)*, (m/o)
  4. Rio Rancho Observer article, “When it rains, it pours” *(7/28/2013)*, (m/o)
  5. Rio Rancho Observer article, “Be careful of what you wish: Rain pounds county”, *(7/31/2013)*, (m/o)

**O. Other Business**

- The Regular Board Meeting on Friday, August 16, 2013 at 9:00 a.m. has been **CANCELLED**.

- Next Regular Board Meeting is on Friday, September 20, 2013.
P. Adjournment

Q. Signatures *

Board items needing official signatures by the chairman and/or secretary.

1. Meeting Minutes*
2. Resolution 2013-14 *
3. Resolution 2013-15 *
4. Resolution 2013-16 *
5. Resolution 2013-17 *

Approved by: ____________________________
Donald Rudy, Chairman
The main objective of the *Stormwater Science* outreach education program is to teach students that the health of the Rio Grande is directly related to the health of the surrounding watershed. The *Stormwater Science* presentation is integrated into our series of 9 BEMP classroom programs that are shared with students throughout the year. The one and one-half hour classroom program was delivered to 616 students in 29 classrooms at 11 different schools in 3 cities.

The main portion of the program uses a model of the Rio Grande Basin watershed constructed inside the classroom. The watershed has 5 different communities along the river: a cattle ranch, up-and-downstream eco-friendly towns, an urban city, and agricultural fields. Students add different ‘runoff cards’ to the river downstream of the community where they came from. Some of the runoff is naturally occurring (turbidity), and others are human caused (pesticides, oil). Other cards such as macro-invertebrates and fish species are changed from pollution sensitive species to more pollution tolerant species where the water quality is degraded. The program runs through two different scenarios, a *before-the-storm* and *after-the-storm* river. They demonstrate the harmful effects stormwater contamination can have on aquatic organisms and downstream communities. The program also encourages students to change their daily behavior in ways that can help to keep their watershed clean. Educators help to provide solutions as well as having students come up with ideas on their own. The handout to accompany this activity is included below.

The field portion of the program involves a trail/arroyo survey which examines and categorizes the amount of visible pollutants (plastics, paper, dog poop, animal scat, etc…) in the San Antonio arroyo which empty into the Rio Grande. This is followed by an activity where the students guess how long it takes for different materials to decompose. When the students arrive at the bank of the Rio Grande they examine the water using a LaMotte water quality monitoring kit. Students share their results and discuss what they could mean in terms of river health. Several high school participants took on a third portion of the *Stormwater Science* program, which was a community outreach tool used to educate Albuquerque citizens about the importance of keeping a clean watershed. Some students created a children’s book about a class that goes for a hike in the bosque and discovers the negative impact trash has had on several animal’s habitats. Another group created a poster about the accumulation of cigarette butts in the drainage of overpasses. By allowing the students to share what they feel is important, it allows the message of keeping a healthy watershed to spread throughout a broader community.
**Stormwater Science**

What 2 sources does Albuquerque get its drinking water from? What % comes from each?

1. 
2. 

A **watershed** is an area of land where all of the water that falls on it, or that is under it, drains to the lowest point.

<table>
<thead>
<tr>
<th>Word</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turbidity</td>
<td>A stream or avenue that brings water to the main channel of the river</td>
</tr>
<tr>
<td>Nonpoint source pollution</td>
<td>Water that has drained from non-porous surfaces in urbanized areas</td>
</tr>
<tr>
<td>Ecolab</td>
<td>A type of bacteria found in water that can lead to algae growth</td>
</tr>
<tr>
<td>Point source pollution</td>
<td>A single location where pollution is being trickled into the environment</td>
</tr>
<tr>
<td>Nitrites and phosphates</td>
<td>A type of bacteria found in water that can make people sick</td>
</tr>
<tr>
<td>Impervious surface</td>
<td>A surface material that does not allow water to seep through it</td>
</tr>
<tr>
<td>Turbidity</td>
<td>Tiny ‘water bugs’ whose species are an indication of water quality</td>
</tr>
<tr>
<td>Macro-invertibrables</td>
<td>Any type of pollution that comes from many different sources</td>
</tr>
<tr>
<td>Water turnover</td>
<td>A measure of water clarity based on the amount of suspended solids</td>
</tr>
</tbody>
</table>
Write the main type(s) of runoff that come from each of the 5 communities along this river. Are they naturally occurring or not?

Write down a few things that YOU can do to help keep our watershed clean!

1. 
2. 
3. 
4. 
5.
BEMPin’ it Up!

Stormwater Science Field Journal

Date: ____________
Name: ____________

![List of items]

1.) List two things that you can do to help keep our watershed clean.
   (Example: planting trees, reducing runoff)

2.) Weather Report

   Time: ____________ 3:15 pm
   Cloud Cover: ______ %
   Humidity: ______ %
   Temperature: ______ °F
      It feels like ______ °F
   Wind: Speed: ______ Km/hr
   Circle the direction the wind is coming from

   - Water Chemistry
     | Type of Pollutant | In the ditch | Next to ditch | Total |
     |------------------|-------------|--------------|-------|
     | Paper trash      |             |              | 1     |
     | Plastic trash    |             |              | 2     |
     | Glass or aluminum|            |              | 3     |
     | Other trash      |             |              | 4     |
     | Dog poop         |             |              | 5     |
     | Coyote scat      |             |              | 6     |
     | Other types of scat |       |              | 7     |
     | Evidence of erosion |       |              | 8     |
     | Cigarette butts  |             |              | 9     |
     | Chemicals        |             |              | 10    |

   What grade would you assign to this section of the river? _______

   What is the main type of pollutant found from your survey? _______

   How many of these items could have been recycled? _______
<table>
<thead>
<tr>
<th>Date</th>
<th>Teacher</th>
<th>School / Assoc.</th>
<th># Students</th>
<th># Adults</th>
<th>Grade</th>
<th>Activity</th>
<th># of Programs</th>
<th># of Hours</th>
<th>School level</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/21/2012</td>
<td>Kim Fike</td>
<td>Bosque Summer camp (Bosque Biology Bonanza)</td>
<td>8</td>
<td>1</td>
<td>4-6th</td>
<td>StormWS class pres.</td>
<td>1</td>
<td>1.5</td>
<td>ES</td>
</tr>
<tr>
<td>8/28/2012</td>
<td>Ms. Goebel</td>
<td>Georgie O'Keeffe</td>
<td>26</td>
<td>4</td>
<td>5th</td>
<td>Study Trip</td>
<td>1</td>
<td>3.5</td>
<td>ES</td>
</tr>
<tr>
<td>8/30/2012</td>
<td>Ms. Rhoades</td>
<td>Georgie O'Keeffe</td>
<td>26</td>
<td>3</td>
<td>5th</td>
<td>Study Trip</td>
<td>1</td>
<td>3.5</td>
<td>ES</td>
</tr>
<tr>
<td>9/5/2012</td>
<td>Ms. Young</td>
<td>Georgie O'Keeffe</td>
<td>28</td>
<td>5</td>
<td>5th</td>
<td>Study Trip</td>
<td>1</td>
<td>3.5</td>
<td>ES</td>
</tr>
<tr>
<td>9/11/2012</td>
<td>Ms. Harden</td>
<td>Georgie O'Keeffe</td>
<td>30</td>
<td>6</td>
<td>5th</td>
<td>Study Trip</td>
<td>1</td>
<td>3.5</td>
<td>ES</td>
</tr>
<tr>
<td>10/2/2012</td>
<td>Ms. Doherty</td>
<td>North Valley Academy</td>
<td>13</td>
<td>3</td>
<td>2nd</td>
<td>Study Trip</td>
<td>1</td>
<td>4</td>
<td>ES</td>
</tr>
<tr>
<td>10/4/2012</td>
<td>Ms. Fuller</td>
<td>Bandalier Elem</td>
<td>24</td>
<td>13</td>
<td>3rd</td>
<td>Study Trip</td>
<td>1</td>
<td>4</td>
<td>ES</td>
</tr>
<tr>
<td>10/10/2012</td>
<td>Ms. Daniels</td>
<td>Bosque School</td>
<td>17</td>
<td>1</td>
<td>7th</td>
<td>Dia del Rio</td>
<td>1</td>
<td>1.5</td>
<td>ES</td>
</tr>
<tr>
<td>10/15/2012</td>
<td>Ms. Madden</td>
<td>The Montessori School</td>
<td>42</td>
<td>2</td>
<td>7th &amp; 8th</td>
<td>StormWS class pres.</td>
<td>2</td>
<td>3</td>
<td>MS</td>
</tr>
<tr>
<td>10/16/2012</td>
<td>Ms. Madden</td>
<td>The Montessori School</td>
<td>28</td>
<td>1</td>
<td>6th</td>
<td>StormWS class pres.</td>
<td>1</td>
<td>1.5</td>
<td>MS</td>
</tr>
<tr>
<td>10/18/2012</td>
<td>Ms. Pape</td>
<td>Bernalillo Middle School</td>
<td>18</td>
<td>1</td>
<td>6th</td>
<td>Study Trip</td>
<td>1</td>
<td>2</td>
<td>MS</td>
</tr>
<tr>
<td>10/18/2012</td>
<td>Ms. Saedi</td>
<td>Van Buren Middle School</td>
<td>14</td>
<td>1</td>
<td>6th-8th</td>
<td>StormWS class pres.</td>
<td>1</td>
<td>1.5</td>
<td>MS</td>
</tr>
<tr>
<td>10/24/2012</td>
<td>Ms. Webb</td>
<td>Dolores Gonzales</td>
<td>28</td>
<td>4</td>
<td>4th</td>
<td>Study Trip</td>
<td>1</td>
<td>4</td>
<td>ES</td>
</tr>
<tr>
<td>10/24/2012</td>
<td>Ms. Saedi</td>
<td>Van Buren Middle School</td>
<td>repeat</td>
<td>repeat</td>
<td>6th-8th</td>
<td>River Chemistry</td>
<td>1</td>
<td>1.5</td>
<td>MS</td>
</tr>
<tr>
<td>10/25/2012</td>
<td>Mr. Shaw</td>
<td>Bosque School A</td>
<td>14</td>
<td>1</td>
<td>11th-12th</td>
<td>StormWS class pres.</td>
<td>1</td>
<td>1.5</td>
<td>HS</td>
</tr>
<tr>
<td>10/26/2012</td>
<td>Mr. Shaw</td>
<td>Bosque School F</td>
<td>14</td>
<td>1</td>
<td>11th-12th</td>
<td>StormWS class pres.</td>
<td>1</td>
<td>1.5</td>
<td>HS</td>
</tr>
<tr>
<td>11/1/2012</td>
<td>Ms. Madden</td>
<td>The Montessori School</td>
<td>repeat</td>
<td>5</td>
<td>7th</td>
<td>Study Trip</td>
<td>1</td>
<td>5</td>
<td>MS</td>
</tr>
<tr>
<td>11/2/2012</td>
<td>Mr. Thrall</td>
<td>21st Century Academy</td>
<td>30</td>
<td>4</td>
<td>7th</td>
<td>Study Trip</td>
<td>1</td>
<td>4.5</td>
<td>MS</td>
</tr>
<tr>
<td>11/5/2012</td>
<td>Mr. Thall</td>
<td>21st Century Academy</td>
<td>26</td>
<td>4</td>
<td>7th</td>
<td>Study Trip</td>
<td>1</td>
<td>4</td>
<td>MS</td>
</tr>
<tr>
<td>11/6/2012</td>
<td>Mr. Shaw</td>
<td>Bosque School A</td>
<td>repeat</td>
<td>1</td>
<td>11th-12th</td>
<td>StormWS Field</td>
<td>1</td>
<td>1.5</td>
<td>HS</td>
</tr>
<tr>
<td>11/7/2012</td>
<td>Mr. Shaw</td>
<td>Bosque School F</td>
<td>repeat</td>
<td>1</td>
<td>11th-12th</td>
<td>StormWS Field</td>
<td>1</td>
<td>1.5</td>
<td>HS</td>
</tr>
<tr>
<td>Date</td>
<td>Name</td>
<td>School</td>
<td>Repeat</td>
<td>Grade</td>
<td>Study Trip</td>
<td>Duration</td>
<td>Type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>---------------</td>
<td>-------------------------------------</td>
<td>--------</td>
<td>-------</td>
<td>------------</td>
<td>----------</td>
<td>------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11/8/2012</td>
<td>Ms. Saedi</td>
<td>Van Buren Middle School</td>
<td></td>
<td></td>
<td>Study Trip</td>
<td>1</td>
<td>MS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11/12/2012</td>
<td>Ms. Raff</td>
<td>Cien Aguas</td>
<td>27</td>
<td>6</td>
<td>4th-5th</td>
<td>1</td>
<td>ES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11/14/2012</td>
<td>Ms. Madden</td>
<td>The Montessori School</td>
<td></td>
<td></td>
<td>Study Trip</td>
<td>1</td>
<td>MS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11/15/2012</td>
<td>Mr. Carter</td>
<td>Jimmy Carter Mesa</td>
<td>15</td>
<td>2</td>
<td>6th-8th</td>
<td>1</td>
<td>MS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11/16/2012</td>
<td>Ms. Lyall</td>
<td>Tierra Adentro</td>
<td>26</td>
<td>2</td>
<td>7th</td>
<td>1</td>
<td>MS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11/26/2012</td>
<td>Ms. Lyall</td>
<td>Tierra Adentro</td>
<td>25</td>
<td>3</td>
<td>7th</td>
<td>1</td>
<td>MS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11/29/2012</td>
<td>Ms. Henry</td>
<td>Georgie O'Keeffe</td>
<td>25</td>
<td>6</td>
<td>3rd</td>
<td>1</td>
<td>ES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12/4/2012</td>
<td>Mr. Galloway</td>
<td>Georgie O'Keeffe</td>
<td>24</td>
<td>6</td>
<td>3rd</td>
<td>1</td>
<td>ES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12/5/2012</td>
<td>Ms. Wynn &amp;</td>
<td>La Academia de Esperanza</td>
<td>32</td>
<td>2</td>
<td>9th-12th</td>
<td>2</td>
<td>HS</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ms. Jolley</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12/6/2012</td>
<td>Ms. Armillo</td>
<td>Georgie O'Keeffe</td>
<td>25</td>
<td>6</td>
<td>3rd</td>
<td>1</td>
<td>ES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12/11/2012</td>
<td>Dr. Ma,ayan</td>
<td>McKinley MS</td>
<td>25</td>
<td>2</td>
<td>6th-8th</td>
<td>1</td>
<td>MS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/23/2013</td>
<td>Ms. McCombs</td>
<td>NM School of the Arts</td>
<td>30</td>
<td>3</td>
<td>10th</td>
<td>1</td>
<td>HS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/28/2013</td>
<td>Jason V.</td>
<td>Apache Elem</td>
<td>25</td>
<td>1</td>
<td>5th</td>
<td>1</td>
<td>ES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/29/2013</td>
<td>Ms. Mariucci</td>
<td>Apache Elem</td>
<td>25</td>
<td>6</td>
<td>5th</td>
<td>1</td>
<td>ES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/29/2013</td>
<td>Mr. Allen</td>
<td>Bosque School</td>
<td>17</td>
<td>1</td>
<td>7th</td>
<td>1</td>
<td>MS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/30/2013</td>
<td>Ms. Daniels</td>
<td>Bosque School</td>
<td>53</td>
<td>1</td>
<td>7th</td>
<td>3</td>
<td>MS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/31/2013</td>
<td>Ms. Daniels</td>
<td>Bosque School</td>
<td>17</td>
<td>1</td>
<td>7th</td>
<td>1</td>
<td>MS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2/1/2013</td>
<td>Ms. Marinucci</td>
<td>Bandalier Elem</td>
<td>24</td>
<td>10</td>
<td>3rd</td>
<td>1</td>
<td>ES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2/5/2013</td>
<td>Ms. McCoy</td>
<td>Bandalier Elem</td>
<td>25</td>
<td>10</td>
<td>3rd</td>
<td>1</td>
<td>ES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2/8/2013</td>
<td>Ms. Marinucci &amp; Ms. Houser</td>
<td>Bandalier Elem</td>
<td>48</td>
<td>2</td>
<td>3rd</td>
<td>2</td>
<td>1.5</td>
<td>ES</td>
<td></td>
</tr>
<tr>
<td>2/14/2013</td>
<td>Ms. McCombs</td>
<td>NM School of the Arts</td>
<td>19</td>
<td>1</td>
<td>10th</td>
<td>1</td>
<td>HS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2/15/2012</td>
<td>Ms. Wynn</td>
<td>La Academia de Esperanza</td>
<td>20</td>
<td>2</td>
<td>9-12th</td>
<td>1</td>
<td>HS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2/25/2012</td>
<td>Ms. Jolley</td>
<td>La Academia de Esperanza</td>
<td>10</td>
<td>2</td>
<td>9-12th</td>
<td>1</td>
<td>HS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2/26/2013</td>
<td>Ms. Munsey &amp;</td>
<td>South Valley Prep Charter School</td>
<td>50</td>
<td>2</td>
<td>6th</td>
<td>2</td>
<td>MS</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ms. O'Brien</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Teacher</td>
<td>School / Assoc.</td>
<td># Students</td>
<td># Adults</td>
<td>Grade</td>
<td>Activity</td>
<td># of Programs</td>
<td># of Hours</td>
<td>School level</td>
</tr>
<tr>
<td>----------</td>
<td>-----------</td>
<td>--------------------------</td>
<td>------------</td>
<td>----------</td>
<td>-------</td>
<td>----------------</td>
<td>---------------</td>
<td>------------</td>
<td>--------------</td>
</tr>
<tr>
<td>2/27/2013</td>
<td>Mr. Tichnelle</td>
<td>Holy Ghost Catholic</td>
<td>24</td>
<td>1</td>
<td>5th</td>
<td>Study Trip/Storm WS field</td>
<td>1</td>
<td>4</td>
<td>MS</td>
</tr>
<tr>
<td>3/1/2013</td>
<td>Ms. Rehder</td>
<td>Cottonwood Valley Charter School</td>
<td>24</td>
<td>1</td>
<td>4th</td>
<td>Storm WS class pres</td>
<td>1</td>
<td>1.5</td>
<td>ES</td>
</tr>
<tr>
<td>3/14/2013</td>
<td>Ms. Pape</td>
<td>Bernalillo Middle School</td>
<td>12</td>
<td>1</td>
<td>6th</td>
<td>Storm WS field</td>
<td>1</td>
<td>2.5</td>
<td>MS</td>
</tr>
<tr>
<td>3/25/2013</td>
<td>Ms. Miller</td>
<td>AIMS</td>
<td>75</td>
<td>2</td>
<td>7th</td>
<td>Storm WS class pres</td>
<td>3</td>
<td>1.5</td>
<td>MS</td>
</tr>
<tr>
<td>4/8/2013</td>
<td>Ms. Smith</td>
<td>Santo domingo Comm school</td>
<td>10</td>
<td>1</td>
<td>7th</td>
<td>Storm WS class pres</td>
<td>1</td>
<td>0.9</td>
<td>MS</td>
</tr>
<tr>
<td>4/9/2013</td>
<td>Ms. Erwin</td>
<td>Wilson MS</td>
<td>121</td>
<td>1</td>
<td>6th-8th</td>
<td>Storm WS class pres</td>
<td>5</td>
<td>4.5</td>
<td>MS</td>
</tr>
<tr>
<td>4/22/2013</td>
<td>?</td>
<td>Zia Elem</td>
<td>18</td>
<td>5</td>
<td>4th</td>
<td>Study Trip</td>
<td>1</td>
<td>4.5</td>
<td>ES</td>
</tr>
<tr>
<td>4/29/2013</td>
<td>Ms. Trahn</td>
<td>Georgia o'Keeffee</td>
<td>23</td>
<td>6</td>
<td>3rd</td>
<td>Study Trip</td>
<td>1</td>
<td>4</td>
<td>ES</td>
</tr>
<tr>
<td>5/3/2013</td>
<td>Ms. Webb</td>
<td>Dolores Gonzales</td>
<td>repeat</td>
<td>4</td>
<td>4th</td>
<td>Study Trip</td>
<td>1</td>
<td></td>
<td>ES</td>
</tr>
<tr>
<td>5/13/2013</td>
<td>Ms. Alumbaugh</td>
<td>Bernalillo Middle School</td>
<td>15</td>
<td>2</td>
<td>6th</td>
<td>Pitfalls / Storm WS Field</td>
<td>1</td>
<td>5</td>
<td>MS</td>
</tr>
<tr>
<td>5/16/2013</td>
<td>Mr. Wilson</td>
<td>Zia Elem</td>
<td>24</td>
<td>5</td>
<td>4th</td>
<td>Study Trip</td>
<td>1</td>
<td>4.5</td>
<td>ES</td>
</tr>
<tr>
<td>5/17/2013</td>
<td>Ms. Grado</td>
<td>Dolores Gonzales</td>
<td>24</td>
<td>3</td>
<td>4th</td>
<td>Study Trip</td>
<td>1</td>
<td>4</td>
<td>ES</td>
</tr>
<tr>
<td><strong>Totals:</strong></td>
<td></td>
<td></td>
<td><strong>1367</strong></td>
<td><strong>175</strong></td>
<td></td>
<td></td>
<td><strong>70</strong></td>
<td><strong>174.65</strong></td>
<td></td>
</tr>
</tbody>
</table>
## Stormwater Science classroom presentations 201

<table>
<thead>
<tr>
<th>Date</th>
<th>Teacher</th>
<th>School</th>
<th># Kids</th>
<th>#adults</th>
<th>grade</th>
<th>activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/21/2012</td>
<td>Kim Fike</td>
<td>Bosque Summer camp (Bosque Biology Bonanza)</td>
<td>8</td>
<td>1</td>
<td>4-6th</td>
<td>StormWS class pres.</td>
</tr>
<tr>
<td>10/15/2012</td>
<td>Ms. Madden</td>
<td>The Montessori School</td>
<td>42</td>
<td>2</td>
<td>7th &amp; 8th</td>
<td>StormWS class pres.</td>
</tr>
<tr>
<td>10/16/2012</td>
<td>Ms. Madden</td>
<td>The Montessori School</td>
<td>28</td>
<td>1</td>
<td>6th</td>
<td>StormWS class pres.</td>
</tr>
<tr>
<td>10/18/2012</td>
<td>Ms. Saedi</td>
<td>Van Buren Middle School</td>
<td>14</td>
<td>1</td>
<td>6th-8th</td>
<td>StormWS class pres.</td>
</tr>
<tr>
<td>10/25/2012</td>
<td>Mr. Shaw</td>
<td>Bosque School A</td>
<td>14</td>
<td>1</td>
<td>11th-12th</td>
<td>StormWS class pres.</td>
</tr>
<tr>
<td>10/26/2012</td>
<td>Mr. Shaw</td>
<td>Bosque School F</td>
<td>14</td>
<td>1</td>
<td>11th-12th</td>
<td>StormWS class pres.</td>
</tr>
<tr>
<td>12/5/2012</td>
<td>Ms. Wynn &amp; Ms. Jolley</td>
<td>La Academia de Esperanza</td>
<td>32</td>
<td>2</td>
<td>9th-12th</td>
<td>StormWS class pres.</td>
</tr>
<tr>
<td>1/23/2013</td>
<td>Ms. McCombs</td>
<td>NM School of the Arts</td>
<td>30</td>
<td>3</td>
<td>10th</td>
<td>StormSW class pres.</td>
</tr>
<tr>
<td>1/29/2013</td>
<td>Mr. Allen</td>
<td>Bosque School</td>
<td>17</td>
<td>1</td>
<td>7th</td>
<td>StormWS class pres.</td>
</tr>
<tr>
<td>1/30/2013</td>
<td>Ms. Daniels</td>
<td>Bosque School</td>
<td>53</td>
<td>1</td>
<td>7th</td>
<td>StormWS class pres.</td>
</tr>
<tr>
<td>1/31/2013</td>
<td>Ms. Daniels</td>
<td>Bosque School</td>
<td>17</td>
<td>1</td>
<td>7th</td>
<td>StormWS class pres.</td>
</tr>
<tr>
<td>2/14/2013</td>
<td>Ms. McCombs</td>
<td>NM School of the Arts</td>
<td>19</td>
<td>1</td>
<td>10th</td>
<td>StormWS class pres.</td>
</tr>
<tr>
<td>3/25/2013</td>
<td>Ms. Miller</td>
<td>AIMS</td>
<td>75</td>
<td>2</td>
<td>7th</td>
<td>StormWS class pres.</td>
</tr>
<tr>
<td>4/8/2013</td>
<td>Ms. Smith</td>
<td>Santo domingo Comm school</td>
<td>10</td>
<td>1</td>
<td>7th</td>
<td>StormWS class pres.</td>
</tr>
<tr>
<td>4/9/2013</td>
<td>Ms. Erwin</td>
<td>Wilson MS</td>
<td>121</td>
<td>1</td>
<td>6th-8th</td>
<td>StormWS class pres.</td>
</tr>
</tbody>
</table>

**Total #s** | 616 | 25
<table>
<thead>
<tr>
<th># classes</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>
APPENDIX B2
Innovative, Long-term Outreach Program for Upper Elementary Students Integrates Water Resources Topics with High Tech Pen Pal Partnerships and Measurable Outcomes

2013 Report

Presented by
Orilla Consulting, LLC

June 20, 2013
EXECUTIVE SUMMARY

RiverXchange is an innovative, long-term outreach program that integrates water resource topics with computer technology, student writing, and a hands-on curriculum to meet specific, measurable outcomes. Since 2007, the program has enabled 193 upper elementary classes from New Mexico (NM) to become “high tech pen pals” with a class outside the state to share what they learn about the geography, culture, and ecology of their local river and watershed.

The curriculum incorporates hands-on activities, multiple classroom presentations by local water resources professionals, and a field trip to the local river or an important watershed feature. The field trip includes water quality monitoring and/or a service learning project. Students write about the various curriculum topics and the field trip via a private wiki website that can be viewed by their partner class. Each student is assigned a pen pal, who is able to read and comment on what was written. The computer technology and writing components provide a unique way to reinforce what was learned, increase student motivation to learn, and enable organizers to collect valuable metrics. All program costs and coordination are provided free of charge to NM teachers. Training, technical support, and some curriculum materials are provided free of charge to partner teachers.

This year, funding enabled 46 NM classes to participate. Each NM class was partnered with a class outside the state for a total of over 2,200 participants (1125 students and 47 teachers in NM). The program required $70,000 in cash and received in-kind contributions valued at $64,873.10.

All major “Next Steps” recommended in the RiverXchange 2012 Report were met. Several new tasks were also developed and met. Notable changes/additions to this year’s program include:

- Pre/Post Survey to measure behavior change
- Mid-year teacher workshops provided constructive feedback and innovation

Performance on the three online assessments showed that NM students achieved Proficiency or higher on many water resources issues covered in the curriculum. Student wiki writing showed that 61% of NM classes met our goal of writing on five or more water resources topics.
PROGRAM DESCRIPTION

Mission
The mission of RiverXchange is to deepen students’ and teachers’ understanding and appreciation for their local river ecosystem, motivate participants to protect local water resources by conserving water and keeping their source water clean, and provide a high quality, high impact outreach opportunity for funders and in-kind contributors.

The Big Water Questions
The curriculum frames program outcomes as “guiding questions” known as Big Water Questions. A long-term goal of RiverXchange is that students understand these questions and can formulate logical, fact-based answers by the time they finish elementary school. We believe that students who can synthesize water facts to understand larger water issues will have the proper critical thinking skills and foundation for further discussion in middle and high school so that they will become informed citizens and voters on water issues.

Understanding a Watershed
- Is every place in the world part of a watershed?
- Where does your community’s stormwater go?
- How can surface water become polluted?
- How does the water cycle relate to weather?
- How are groundwater and surface water connected?
- How can groundwater become polluted?
- What actions can all of us take to keep water clean?

Water in Our Society
- In what ways does our society use water?
- Where does your community’s drinking water come from?
- Does everyone have the right to use as much water as they want?
- Where does your community’s wastewater go?
- What actions can all of us take to conserve water?

River Ecosystem
- How does water affect living things in an ecosystem?
- What role do forests play in a watershed?
- What role do wetlands play in a watershed?
- What are some of the ways scientists can determine the health of a river, lake, bay or ocean?
- What actions can all of us take to improve the health of our ecosystem?
Background

As producers of children’s water festivals and other grade K-12 water resources outreach in NM since 2007, we observed early on that NM elementary teachers rarely incorporated water concepts in the classroom beyond what is required by the state (e.g., water cycle), and that most elementary teachers considered “water” strictly as a science topic. While teachers personally acknowledged the importance of conserving water and keeping source water clean, we continued to find that upper elementary students had little or no understanding of major water resources topics unless the teacher specifically integrates a wide range of water topics into the curriculum.

We created RiverXchange to provide a free program that is fun, interesting, and easy to integrate into the normal curriculum. Our hope was that participants would want to explore water resources topics in depth. The program is carried out over eight months so that students spend more time developing a sense of pride and personal connection to their own river ecosystem, as well as a personal connection to a distant river ecosystem and the students who live near it.

RiverXchange began in 2007 as a pilot project of Experiential EE, LLC (under a services agreement with the New Mexico Water Conservation Alliance) and the National Great Rivers Research and Education Center, featuring partnerships between two fourth grade classes in Albuquerque, NM, and two fifth grade classes in Godfrey, IL. A curriculum was developed, a field trip to the river was coordinated, and partner classes “met” three times during the year via video teleconferencing to present what they had learned. The upper elementary level was chosen because of our successful festival work with this age group.

After the pilot project, we transitioned to a web-based technology called a wiki. This enabled us to overcome limitations such as the high cost, availability and time zone logistical issues associated with video teleconferencing – and easily involve more classes. The curriculum was updated to incorporate the writing component, and we introduced classroom guest speakers to reduce teacher work load and bring up-to-date technical information into the classroom.

This year, ownership of RiverXchange transferred to Amy White of Orilla Consulting, LLC, who has managed the program since its inception. The program featured the following components:

- Standards-based curriculum including hands-on science and social studies lessons, as well as writing assignments.
- Coordination of class partnerships
- Pre-formatted wiki website
- Teacher training on curriculum implementation and use of the wiki technology
- Ongoing technical and motivational support
- Three online student assessments and a teacher survey
- Payment for teacher workshop substitute teachers (NM only)
- Coordination of at least four guest speakers into the classroom (NM only)
- Coordination of a field trip to the local river, tributary or important watershed feature (NM only)
- Field trip bus transportation payment (NM only)
- Field trip leadership and activity planning (NM only)
- Two mid-year teacher gatherings for support and motivation (NM only)
Program Management and Financial Support

The program timeframe was July 1, 2012 through June 30, 2013. All components including fundraising, design, planning, implementation and analysis were carried out by Orilla Consulting, LLC, an Albuquerque-based consulting firm owned by Amy White. In addition to Ms. White, work was carried out by the following team of independent contractors:

Bonnie Schmader, Field Trip Coordinator
Michelle Watson, NM Teacher Coordinator and Web Application Support
Jill Turner, Partner Teacher Coordinator
Carolyn Gregory, Partner Teacher Coordinator (replaced Jill in May 2013)

The New Mexico Water Conservation Alliance (NMWCA) served as a fiscal agent for several grants. NMWCA is a nonprofit 501(c)(3) corporation comprised of municipal and industrial water conservation professionals dedicated to water conservation education and networking.

Sponsors
- Southern Sandoval County Arroyo and Flood Control Authority (SSCAFCA)
- Mid Rio Grande Stormwater Quality Team
- Edgewood Soil and Water Conservation District
- PNM (through NMWCA)
- Bohannan Huston (through NMWCA)
- Air and Waste Management Association (through NMWCA)
- Rocky Mountain Section of American Water Works Association/Water Environment Federation (RMSAWWA/WEF)

Sponsors provided $70,000 in cash. Program expenses included:
- Substitute teachers for NM teacher workshops
- Field trip bus transportation for NM classes
- Field trip portable toilet rentals for NM classes
- USGS water education posters for each teacher
- Coordination services (planning, implementing and assessing all program components)

New Mexico In-kind Partners
- Albuquerque Bernalillo County Water Utility Authority (ABCWUA)
- Bernalillo County Cooperative Extension, 4-H
- Bernalillo County Open Space
- CDM Smith, Inc.
- CH2MHILL
- City of Albuquerque Open Space
- City of Rio Rancho
- Ciudad Soil and Water Conservation District
- La Plazita Institute
- New Mexico Environment Department
- OMI
- Sandoval County Cooperative Extension, 4-H
- Santa Fe County Cooperative Extension, 4-H
- Southern Sandoval County Arroyo and Flood Control Authority (SSCAFCA)
- World Water Monitoring Challenge (WWMC)

In-kind contributions totaled $64,873.10. For NM classes, in-kind contributions included classroom guest speakers, field trip docents, workshop space and computer lab use, student assessment software,
wiki technology, and classroom resources. For partner classes, in-kind contributions included classroom guest speakers, field trip docents and field trip bus transportation. Sponsors and in-kind partners were recognized on our website and in presentations.

**Participant Selection**

Of the 46 participating NM classes, 45 were fifth grade and one was fourth grade (this teacher was participating before the program transitioned to fifth grade exclusively). There were 1,125 students and 47 teachers distributed as follows:

<table>
<thead>
<tr>
<th>Bernalillo County</th>
<th>Sandoval County</th>
<th>Santa Fe County (Edgewood)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apache Elementary</td>
<td>Corrales Elementary</td>
<td>South Mountain Elementary</td>
</tr>
<tr>
<td>Chelwood Elementary</td>
<td>Enchanted Hills Elementary</td>
<td></td>
</tr>
<tr>
<td>Cochiti Elementary</td>
<td>Maggie Cordova Elementary</td>
<td></td>
</tr>
<tr>
<td>Georgia O'Keeffe Elementary</td>
<td>Rio Rancho Elementary</td>
<td></td>
</tr>
<tr>
<td>John Baker Elementary</td>
<td>Sandia Vista Elementary</td>
<td></td>
</tr>
<tr>
<td>Lew Wallace Elementary</td>
<td>Stapleton Elementary</td>
<td></td>
</tr>
<tr>
<td>North Star Elementary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Osuna Elementary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whittier Elementary</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>550 students, 22 teachers</strong></td>
<td><strong>550 students, 23 teachers</strong></td>
<td><strong>50 students, 2 teachers</strong></td>
</tr>
</tbody>
</table>

Of the partner classes, located outside NM, about half were fourth grade and half fifth grade. We marketed the program to both grade levels in order to find more partners. There were 1,125 students and 39 teachers (some teachers had more than one class participating). Partner classes were located in 12 U.S. States, as well as Russia and Romania. We have especially high numbers of teachers in Ohio, Virginia, and Washington. We have found that partner teachers are highly motivated and come to the program with a willingness to participate even though our NM-based funding cannot be used to help coordinate their classroom guest speakers, arrange the field trip, or pay for any direct costs.

**Curriculum**

A key component of RiverXchange is the hands-on curriculum, which is to be carried out from approximately September 15 to May 15. It was developed to help students reach for deeper meaning through hands-on learning, and reinforce what they have learned through the process of writing to their pen pal. Organizers strive to incorporate emerging water resources issues into the curriculum, increase networking opportunities for teachers, reduce teacher workload, and align the curriculum with public school curriculum priorities including Common Core Standards.

Each class learns about its own local water resources issues through hands-on activities, classroom guest speakers and a field trip. Students write about what they are learning via a private wiki website that can be viewed by their partner class. Each student is assigned a pen pal, who is able to read and comment on what was written. The computer technology and writing components provide a unique opportunity to reinforce what was learned, increase student motivation to learn, and collect valuable metrics about student performance.
Through RiverXchange, students take pride in sharing their knowledge of the local ecosystem, and learning from their peers about another river ecosystem. Comparing the two geographical areas gives students a broader understanding of the importance of a river ecosystem to human and other life. Students gain the unique opportunity to share personal experiences and ask questions about a distant place. Teachers feel this kind of personal connection is a big deal for kids – many of whom have never traveled beyond their city limits.

All activities are correlated to NM state standards and benchmarks for Science, Social Studies and/or Mathematics. All activities (because they require that students post written information on the wiki) address Language Arts standards for writing. We have also correlated the RiverXchange curriculum to the new Common Core Standards for Language Arts, which go into effect next year. For a summary of the RiverXchange Curriculum, see Appendix 1.

**Guest Speakers**

We coordinated four guest speakers to visit each NM classroom. In all cases, guest speakers were water resources professionals from local agencies. Guest speakers introduced technical information that was often completely new to a teacher. Topics included:

- watershed/nonpoint source pollution
- drinking water
- wastewater
- water and agriculture

Partner teachers were strongly encouraged to invite guest speakers into the classroom to help carry out the curriculum. Since program funding is NM-based, we were not able to assist partner teachers with coordinating guest speakers into the classroom; however, we provided partner teachers with names of agencies located in most parts of the U.S. that may be able to assist.

**Field Trips**

The program requires that all classes attend at least one field trip to their local river or important watershed feature, which should incorporate a service learning component, if possible. We coordinated all NM field trips. On several winter field trips, students helped plant approximately 600 trees and shrubs throughout a 7-acre area of Albuquerque Open Space in the Rio Grande riparian area. Fall and spring field trips included a water quality monitoring component. All data collected by RiverXchange classes were submitted to the World Water Monitoring Challenge website so that they can be shared with others around the world.

**Albuquerque Field Trip Locations**

*Sanchez Farm*

This 14-acre tract of land located in Albuquerque’s South Valley, is owned by Bernalillo County Open Space and serves as a drainage retention basin for stormwater runoff. The property features a wetland, irrigation ditch, and working farm that is run by La Plazita Institute. Students helped with planting, tested water quality, learned how farms are flood irrigated using the local acequia, and how wetlands clean stormwater.

*La Orilla Bosque / Open Space Visitor Center*

Managed by City of Albuquerque Open Space, this property is located in northwest Albuquerque, adjacent to the Bosque and Rio Grande. Students took a nature hike, saw how irrigation water and stormwater travel through the area, planted native shrubs near the wetland, and learned about the ancient people who lived on the property.

*Alameda Wetland/Bachechi Open Space*

The Bachechi property, owned by Bernalillo County Open Space, is 27 acres of fertile valley farmland, located just south and east of the adjacent 8-acre Alameda Open Space that is owned
and operated by the City of Albuquerque Open Space Division. It is adjacent to the Rio Grande bosque and Rio Grande Valley State Park. Students took a nature hike, saw how irrigation water travels through the area, planted native shrubs near the wetland (City property only), tested water quality, and observed macroinvertebrates.

Teachers were encouraged to invite additional water-related guest speakers into the classroom and/or go on additional field trips. Several teachers organized additional field trips to Albuquerque’s Southside Water Reclamation Plant, Cooperative Extension’s “Kids, Kows, and More” event, or a Bosque Ecosystem Monitoring Program site, to expand upon what their students learned through RiverXchange.

**Partner Field Trip Locations**
Since program funding is NM-based, we were not able to assist partner teachers with coordinating a field trip; however, we did provide partner teachers with names of agencies located in most parts of the U.S. that may be able to assist.

**Teacher Professional Development Workshop**
Although work began many months earlier, RiverXchange officially kicked off in September with a full-day teacher workshop for NM teachers and online training sessions for partner teachers. Three in-person workshops and many online training sessions were held to train all 86 teachers. The workshops and trainings focused on how to implement the activities in the curriculum and how to operate and manage a class wiki. NM teachers learned how to implement several of the hands-on activities, and they were introduced to guest speakers who were on hand to schedule classroom presentations.

As a condition of participation, all teachers signed a *Letter of Understanding and Agreement*. They were asked to review what the program is about, agree to carry out all major components of the program, and protect student privacy. Teachers also received an information packet containing a copy of this letter, the curriculum, and other program information.

**Wiki Technology**
One of the most important, yet challenging, aspects of program implementation continued to be the training of teachers on how to use the wiki so that they feel confident and remember what to do back in the classroom. A wiki enables one or more users to edit any page or to create new pages within the wiki web site. It is similar to a blog, with each student using their own page as a blog. We chose PBWorks as our web-based communication network. We created the wikis as well as the student accounts prior to the workshop, in order to streamline the training for teachers.

**Online Partner Training**
Teachers were able to view an online slideshow explaining basic wiki procedures, then log in at an appointed time to participate in a live discussion and demonstration of the basic wiki procedures. We used GoToMeeting, a virtual meeting platform that allows participants to see the presenter’s computer screen as they demonstrate procedures, and communicate with the presenter to ask questions. Time zone differences and teachers’ schedules necessitated that we hold several online trainings.

**EVALUATION**

**Teacher Surveys**
Using FluidSurvey, we asked for feedback from NM and partner teachers, to help us identify areas in which we could improve the program to make it easier and more useful for them. Unfortunately, the response rate was only about 12%, probably because we administered at the end of the school year, when
teachers are extremely busy. However, we did get very useful information from those who did respond. Here are a few major points:

1. Activity on the wiki decreased as the school year progressed, probably due to less interest if partners did not respond, standardized testing in spring, and typical end of year 5th grade “graduation” events. Below is a list of how each topic was covered.

2. Most respondents were satisfied with the training at the beginning of the school year, and did not think there was anything we could have left out.
3. Many factors made it difficult to implement the curriculum; but as seen above, most teachers were able to fit in the science/social studies activities, even if they did not post on the wiki.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructional time</td>
<td></td>
<td>73%</td>
</tr>
<tr>
<td>Scheduling computer lab or laptop cart</td>
<td></td>
<td>55%</td>
</tr>
<tr>
<td>Scheduling guest speakers</td>
<td></td>
<td>36%</td>
</tr>
<tr>
<td>Scheduling/organizing the field trip</td>
<td></td>
<td>18%</td>
</tr>
<tr>
<td>Your technical comfort level</td>
<td></td>
<td>0%</td>
</tr>
<tr>
<td>Students' typing skills</td>
<td></td>
<td>45%</td>
</tr>
<tr>
<td>Students' writing skills</td>
<td></td>
<td>27%</td>
</tr>
<tr>
<td>Activities were hard for students</td>
<td></td>
<td>0%</td>
</tr>
<tr>
<td>Difficulty communicating with partner teacher</td>
<td></td>
<td>55%</td>
</tr>
<tr>
<td>Other frustrations, please specify...</td>
<td></td>
<td>36%</td>
</tr>
</tbody>
</table>

4. Most teachers communicated by email or just on the wiki with their partner teachers; none of the respondents tried communicating by phone!

5. Respondents clearly felt that the writing, collaboration, and technology use were very important.

6. We received very positive responses to “How has RiverXchange impacted your students' writing skills?”
   5 “nonfiction writing is critical so I'm glad the kids got to do writing about topics”
   5 “Awesome!!!Students really grew from the demands of writing in all aspects; organization, ideas, and spelling.Having a real audience (sort of) to write to makes a real difference.”
   5 “Absolutely,my students are used to writing in their RiverXChange journals, and this was an expectation all year.”
   5 “It fits in well with writing for a purpose standards.”
   5 “A LOT OF IMPROVEMENT”
5. “Absolutely. They have had to write more than ever on the computer.”

7. Many positive responses to “How useful is RiverXchange in helping your students achieve Common Core English/Language Arts Standards” but many seem not to have thought about it much yet.

8. We also received very positive responses to “Compared to other field trips you have taken, how would you rate the RiverXchange field trip in the following areas?”

9. Many respondents were open to using more technology such as skype and video projects. One teacher suggested “I think the partners need to be screened differently for technology capacity. Maybe they could participate in some kind of mini-preexperience that would demonstrate what
they are capable of. Maybe the way partners are contacted could be sourced differently; School districts to identify magnet tech. or science or STEM schools?”

10. We received many positive responses to “How useful is RiverXchange in helping your students develop the following 21st Century Skills?”
11. Most respondents learned a lot about water resources that they didn't know:

- "the resources available about water conservation and programs available to share information with children (field trips)"
- "Really understood where we get our water for use in Rio Rancho."
- "that by planting cottonwoods and Willow trees we were promoting the return of the Southern Willow Flycatcher an endangered bird. That people in Albuquerque and Rio Rancho are basically drinking recycled pee plus water. That our Rio Grande Watershed is at the base of Mount Camby and if you go there to see it (I did) there is an old mining shaft right there!!!! I never knew how waste water was exactly treated. I'm tired. I could go on and on but there is too much to do and it's a Saturday. Let's just say I learned a butt load and loved all the learning."

**Student Surveys**

A key component of RiverXchange is its specific, measurable goals relating to student performance. We collected quantitative data on student performance for each curriculum unit via three online student surveys, and qualitative data by reading what students wrote on their wiki pages. **Performance on the three online assessments showed that students achieved Proficiency or higher on many water resources questions relating to the curriculum.** We also surveyed students about their actions before and after participating in RiverXchange.

**Pre/Post Behavior Survey**
We asked students about their actions regarding water use before and after the program; improvements were observed in several areas. This is an exciting new tool to measure actual behavior change!

**How often do you or your family do the following things?**
*(positive response desired)*

- **Always (or Very Often) – PRE**
- **Sometimes – PRE**
- **Never (or Not Very Often) – PRE**
- **Always (or Very Often) – POST**
- **Sometimes – POST**
- **Never (or Not Very Often) – POST**

- Turn off the faucet while brushing your teeth
- Spend less than 10 minutes in the shower
- Pick up your dog’s poop, if you have a dog - otherwise leave blank
- Water your outdoor plants during the coolest part of the day, if you have any - otherwise leave blank
- Do a full load when you’re doing laundry
- When you wash your car, take it to a carwash
- Visit your local river

**How often do you or your family do the following things?**
*(negative response desired)*

- **Always (or Very Often) – PRE**
- **Sometimes – PRE**
- **Never (or Not Very Often) – PRE**
- **Always (or Very Often) – POST**
- **Sometimes – POST**
- **Never (or Not Very Often) – POST**

- Drop your trash on the ground if you can’t find a trash can
- Dump chemicals, paints, or oil down a storm drain
- Sweep grass clippings and leaves into a storm drain
- Apply fertilizer and/or pesticides right before it’s forecast to rain
- Pour fats, oils or grease down the drain
- Use your toilet as a trash can (flush it just to get rid of tissues, Q-tips or other trash)
This year, we updated the three online student assessments to reflect our new *Big Water Questions*, and we made all questions multiple-choice, eliminating open-ended responses.

**Response Rates**
As in previous years, a higher percentage of NM students versus partner students completed the student assessments. Teachers reported that as the year progressed, scheduling complications (e.g., testing, end-of-year activities), access to computers, and lack of instructional time were ongoing barriers that prevented them from completing all components of the curriculum.

Our incentive program, funded by RMS-AWWA/WEF, was expanded to include Unit 3 and to offer prizes to partner teachers. The incentives were awarded to two NM and two partner classes, for each unit, who produced the best wiki writing and had also taken the student assessment for that unit. Prizes included bus transportation funding for a field trip to a selected local water-related site, or a gift card to a science supply company. We did see an improved response rate on Unit 3 for NM teachers.

<table>
<thead>
<tr>
<th>Unit 1</th>
<th>2011-2012</th>
<th>2012-2013</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>81% New Mexico</td>
<td>74% New Mexico</td>
</tr>
<tr>
<td></td>
<td>57% Partner</td>
<td>56% Partner</td>
</tr>
<tr>
<td>Unit 2</td>
<td>2011-2012</td>
<td>2012-2013</td>
</tr>
<tr>
<td></td>
<td>67% New Mexico</td>
<td>41% New Mexico</td>
</tr>
<tr>
<td></td>
<td>20% Partner</td>
<td>15% Partner</td>
</tr>
<tr>
<td>Unit 3</td>
<td>2011-2012</td>
<td>2012-2013</td>
</tr>
<tr>
<td></td>
<td>34% New Mexico</td>
<td>54% New Mexico</td>
</tr>
<tr>
<td></td>
<td>15% Partner</td>
<td>13% Partner</td>
</tr>
</tbody>
</table>

**Performance Summary**
Performance on the three online assessments showed that NM students achieved *Proficiency* on many questions. For the purposes of this report, “Proficiency” is defined as at least 70% of students correctly answering the question. Proficiency levels are as follows:

- **Beginning Step** – score of < 60%
- **Nearing Proficiency** – score of 60-69%
- **Proficiency** – score of 70-79%
- **Advanced** – score of ≥ 80%

Performance on all answer options are shown, rather than a simple percent correct and incorrect. We feel this approach provides organizers, teachers, guest speakers and field trip docents with a more complete understanding of what students are thinking, where confusion exists, and how adults can help students become proficient in all areas. In some cases, the answer options will be re-worked in 2012-2013 to improve clarity/reduce student confusion.

When comparing results from previous years it should be noted that not all teachers are the same. While we try to get teacher to return each year, many of these classes experienced RiverXchange for the first time.
2011-2012 Student Assessment Results -- UNIT 1

1. WHAT IS A WATERSHED (ALSO KNOWN AS A CATCHMENT OR DRAINAGE BASIN)? CHOOSE ONE ANSWER.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is a building where we store water.</td>
<td></td>
<td>8%</td>
<td>61</td>
</tr>
<tr>
<td>It is an area of land that drains to a river, lake, bay or ocean.</td>
<td></td>
<td>74%</td>
<td>537</td>
</tr>
<tr>
<td>It is a water body such as a river, lake, bay or ocean.</td>
<td></td>
<td>16%</td>
<td>117</td>
</tr>
<tr>
<td>I don’t know.</td>
<td></td>
<td>1%</td>
<td>10</td>
</tr>
</tbody>
</table>

Total Responses 725

- Presenter-led activity. Proficiency: at least 70% of students chose the correct answer.
- Many fifth graders may be hearing this concept for the first time.

2. IS EVERY PLACE IN THE WORLD PART OF A WATERSHED? CHOOSE ONE ANSWER.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes.</td>
<td></td>
<td>68%</td>
<td>492</td>
</tr>
<tr>
<td>No.</td>
<td></td>
<td>28%</td>
<td>204</td>
</tr>
<tr>
<td>I don’t know.</td>
<td></td>
<td>4%</td>
<td>28</td>
</tr>
</tbody>
</table>

Total Responses 724

- Presenter-led activity. Nearing Proficiency: almost 70% of students chose the correct answer.
- This question requires some deep thinking for students unless the presenter or teacher directly addressed this concept.
3. HOW MUCH PRECIPITATION DOES YOUR COMMUNITY RECEIVE EACH YEAR? CHOOSE ONE ANSWER.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>less than 10 inches</td>
<td></td>
<td>82%</td>
<td>587</td>
</tr>
<tr>
<td>11-30 inches</td>
<td></td>
<td>8%</td>
<td>60</td>
</tr>
<tr>
<td>31-40 inches</td>
<td></td>
<td>2%</td>
<td>12</td>
</tr>
<tr>
<td>more than 40 inches</td>
<td></td>
<td>1%</td>
<td>6</td>
</tr>
<tr>
<td>I don’t know.</td>
<td></td>
<td>8%</td>
<td>54</td>
</tr>
</tbody>
</table>

Total Responses: 719

Advanced: over 80% of students answered correctly. Edgewood actually gets more precipitation in an average year, but less than 10 inches is correct for this year.

4. WHERE DOES YOUR RIVER START? CHOOSE ONE ANSWER.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Mexico</td>
<td></td>
<td>3%</td>
<td>23</td>
</tr>
<tr>
<td>Utah</td>
<td></td>
<td>1%</td>
<td>6</td>
</tr>
<tr>
<td>Texas</td>
<td></td>
<td>1%</td>
<td>6</td>
</tr>
<tr>
<td>Colorado</td>
<td></td>
<td>86%</td>
<td>618</td>
</tr>
<tr>
<td>Gulf of Mexico</td>
<td></td>
<td>7%</td>
<td>47</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>2%</td>
<td>11</td>
</tr>
<tr>
<td>I don’t know.</td>
<td></td>
<td>2%</td>
<td>11</td>
</tr>
</tbody>
</table>

Total Responses: 722

Teacher-led activity. Advanced: over 80% of students chose the correct answer.
5. INTO WHAT OCEAN DOES YOUR RIVER EVENTUALLY FLOW? CHOOSE ONE ANSWER.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pacific Ocean</td>
<td></td>
<td>14%</td>
<td>98</td>
</tr>
<tr>
<td>Indian Ocean</td>
<td></td>
<td>1%</td>
<td>5</td>
</tr>
<tr>
<td>Atlantic Ocean</td>
<td></td>
<td>76%</td>
<td>546</td>
</tr>
<tr>
<td>Arctic Ocean</td>
<td></td>
<td>3%</td>
<td>21</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>5%</td>
<td>34</td>
</tr>
<tr>
<td>I don’t know.</td>
<td></td>
<td>2%</td>
<td>16</td>
</tr>
<tr>
<td><strong>Total Responses</strong></td>
<td></td>
<td><strong>720</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Teacher-led activity. Proficient:** over 70% of students answered correctly.

These results are much better than last year (~60% correct), when the majority of students chose Gulf of Mexico. This improvement is probably because we pointed out the confusion at the teacher workshop and this was no longer an option.

6. WHEN IT RAINS, WHERE DOES YOUR COMMUNITY’S STORMWATER GO? CHOOSE ONE ANSWER.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>It goes through storm drains into a river, lake, bay or ocean.</td>
<td></td>
<td>81%</td>
<td>587</td>
</tr>
<tr>
<td>It goes to a wastewater treatment plant.</td>
<td></td>
<td>14%</td>
<td>99</td>
</tr>
<tr>
<td>I don’t know.</td>
<td></td>
<td>5%</td>
<td>36</td>
</tr>
<tr>
<td><strong>Total Responses</strong></td>
<td></td>
<td><strong>722</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Presenter-led activity. Advanced:** over 80% of students answered correctly.

These results are much better than last year (~60% correct).
9. WHAT ACTIONS CAN ALL OF US TAKE TO KEEP WATER CLEAN? CHOOSE ALL ANSWERS THAT APPLY.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>We can pick up trash.</td>
<td></td>
<td>94%</td>
<td>682</td>
</tr>
<tr>
<td>We can pick up dog poop.</td>
<td></td>
<td>91%</td>
<td>659</td>
</tr>
<tr>
<td>We can use extra fertilizers and pesticides right before it’s going to rain.</td>
<td></td>
<td>8%</td>
<td>59</td>
</tr>
<tr>
<td>We can wash our car at a car wash so that the dirty water gets cleaned and recycled.</td>
<td></td>
<td>64%</td>
<td>455</td>
</tr>
<tr>
<td>We can take oil and chemicals to be recycled instead of dumping them in storm drains or on the ground.</td>
<td></td>
<td>77%</td>
<td>560</td>
</tr>
<tr>
<td>If a car is leaking fluids, we can wash the chemicals off the driveway and into the gutter.</td>
<td></td>
<td>19%</td>
<td>136</td>
</tr>
<tr>
<td>We can sweep grass clippings and trash into a storm drain.</td>
<td></td>
<td>6%</td>
<td>45</td>
</tr>
</tbody>
</table>

Total Responses 723

- Presenter-led activity. *Advanced* for two major objectives that kids can do personally (dog poop and trash). *Proficient* for not putting harmful substances down storm drains (possibly because kids have never thought to do this), and *Nearing Proficiency* for car wash awareness.

10. HOW DOES THE WATER CYCLE RELATE TO WEATHER? CHOOSE ALL ANSWERS THAT APPLY.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>The water cycle determines our daily weather, bringing more or less precipitation at certain times of the year.</td>
<td></td>
<td>82%</td>
<td>590</td>
</tr>
<tr>
<td>If the water cycle speeds up, the weather gets better.</td>
<td></td>
<td>19%</td>
<td>136</td>
</tr>
<tr>
<td>The water cycle can bring long-term weather patterns like La Niña and El Niño.</td>
<td></td>
<td>58%</td>
<td>417</td>
</tr>
<tr>
<td>If the water cycle stops, the weather will stay the same.</td>
<td></td>
<td>25%</td>
<td>182</td>
</tr>
<tr>
<td>The water cycle has no effect on our weather.</td>
<td></td>
<td>14%</td>
<td>103</td>
</tr>
</tbody>
</table>

Total Responses 721

- Teacher-led activity. *Advanced* for basic weather, *Beginning Steps* for long-term weather patterns.
11. WHAT ARE THE SIX MAJOR COMPONENTS OF THE WATER CYCLE? CHOOSE ALL THAT APPLY.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>evaporation</td>
<td></td>
<td>92%</td>
<td>657</td>
</tr>
<tr>
<td>condensation</td>
<td></td>
<td>81%</td>
<td>573</td>
</tr>
<tr>
<td>participation</td>
<td></td>
<td>28%</td>
<td>202</td>
</tr>
<tr>
<td>precipitation</td>
<td></td>
<td>84%</td>
<td>599</td>
</tr>
<tr>
<td>transpiration</td>
<td></td>
<td>75%</td>
<td>533</td>
</tr>
<tr>
<td>flotation</td>
<td></td>
<td>19%</td>
<td>132</td>
</tr>
<tr>
<td>infiltration (or percolation)</td>
<td></td>
<td>61%</td>
<td>435</td>
</tr>
<tr>
<td>anticipation</td>
<td></td>
<td>16%</td>
<td>111</td>
</tr>
<tr>
<td>runoff (or surface runoff)</td>
<td></td>
<td>67%</td>
<td>475</td>
</tr>
</tbody>
</table>

Teacher-led activity. Many teachers, especially in early grades, do not teach infiltration and runoff as part of the water cycle; these concepts may be new to 5th graders.

12. WHAT IS A WETLAND? CHOOSE ONE ANSWER

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>A water theme park.</td>
<td></td>
<td>2%</td>
<td>17</td>
</tr>
<tr>
<td>An area that is covered with shallow water or where the soil is naturally soaked with water.</td>
<td></td>
<td>76%</td>
<td>540</td>
</tr>
<tr>
<td>Land that is covered or soaked with water by farmers, to irrigate their crops.</td>
<td></td>
<td>11%</td>
<td>81</td>
</tr>
<tr>
<td>A rainforest.</td>
<td></td>
<td>7%</td>
<td>47</td>
</tr>
<tr>
<td>I don't know.</td>
<td></td>
<td>3%</td>
<td>21</td>
</tr>
</tbody>
</table>

Teacher-led activity. Proficient: over 70% of students answered correctly (better than last year).
13. WHAT ROLE DO WETLANDS PLAY IN A WATERSHED? CHOOSE ALL ANSWERS THAT APPLY.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetlands just smell bad and breed mosquitoes.</td>
<td></td>
<td>9%</td>
<td>62</td>
</tr>
<tr>
<td>Wetlands support a diverse community of plant and animal life.</td>
<td></td>
<td>73%</td>
<td>511</td>
</tr>
<tr>
<td>Wetlands just take up space where we want to build houses.</td>
<td></td>
<td>9%</td>
<td>66</td>
</tr>
<tr>
<td>Wetlands help control flooding by storing the runoff and releasing it slowly.</td>
<td></td>
<td>74%</td>
<td>520</td>
</tr>
<tr>
<td>Wetland plants help clean stormwater before it goes into a river, lake, bay or ocean.</td>
<td></td>
<td>64%</td>
<td>449</td>
</tr>
<tr>
<td>Wetland plants help clean our community’s wastewater.</td>
<td></td>
<td>38%</td>
<td>266</td>
</tr>
</tbody>
</table>

Total Responses 703

③ Teacher-led activity. Proficient on two of the correct answers, Nearing Proficiency on the other (better than last year).

14. WHAT ROLE DO FORESTS PLAY IN A WATERSHED? CHOOSE ALL ANSWERS THAT APPLY.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forests help control flash flooding and erosion by holding the soil in place.</td>
<td></td>
<td>78%</td>
<td>550</td>
</tr>
<tr>
<td>Forests just suck up all the water that should be going into our rivers and lakes.</td>
<td></td>
<td>18%</td>
<td>128</td>
</tr>
<tr>
<td>Trees near rivers and lakes shade the water and help keep it cool.</td>
<td></td>
<td>55%</td>
<td>386</td>
</tr>
<tr>
<td>Forests just cause forest fires.</td>
<td></td>
<td>9%</td>
<td>66</td>
</tr>
<tr>
<td>Forests support a diverse community of plant and animal life.</td>
<td></td>
<td>63%</td>
<td>445</td>
</tr>
</tbody>
</table>

Total Responses 706

⑤ Proficient on erosion control (better than last year). This choice is the one most directly addressed by the activity. Evidently teachers are actually doing this activity in the classroom!
③ This is an advanced connection for kids to make, considering the watershed concept is new to many of them.
2011-2012 Student Assessment Results -- UNIT 2

1. HOW HAS WATER INFLUENCED HUMAN SETTLEMENTS AND CULTURE? CHOOSE ALL THAT APPLY.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humans have usually settled near water for drinking, farming, fishing, to put out fires, and/or transportation.</td>
<td></td>
<td>91%</td>
<td>502</td>
</tr>
<tr>
<td>Humans have usually just settled wherever they want, without worrying about water.</td>
<td></td>
<td>10%</td>
<td>54</td>
</tr>
<tr>
<td>Humans have sometimes abandoned their settlements if there was not enough water.</td>
<td></td>
<td>68%</td>
<td>375</td>
</tr>
<tr>
<td>Humans have developed new technologies over time to solve water problems.</td>
<td></td>
<td>57%</td>
<td>315</td>
</tr>
<tr>
<td><strong>Total Responses</strong></td>
<td></td>
<td></td>
<td>554</td>
</tr>
</tbody>
</table>

Teacher-led and presenter-led activities. *Advanced* for knowing communities are usually settled near water. The other choices may not be obvious to students unless they were addressed specifically. These results are better than last year's.

2. WHAT ARE THE MAJOR COMMERCIAL USE(S) OF YOUR RIVER? CHOOSE ALL ANSWERS THAT APPLY.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial fishing</td>
<td></td>
<td>41%</td>
<td>226</td>
</tr>
<tr>
<td>Commercial navigation</td>
<td></td>
<td>27%</td>
<td>147</td>
</tr>
<tr>
<td>Agricultural Irrigation</td>
<td></td>
<td>61%</td>
<td>336</td>
</tr>
<tr>
<td>Recreation</td>
<td></td>
<td>34%</td>
<td>188</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>17%</td>
<td>94</td>
</tr>
<tr>
<td>I don’t know</td>
<td></td>
<td>12%</td>
<td>67</td>
</tr>
<tr>
<td><strong>Total Responses</strong></td>
<td></td>
<td></td>
<td>547</td>
</tr>
</tbody>
</table>

Presenter-led activity. *Nearing Proficiency* (better than last year): students are certainly aware of agriculture as a commercial use of the Rio Grande, but not totally clear that it is THE major commercial use of our river.
4. IN WHAT WAYS IS DRINKING WATER USED IN AND AROUND OUR HOMES? CHOOSE ALL THAT APPLY.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>flushing toilets</td>
<td></td>
<td>83%</td>
<td>457</td>
</tr>
<tr>
<td>playing the piano</td>
<td></td>
<td>1%</td>
<td>6</td>
</tr>
<tr>
<td>brushing teeth</td>
<td></td>
<td>93%</td>
<td>514</td>
</tr>
<tr>
<td>showering</td>
<td></td>
<td>88%</td>
<td>485</td>
</tr>
<tr>
<td>cleaning dishes</td>
<td></td>
<td>89%</td>
<td>494</td>
</tr>
<tr>
<td>walking the dog</td>
<td></td>
<td>3%</td>
<td>17</td>
</tr>
<tr>
<td>cleaning clothes</td>
<td></td>
<td>83%</td>
<td>458</td>
</tr>
<tr>
<td>drinking</td>
<td></td>
<td>96%</td>
<td>528</td>
</tr>
<tr>
<td>watering yard/plants outside</td>
<td></td>
<td>85%</td>
<td>471</td>
</tr>
<tr>
<td><strong>Total Responses</strong></td>
<td></td>
<td><strong>552</strong></td>
<td></td>
</tr>
</tbody>
</table>

5. Presenter-led activity. Advanced: students correctly indicated all of the activities that use drinking water; however, the question may need to be asked differently to find out whether they recognize the difference between drinking water and other kinds of water.

5. FROM WHAT SOURCE DOES YOUR COMMUNITY GET ITS DRINKING WATER? CHOOSE ALL THAT APPLY.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>clouds</td>
<td></td>
<td>37%</td>
<td>201</td>
</tr>
<tr>
<td>glaciers and icebergs</td>
<td></td>
<td>10%</td>
<td>53</td>
</tr>
<tr>
<td>groundwater/aquifer (wells) (correct for all NM communities)</td>
<td></td>
<td>90%</td>
<td>496</td>
</tr>
<tr>
<td>lake</td>
<td></td>
<td>19%</td>
<td>102</td>
</tr>
<tr>
<td>ocean</td>
<td></td>
<td>8%</td>
<td>43</td>
</tr>
<tr>
<td>river (correct for Albuquerque and many other places, but NOT Rio Rancho or Edgewood)</td>
<td></td>
<td>63%</td>
<td>348</td>
</tr>
<tr>
<td><strong>Total Responses</strong></td>
<td></td>
<td><strong>550</strong></td>
<td></td>
</tr>
</tbody>
</table>

5 Covered in several activities. Advanced for knowing drinking water comes from groundwater.

6 For river, 86% of Albuquerque students correctly chose this answer (Advanced). But 31% of Rio Rancho, Edgewood, and Corrales students also chose river. There is still some confusion, probably because they hear more about Albuquerque's water situation than their own in the media.
6. DOES EVERYONE HAVE THE RIGHT TO USE AS MUCH WATER AS THEY WANT? CHOOSE ONE ANSWER.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes.</td>
<td></td>
<td>31%</td>
<td>171</td>
</tr>
<tr>
<td>No.</td>
<td></td>
<td>60%</td>
<td>326</td>
</tr>
<tr>
<td>I don’t know.</td>
<td></td>
<td>9%</td>
<td>50</td>
</tr>
</tbody>
</table>

Total Responses 547

About the same results as last year.

7. WHAT ACTIONS CAN ALL OF US TAKE TO CONSERVE WATER? CHOOSE ALL ANSWERS THAT APPLY.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drink less water.</td>
<td></td>
<td>23%</td>
<td>128</td>
</tr>
<tr>
<td>Take shorter showers.</td>
<td></td>
<td>98%</td>
<td>535</td>
</tr>
<tr>
<td>Drink bottled water or juice instead.</td>
<td></td>
<td>30%</td>
<td>164</td>
</tr>
<tr>
<td>Turn off the water when brushing your teeth.</td>
<td></td>
<td>96%</td>
<td>527</td>
</tr>
<tr>
<td>Water outdoor plants during the coolest part of the day so less evaporates.</td>
<td></td>
<td>68%</td>
<td>375</td>
</tr>
<tr>
<td>Water outdoor plants during the hottest part of the day.</td>
<td></td>
<td>17%</td>
<td>94</td>
</tr>
<tr>
<td>Fix leaking faucets, toilets and outdoor water pipes.</td>
<td></td>
<td>91%</td>
<td>498</td>
</tr>
</tbody>
</table>

Total Responses 548

Teacher and presenter-led activities. Advanced for showers, leaks, and turning off water while brushing teeth. Nearing Proficiency for outdoor watering (better than last year).
8. HOW CAN DROUGHT OR FLOODING AFFECT OUR DRINKING WATER? CHOOSE ALL THAT APPLY.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flooding just means there is more drinking water available for everyone.</td>
<td></td>
<td>10%</td>
<td>57</td>
</tr>
<tr>
<td>Drought means there is less drinking water available for everyone.</td>
<td></td>
<td>85%</td>
<td>465</td>
</tr>
<tr>
<td>Drought and flooding do not affect our drinking water.</td>
<td></td>
<td>10%</td>
<td>55</td>
</tr>
<tr>
<td>Floodwater is dirty and can contaminate drinking water supplies or ruin equipment.</td>
<td></td>
<td>81%</td>
<td>440</td>
</tr>
<tr>
<td>Total Responses</td>
<td></td>
<td></td>
<td>546</td>
</tr>
</tbody>
</table>

* Teacher-led activity (some presenters may have covered). *Advanced* for both correct answers.

9. HOW CAN OUR GROUNDWATER (AQUIFER) BECOME POLLUTED? CHOOSE ALL ANSWERS THAT APPLY.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>A leak from an underground tank can pollute groundwater.</td>
<td></td>
<td>68%</td>
<td>372</td>
</tr>
<tr>
<td>Dogs can poop in groundwater.</td>
<td></td>
<td>48%</td>
<td>260</td>
</tr>
<tr>
<td>Wind can blow trash into groundwater.</td>
<td></td>
<td>47%</td>
<td>259</td>
</tr>
<tr>
<td>Chemicals and oil on top of the soil surface can pollute groundwater, especially after it rains.</td>
<td></td>
<td>90%</td>
<td>495</td>
</tr>
<tr>
<td>Leaves, sticks and rocks can pollute groundwater.</td>
<td></td>
<td>31%</td>
<td>171</td>
</tr>
<tr>
<td>Total Responses</td>
<td></td>
<td></td>
<td>547</td>
</tr>
</tbody>
</table>

* Teacher-led activity. *Advanced* for knowing chemicals and oil can pollute. *Nearing proficiency* for leaking underground storage tanks.
* Judging from incorrect answers selected, students may still be unclear about the difference between groundwater and other kinds of water.
10. HOW ARE GROUNDWATER AND SURFACE WATER CONNECTED? CHOOSE ALL ANSWERS THAT APPLY.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical pollution can travel between groundwater and surface water.</td>
<td></td>
<td>64%</td>
<td>351</td>
</tr>
<tr>
<td>Fish can travel between groundwater and surface water.</td>
<td></td>
<td>14%</td>
<td>74</td>
</tr>
<tr>
<td>Dirt can travel between groundwater and surface water.</td>
<td></td>
<td>68%</td>
<td>372</td>
</tr>
<tr>
<td>Trash can travel between groundwater and surface water.</td>
<td></td>
<td>40%</td>
<td>221</td>
</tr>
<tr>
<td>Clean water can travel between groundwater and surface water.</td>
<td></td>
<td>58%</td>
<td>316</td>
</tr>
<tr>
<td>If we pump too much of either one, it can affect the other.</td>
<td></td>
<td>51%</td>
<td>277</td>
</tr>
</tbody>
</table>

Total Responses 546

Teacher-led activity. *Beginning Steps or Nearing Proficiency* on all correct answers.

11. WHERE DOES YOUR COMMUNITY’S WASTEWATER GO? CHOOSE ONE ANSWER.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>It goes into a sewer system, which carries it through underground pipes to a centralized treatment plant.</td>
<td></td>
<td>62%</td>
<td>328</td>
</tr>
<tr>
<td>It goes into a storm drain system.</td>
<td></td>
<td>8%</td>
<td>42</td>
</tr>
<tr>
<td>It goes into your drinking water system.</td>
<td></td>
<td>6%</td>
<td>32</td>
</tr>
<tr>
<td>It goes into a septic system, which treats it in an underground tank near the home or building.</td>
<td></td>
<td>10%</td>
<td>54</td>
</tr>
<tr>
<td>It goes directly into the river, lake, bay or ocean.</td>
<td></td>
<td>6%</td>
<td>34</td>
</tr>
<tr>
<td>I don’t know.</td>
<td></td>
<td>8%</td>
<td>41</td>
</tr>
</tbody>
</table>

Total Responses 531

Presenter-led activity. *Nearing Proficiency*. Presenters may not have used the words "sewer" and "septic." There are very few classes in areas with septic systems this year.
12. WHAT IS THE DIFFERENCE BETWEEN STORMWATER, WASTEWATER, AND DRINKING WATER? CHOOSE ONE ANSWER.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wastewater is dirty; stormwater and drinking water are clean.</td>
<td></td>
<td>20%</td>
<td>105</td>
</tr>
<tr>
<td>Wastewater goes through the sewer system, stormwater goes through the storm drains, and drinking water goes through nice clean pipes to your faucet.</td>
<td></td>
<td>62%</td>
<td>324</td>
</tr>
<tr>
<td>Stormwater and wastewater go through the same pipes straight to the river, lake, bay or ocean; drinking water goes through different pipes.</td>
<td></td>
<td>11%</td>
<td>56</td>
</tr>
<tr>
<td>Stormwater is from rain; wastewater and drinking water are the same because they come from the same place.</td>
<td></td>
<td>5%</td>
<td>27</td>
</tr>
<tr>
<td>None, it's all just water and all the pipes are connected.</td>
<td></td>
<td>2%</td>
<td>11</td>
</tr>
</tbody>
</table>

Total Responses: 523

5 Nearing Proficiency: this question may be confusingly written, but results are encouraging.

2011-2012 Student Assessment Results -- UNIT 3

1. WHAT ARE SOME OF THE WAYS SCIENTISTS CAN DETERMINE THE HEALTH OF A RIVER, LAKE, BAY OR OCEAN? CHOOSE ALL ANSWERS THAT APPLY.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>They can look under its tongue or in its ears.</td>
<td></td>
<td>5%</td>
<td>23</td>
</tr>
<tr>
<td>They can check pH, turbidity, temperature, and dissolved oxygen.</td>
<td></td>
<td>82%</td>
<td>420</td>
</tr>
<tr>
<td>They can check the weather channel.</td>
<td></td>
<td>13%</td>
<td>64</td>
</tr>
<tr>
<td>They can look at the types of macroinvertebrates that are living in it.</td>
<td></td>
<td>71%</td>
<td>365</td>
</tr>
<tr>
<td>If the water looks clean, they know it is healthy.</td>
<td></td>
<td>19%</td>
<td>95</td>
</tr>
<tr>
<td>They can look at the diversity of animals and plants living in and around it.</td>
<td></td>
<td>73%</td>
<td>372</td>
</tr>
</tbody>
</table>

Total Responses: 511

6 Presenter-led (field trip). Proficient or Advanced for all correct answers.
2. HOW DOES WATER AFFECT LIVING THINGS IN AN ECOSYSTEM? CHOOSE ALL ANSWERS THAT APPLY.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Many animals that do not live in the water eat fish and/or insects that come from the water.</td>
<td></td>
<td>43%</td>
<td>219</td>
</tr>
<tr>
<td>All living things need water that is clean or at least not too polluted.</td>
<td></td>
<td>81%</td>
<td>412</td>
</tr>
<tr>
<td>Some living things do not need any water.</td>
<td></td>
<td>11%</td>
<td>56</td>
</tr>
<tr>
<td>Fortunately, water pollution has no effect on humans, because we are not part of an ecosystem.</td>
<td></td>
<td>10%</td>
<td>51</td>
</tr>
<tr>
<td>If there is not enough water (drought), humans can learn to conserve.</td>
<td></td>
<td>44%</td>
<td>227</td>
</tr>
<tr>
<td>If there is not enough water (drought), some plants and animals can adapt, but others may die.</td>
<td></td>
<td>74%</td>
<td>376</td>
</tr>
</tbody>
</table>

**Total Responses**: 511

5. Presenter-led (field trip). Advanced on knowing all things need clean water, Proficient on drought. Beginning Steps on other correct answers.

3. WHAT ROLE DO AQUATIC MACROINVERTEBRATES PLAY IN THE FOOD WEB? CHOOSE ONE ANSWER.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plants eat them.</td>
<td></td>
<td>9%</td>
<td>48</td>
</tr>
<tr>
<td>They provide food for many other animals in the ecosystem.</td>
<td></td>
<td>67%</td>
<td>343</td>
</tr>
<tr>
<td>They are at the top of the food web.</td>
<td></td>
<td>8%</td>
<td>41</td>
</tr>
<tr>
<td>They are just annoying and gross.</td>
<td></td>
<td>2%</td>
<td>12</td>
</tr>
<tr>
<td>I don't know.</td>
<td></td>
<td>13%</td>
<td>65</td>
</tr>
</tbody>
</table>

**Total Responses**: 509

5. Presenter-led (field trip). Nearing Proficiency: Students know what macroinvertebrates are, according to the next question, but may not have made the connection to the food web.
4. WHY DO SCIENTISTS STUDY AQUATIC MACROINVERTEBRATES? CHOOSE ALL ANSWERS THAT APPLY.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Because we want to figure out how to get rid of them.</td>
<td></td>
<td>12%</td>
<td>63</td>
</tr>
<tr>
<td>Because they are important in the food web and we want to make sure they are healthy.</td>
<td></td>
<td>69%</td>
<td>353</td>
</tr>
<tr>
<td>They serve as indicators of water pollution and tell us a lot about water quality and health.</td>
<td></td>
<td>72%</td>
<td>365</td>
</tr>
<tr>
<td>Because the more bugs we see, the more polluted the water is.</td>
<td></td>
<td>17%</td>
<td>86</td>
</tr>
</tbody>
</table>

Total Responses: 509

5. WHAT ARE SOME OF THE WAYS THAT HUMANS HAVE CHANGED RIVER ECOSYSTEMS? CHOOSE ALL ANSWERS THAT APPLY.

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constructed dams for water storage, flood control, and irrigation.</td>
<td></td>
<td>81%</td>
<td>407</td>
</tr>
<tr>
<td>Introduced non-native plants and animals.</td>
<td></td>
<td>53%</td>
<td>266</td>
</tr>
<tr>
<td>Straightened river channels, making water flow faster.</td>
<td></td>
<td>43%</td>
<td>215</td>
</tr>
<tr>
<td>Put more water into the river, making it overflow.</td>
<td></td>
<td>15%</td>
<td>77</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>26%</td>
<td>129</td>
</tr>
</tbody>
</table>

Total Responses: 505

6. WHAT ACTIONS CAN PEOPLE TAKE TO IMPROVE THE HEALTH OF OUR ECOSYSTEM? CHOOSE ALL
Presenter-led (field trip). Advanced on conserving water; they are definitely getting the message.

Proficient and Nearing Proficiency on monitoring and planting, probably because that is what they actually did on their field trips. The concept of removing invasives may never have occurred to them.

**Student Writing**

The writing component is one of the most valuable components of the program, yet it continues to be our biggest challenge. We are continually striving to improve participation in this area because it helps teachers integrate writing in the content areas (a hot topic in education) and reinforces student understanding of key water resources concepts. This component will be even more important next year as teachers start implementing the Common Core standards for Language Arts, which require they focus more on writing within content areas and use/production of informational texts.

As noted in the Teacher Surveys section, computer time was often the most significant barrier teachers faced in carrying out the program. Many teachers were also dealing with issues unrelated to the program, such as new curriculum in other areas, school reorganization, or construction which prevented access to the computer lab for a portion of the year.

With over 2,200 student pages to track throughout the school year, managing and analyzing this unique assessment component required regular and ongoing wiki review. We tracked the number of different curriculum topics written on by each class.

The curriculum outlines 10 topics (including a personal introduction by each student) to be covered by the teacher, guest speakers and/or field trip docents. Because of our November 1 wiki writing requirement, 100% of NM classes wrote at least once. We had to replace several partners, and the new partners had a difficult time getting started in the middle of the year; unfortunately some of them did not write on even one topic.
Our hope was that all NM classes would write on at least five topics, since we coordinated four classroom guest speakers plus the field trip – 61% of NM classes achieved this goal, only slightly more than last year. These results are higher overall; 80% of NM classes wrote on at least 4 topics, compared to only 67% last year. As in previous years, we saw less writing from our partners, who receive less support. On one hand, this is unexpected because partner teachers generally only participate because of the partnership component. On the other hand, this makes sense because NM teachers and students are highly motivated to write on the wikis after guest speakers visit.

In Unit 1, we asked for:
- thorough explanation of watershed geography
- persuasive writing about why it's important to keep stormwater clean, and/or
- connecting the topics to personal action

In Unit 2 we asked for:
- explanation of where our drinking water comes from and where our wastewater goes
- persuasive writing about why it is important to conserve water and what we can do
- explanation of how our river has affected agriculture, and how agriculture has affected our river ecosystem, in our community's history

In Unit 3 we asked for:
- explanation of what makes a healthy ecosystem,
- what affects the ecosystem's health, and
- how scientists find out whether the ecosystem is healthy

Expanding the incentive program this year to include Unit 3 and awards for partner teachers seems to have produced a significant improvement in the percentage of classes writing about the field trip (Unit 3).
Samples of Student Writing (spelling and punctuation are original)

**Our Rivers/Mapping**

Our river is called the Rio Grande. It starts in Silverton, Colorado. The Rio Grande passes through Brownsville, Texas and Matamoros, Mexico. The Rio Grande flows into the Atlantic Ocean. A watershed is the land area that drains into a body of water, such as a river. Every place in the world is part of a watershed even if there are no hills, mountains, or visible surface water. New Mexico gets 8 to 10 inches of precipitation each year and most of it falls in the summer.

**Watershed Model**

It is important to keep our stormwater clean. This is important because stormwater is the human source of drinking water and any other way that humans use water. 70% of our Earth is water. 97% of that water is salt water. The remaining water is clean, but only 1% is available for use. The scarcity of water in New Mexico is hard so we have to take care of our river.

A couple of ways to take care of our river are by picking up your dogs poop. Also repair your car so it does not leak oil. Keep chemicals sealed and away from rain so it cannot wash away into our river. Do not litter. some items that pollute our river are: plastic bottles, cigarettes, dirt, fertilizer, and grass and leave clipping. Muddy water causes fish to die. It is not recommended to fish in our river because it is so polluted. Run-off is also a way of pollution. Run-off is caused by concrete. Some other ways to prevent pollution is to recycle, for humans to get involved, wash your car on grass or a carwash, use a rain barrel to collect gutter water, and never put anything in stormdrains.

**Wetlands**

I believe that wetlands are very important. Wetlands provide homes for animals and plants. They also help stop floods and help filter our water. Different types of wetlands provide homes for different animals and plants. For example, forested wetlands provide homes for woodpeckers, wood ducks, moose, snowshoe hares, raccoons, opossums and alligators. There are many other wetlands with more animals that we need to protect.

Wetlands also help filter our water and that also helps ground water. Ground water can supply wetlands so wetlands and ground water help each other out. The last reason I think you should protect the wetlands is because they help stop floods. Wetlands prevent erosion and it holds the water that’s how wetlands help protect us from floods. If there were no wetlands many people would have flooded houses.

So now that you have heard three reasons why you should save the wetlands are you going to try to save them? Before you read this did you know how important wetlands were? If you didn't know, now you do, and now you know why you should help save the wetlands.

**Drinking Water**

It is important to conserve water because fresh water is running out! We are using too much water every day. We need to flush the toilet less because 26% of the fresh water is used for toilets. We need to take shorter showers because 17% of are fresh water is used for showers. Doing a full load of laundry will save water because 21% of fresh water is used for laundry. Let's all try to watch our sprinklers too, because a lot of water is wasted from bad sprinklers. If we don't start conserving water, we will all be in trouble.

**Wastewater**
I am a piece of rice. I am the piece of food that you forget to put into the trash and I go into the drain. I first go to the filtration center, where all the large solids get picked up. Then I head to the separation tank where the remaining heavy waste settles to the bottom and micro-organisms break down the remaining waste to clean the water. Then the rest of the water goes into the sanitation tank and that gets rid of all the chemicals, bacteria, and micro-organisms using ultra-violet light. Finally, it can go to the Rio Grande River so the humans can drink it.

**Water and Agriculture**

There are three different types of irrigation: flood, sprinkler, and drip. Drip is where you have this system that drips water by the trunk of the trees. Sprinkler is where you sprinkle your field with a sprinkler. Flood is basically when you flood your field with water. We did an experiment where each group put a number of seeds on the sand than we did the three irrigations in each bucket. Turns out for crops sprinkler works the best, but for orchards it’s best to flood. On vineyards it’s best to use the drip system. Some crops we grow in New Mexico are corn, tomatoes, grapes, pepper, cotton, rice, and the one we were best known for chile which irrigation works best for you. What crops do you grow?

**Field Trips**

Today I am going to tell how amazing the field trip was. For the field trip we went to the Bosque (the largest cottonwood forest in the world) and planted trees to help the Bosque grow. The tree we planted were Cottonwoods and Black willows. In just over an hour we had planted 200 trees in total so that means we planted three trees per minute. The tools we used were the hand auger which was a ten foot tool that you had to twist the handle at the very top to create about an six foot hole. After we made the six foot hole we put a Cottonwood or a Black Willow branch inside the hole and then we used the shovel to put soil into the hole. That is my amazing field trip.

It was common for students to “jazz up” their writing with special font colors and styles. More technologically confident teachers taught their students how to upload graphs and photos. Each year, we strongly encourage teachers to have students write paragraphs before going to the computer lab, because this promotes higher-quality thinking and writing. Some say they do not have time to do this; however, other teachers use RiverXchange as a major component of their writing program, and it shows.

Obviously, the more often students communicated on the wiki, the more fun they had with the pen pal component. Teachers and students expressed frustration if the pen pals did not write back quickly or at the same pace. We explained to teachers that the writing component was valuable for students even if pen pals didn’t post often, or at all, because students in the same class could read and comment on each other’s writing. Still, our biggest challenge is to increase the number of successful partnerships, in which both partners are actively engaged. One of our goals for next year is to strengthen the “handshake” – the initial introduction between teachers at the beginning of the program – so that they form a more personal connection.

We know from discussions with teachers (and this year’s survey) that the absence of student writing does not mean that no learning took place or that no activities occurred. On the contrary, teachers said that they really enjoyed participating in RiverXchange and felt that their students learned a lot, but admitted that computer time and instructional time were in short supply. Almost all NM teachers asked to participate again in 2013-2014.

**RECOGNITION**

We acknowledged the exceptional commitment made by RiverXchange teachers by sending a Certificate of Appreciation to each teacher. In addition, we sent thank you cards to presenters and field trip docents,
with quotes from student wiki writing about the activities they provided. We acknowledged sponsors and in-kind contributors on our website.

NEXT STEPS

- Funding has been secured for 2013-2014 which will enable at least 54 NM classes to participate. Classes will be located in Albuquerque, Rio Rancho and Edgewood. Additional locations may include Bernalillo, Placitas, Cochiti Pueblo and Santo Domingo Pueblo. Sponsors include:
  - Southern Sandoval County Arroyo and Flood Control Authority (20 classes)
  - Mid Rio Grande Stormwater Quality Team (18 classes)
  - US EPA, in partnership with Ciudad Soil and Water Conservation District (9 classes)
  - Edgewood Soil and Water Conservation District (2 classes)
  - Rocky Mountain Section/American Water Works Association

- Motivation:
  - Multiple social gatherings for teachers during the year.
  - Create online forum for teachers where:
    1. Teachers can ask questions without feeling like they are bothering us; other teachers can answer and everyone can see the response
    2. Frequently asked questions will be posted with answers
    3. Teachers can share lesson plan extras they have created
    4. We can share examples of excellent student writing
  - Continue online Teacher Agreement procedure, November 1 deadline for initial wiki writing, and expanded incentive program.

- Teacher Workshop:
  - A technical guest speaker will give teachers more detailed information about water resources issues, and/or how RiverXchange can help meet new educational standards.
  - “The Handshake” We need to work on getting teachers more personally engaged with their partners – ideas include having each teacher make a 30 second video at workshop.
  - Partner teachers more systematically for mentoring and/or technologies available to them.

- Guest Speakers:
  - Before and after each guest speaker and field trip, remind teachers about writing prompts.
  - Send guest speakers a copy of assessment questions right before their first presentation.
  - Send presentation reminders to all teachers and the school instead of just the key RiverXchange contact.

- Field Trips:
  - Send teachers a permission slip reminder 10 days before the field trip.
  - Provide RiverXchange FAQs with related assessment questions to field trip docents.

- Curriculum:
  - Continue pre/post behavior survey.
  - Avoid scheduling presentations for the week before any break; they won't have time to write about it afterward.
  - Revise the curriculum to include suggestions from teachers.
  - Revise student assessment questions, question formats, and answer options to improve clarity and ease of analysis.
  - Offer video or other presentation formats as an option instead of all writing assignments.
  - Put detailed writing prompts on student pages instead of just topic headings.
  - Lock wiki front page format, and remove comments section.
  - Reformat student wiki pages to be more user-friendly and discussion focused.
Appendix 1: RiverXchange – Intro & Calendar

Background
RiverXchange combines a year-long water resources curriculum with “high-tech pen pal” partnerships through social networking technology. The program helps fifth grade students learn about major water resources issues using their local river as a focal point, and then demonstrate understanding by applying that knowledge in a fun, interactive way. It also helps teachers expand their technical knowledge base and environmental network, and learn how to integrate water resources topics in multiple subject areas.

The curriculum integrates science, social studies and math lessons with essential writing skills to cover three units -- Understanding a Watershed, Water in Our Society, and River Ecosystem. Student outcomes are framed as The Big Water Questions and form the basis of the writing assignments and online assessments. Where possible, we have incorporated public-domain activities and resources. We strongly recommend that all teachers invite guest speakers into the classroom to conduct as many of the hands-on activities as possible. That way, teachers have more time to help students carry out the writing assignments. At least one field trip to the local river, tributary or important watershed feature is required. This year, we are able to cover the cost of a classroom water quality test kit for use on the field trip.

Participant Outcomes
- Participants will learn about major water resources issues, the need to protect our water resources, and what all of us can do to conserve water and keep source water clean.
- Teachers will learn about water-related classroom resources that can help them achieve their teaching goals.
- Teachers will learn how to integrate computers/technology in an innovative way.
- Students will achieve Proficiency on all three online unit assessments.
- Students will post on at least five water resources topics during the school year

Expectations
Organizers will provide (free of charge) all of the following:
- Partnership matching.
- Training on how to use the wiki technology.
- USGS water resources education posters (set of nine).
- The use of a “classroom” water quality test kit to be used on the field trip.
- Technical and moral support throughout the school year.
- For New Mexico teachers, we will also cover the cost of coordinating four classroom guest speakers, field trip coordination, field trip bus transportation, and the cost of a substitute teacher so teachers can attend the workshop.

In return, teachers must ensure all of the following:
- Students take the online assessment at the end of each unit.
- Students post on at least one topic no later than November 1.
- Students post on at least five topics during the school year.
- Students comment on their pen pal’s writing.
- Partner class water quality testing results are submitted to the RiverXchange team immediately after the field trip is taken.
Program Funding
Feedback gained from online student assessments and student wiki writing enables us to carry out measurable outcomes. Providing this “proof of student learning” is a key feature that distinguishes RiverXchange from other water resources outreach programs and helps us ensure continued funding. **For this reason, all classes must make their first posting no later than November 1 or they will not be allowed to continue participation.** We don’t want this to happen after all the great training and effort!

Big Water Questions (Student Outcomes)

**Understanding a Watershed**
- Is every place in the world part of a watershed?
- Where does your community’s stormwater go?
- How can surface water become polluted?
- How does the water cycle relate to weather?
- How are groundwater and surface water connected?
- How can groundwater become polluted?
- What actions can all of us take to keep water clean?

**Water in Our Society**
- In what ways does our society use water?
- Where does your community’s drinking water come from?
- Does everyone have the right to use as much water as they want?
- Where does your community’s wastewater go?
- What actions can all of us take to conserve water?

**River Ecosystem**
- How does water affect living things in an ecosystem?
- What role do forests play in a watershed?
- What role do wetlands play in a watershed?
- What are some of the ways scientists can determine the health of a river, lake, bay or ocean?
- What actions can all of us take to improve the health of our ecosystem?
**2011-2012 Calendar**
This is a general timeline. Partner teachers may substitute similar hands-on activities and alter the timing of the activities; however, our goal is for all classes to cover similar topics at approximately the same time of year so that students can relate to the topics written about by their pen pal. *All students should post on at least five topics.* A “topic” is a major theme, as described below. It is not the same as commenting on the pen pal’s writing or general writing/chit chat between students. The field trip can occur at any time during the school year; however, note that there are suggested pre- and post-field trip activities.

**RED = Student Assessment Questions, which also relate to the Big Water Questions.**

**September**
- Teacher Workshops (New Mexico teachers)
- Online Trainings (Partner teachers)
- Scheduling of guest speaker presentations and field trips

**October**

*Unit 1: Understanding a Watershed*

**Topic 1: Our Rivers** - Study maps of your river and discuss the major features of your local watershed. Locate your school and your partners' school on the precipitation map. Post photos of your local area on the class wiki, and have students write a *friendly letter* about your watershed and its climate on their wiki pages.

- Is every place in the world part of a watershed?
- What is a watershed?
- Where does your river start?
- Into what ocean does your river eventually flow?
- How much precipitation does your community receive each year?

**Topic 2: Watershed Model** – Invite a guest speaker to present, or make your own model of a watershed. Learn about nonpoint source pollution, the difference between stormwater and wastewater, and what kinds of things pollute surface water. Watch *Science or Fiction*. Students write a *persuasive paragraph/essay* on their wiki pages about why it is important to keep stormwater clean and what we can do.

- Where does your community's stormwater go?
- How can surface water (like a river, lake, bay or ocean) become polluted?
- What actions can all of us take to keep water clean?

*Optional*: Do the math-based activity *Don't Trash Our Rio* to learn about a *real-life trash and storm drain problem*, then calculate how many trash bags and classrooms it would take to store all that trash.

**November**
- **NOTE**: *All students must post on at least one topic by November 1!*
- If you take a field trip in the fall, please see the field trip page for pre- and post- activities.

**Topic 3: Infiltration and Runoff** – Listen to the *Water Cycle Song* and discuss how the water cycle relates to weather. Take a mini field trip on the school grounds to observe where runoff goes and where infiltration happens. Students write a *RACE paragraph/essay* answering the question, “Where does water go when it falls on our school grounds?” and citing evidence such as puddles or erosion observed.

- How does the water cycle relate to weather?
- What are the major components of the water cycle?
- In the water cycle, what happens to precipitation that hits the ground?
Optional: Test to find out where infiltration occurs rapidly and slowly throughout the campus.

**Topic 4: Groundwater** – Watch *The Story of Groundwater*. Build a simple aquifer model to learn about how groundwater and surface water are connected, and how pollution can get into groundwater. Students write a creative or narrative paragraph/essay describing the journey of a raindrop into the aquifer.

- How are groundwater and surface water connected?
- How can groundwater (aquifer) become polluted?
- What actions can all of us take to keep water clean?

**Unit 1 Review** – Do vocabulary crossword included in teacher packet. 
**Take Unit 1 online student assessment.**

**December**

*Unit 2: Water in our Society*

**Topic 5: Drinking Water** – Find out where your drinking water comes from. Discuss how weather patterns bring drought or flooding to your area, and how it affects your drinking water. Invite a guest speaker, or do the activity *The Value of Water*. Students write a persuasive paragraph/essay explaining why it is important to conserve water, and what we can do.

- In what ways does our society use water?
- Where does your community’s drinking water come from?
- Does everyone have the right to use as much water as they want?
- What actions can all of us take to conserve water?
- How does the water cycle relate to conserve water?
- How does drought or flood affect our drinking water?

Optional: Learn what a water footprint is, then do the water footprint calculator.

Optional: Learn how water and energy are connected, and the resources used to produce a bottle of water.

- In what ways does our society use water?
- How are water and electricity connected?
- What resources does it take to produce a bottle of water?
- What actions can all of us take to conserve water?

**January**

**Topic 6: Water Rights** – Brainstorm a list of all the water users in our society, then act out the ways of assigning water rights. Revisit the precipitation map to see why different water rights doctrines are used in different areas. Students write a persuasive paragraph/essay explaining how they would modify the water rights rules in your area to make sure they are fair to all water users.

- In what ways does our society use water?
- How are water rights assigned in your area?
- Does everyone have the right to use as much water as they want?
- How are water rights assigned in your area?

**Topic 7: Wastewater** - Invite a guest speaker or do an activity to learn where your wastewater (sewage) goes. Learn the difference between a sewer system and a septic system. Review the differences between stormwater, drinking water and wastewater -- emphasizing how different sets of pipes are involved, and the quality of the water being transported is very different. Students write an informational or creative paragraph/essay explaining the journey of our wastewater.

- Where does your community’s wastewater go?
- What is a sewer system?
- What is a septic system?
February

**Topic 8: Commercial Uses of Our Waterways** – Research the major commercial use(s) of your river (such as agriculture, transportation, fisheries and/or recreation) and do an activity, or invite a guest speaker to present. Discuss how these uses influenced the location/history of your community, and how these users can conserve water and keep water clean. Students write an *informational or persuasive paragraph/essay* explaining how the river has influenced your community's history and what commercial users can do to protect it.

**In what ways does our society use water?**
- How has water influenced human settlements and culture?
- What are the major commercial uses(s) of your river?

**What actions can all of us take to keep water clean?**
- What actions can all of us take to conserve water?

**Optional:** Play one or more of the *Water Ripples* games which will help you review the ways our society uses water, particularly in *agriculture*.

**Optional:** To learn more about *water use in other countries*, invite a guest speaker from Water for People, or read the book *A Long Walk to Water*, by Linda Sue Park. Compare average indoor water use in the U.S. to that in other countries.

**In what ways does our society use water?**
- How does water use in the U.S. differ from water use in other countries?
- How can the lack of clean drinking water affect children in other parts of the world?

**Unit 2 Review** – Do the vocabulary crossword puzzle included in the teacher packet.

**Take Unit 2 online student assessment.**

March

**Unit 3: River Ecosystems**

**Topic 9: River Food Web** – Invite a guest speaker or watch *Macroinvertebrate Lunch* to learn about the role of aquatic macroinvertebrates in the food web and what they can tell us about the health of our ecosystem. Discuss producers, consumers and decomposers, and where macroinvertebrates fit. Watch *Frogline News* to revisit how pollution gets into surface water. Students write an *informational paragraph/essay* about one macroinvertebrate species and its role in the ecosystem.

**How does water affect living things in an ecosystem?**
- What role do aquatic macroinvertebrates play in the food web?
- Why do scientists study aquatic macroinvertebrates?

**Optional:** Make a food web for your local ecosystem, identifying *native* and *invasive species*, as well as local *endangered species*.
- What are some *producers* that are *native* to your river’s ecosystem?
- What are some *consumers* that are *native* to your river’s ecosystem?
- What is one *invasive* species in your river’s ecosystem?
- What is one *endangered* species in your river's ecosystem?
April

**Topic 10: Forests and Wetlands** – Watch *The Adventures of Junior Raindrop*. Examine models of how wetlands and other vegetation in our watersheds can help clean water, reduce erosion, reduce flooding, and support a diverse community of living things. Students write a *persuasive paragraph/essay* about why wetlands are important in our watersheds.

- What role do forests play in a watershed?
- What role do wetlands play in a watershed?
- What is a wetland?

May

Catch up or do optional activities if desired.

**Unit 3 Review** – Do the Unit 3 vocabulary crossword (included in teacher packet).
**Take Unit 3 online student assessment.**

**Teacher Feedback Survey** - we value your input!

**Topic 11: Field Trip (field trips may occur at any time of year)**

**Pre-field Trip Activity** - Read *A Waterproof Case* to learn about why we do different kinds of water testing. Test classroom tap water for temperature and pH; record to compare with the data students will collect at the river. Talk with students about the field trip and location, and what to expect.

*Optional:* Read *The Water Down Under*.

**Field Trip** – Field trips in New Mexico will incorporate hands-on lessons about wetlands, aquatic macroinvertebrates and water quality, and students will use a field journal. Water quality testing data will be submitted to the World Water Monitoring Challenge program. In some cases, an additional service learning project will be included (e.g., tree planting or agriculture activity).

**Post-field Trip Activity** – Review how land use affects water quality and what the water quality data tells us about the ecosystem. Compare your data to other World Water Monitoring Challenge sites. Students write a *narrative paragraph/essay* about their experience at the river, why we collect this data and what it means.

- What are some of the ways scientists can determine the health of a river?
- How does water affect living things in an ecosystem?
- Who or what are the other water users (besides humans) in an ecosystem?
- What actions can all of us to take to improve the health of our ecosystem?
APPENDIX B3
Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA)

Professional Water Resources Education Consulting Services - Pilot Program Report

Submitted by:
Orilla Consulting, LLC
1200 Los Tomases Dr NW
Albuquerque, NM 87102

Technical Contact:
Amelia White, CEO/Owner
(505) 225-7487
amy@riverxchange.com

July 3, 2013
Arroyo Habitat Education Program

A pilot program was developed for 3rd graders, utilizing the arroyos as outdoor classrooms. Orilla Consulting, LLC implemented the program for 7 classes (approximately 175 students and 7 teachers) at Maggie Cordova Elementary in Rio Rancho, NM. The program consisted of a three-part series of lessons, based on grade-level science standards and addressing areas of interest to SSCAFCA, such as bats, burrowing owls, recreation use, pet waste, trash, debris/illegal dumping and arroyo safety. Each of the activities incorporated walking out to the Black Arroyo, across the street from the school's main entrance.

We contacted 1st and 3rd grade teachers at Maggie Cordova Elementary in January to find out if they were interested in participating. The 3rd grade lead teacher responded that all classes at the grade level would like to participate, while the 1st grade lead teacher did not respond after multiple inquiries. We decided to focus on 3rd grade for this initial year and offer the program to all classes as requested.

The first lesson, about arroyo safety and the animals and plants that live there, was presented on April 16th and 18th, with one presentation being rescheduled to April 25th. We talked to students first about the difference between concrete-lined channels and sandy-bottomed/sandy-side arroyos. We emphasized that it is never safe to go into concrete-lined channels, while sandy-bottomed arroyos can be visited when there are no clouds in the sky. This message was repeated in each lesson thereafter, and we did not actually go into the bottom of the arroyo on any of the visits. We searched for evidence of animals living in the habitat on the banks, learned about how lizards are adapted to the desert environment by moving about to regulate their temperature, and looked for certain adaptations of desert plants to minimize water loss in the desert.

The second lesson was about burrowing owls. We contracted with Envirological Services, Inc. for a biologist to bring a live burrowing owl to the school on April 30 and May 2. The presenter was very engaging, and students were highly attentive. We emphasized that the owls are protected by federal law, and that 3rd graders would be ambassadors and protectors for the owls. Students were allowed to look through binoculars at an owl burrow with a nesting pair in the arroyo bank, and promised they would tell others not to disturb the birds. One teacher volunteered to host an “owl club” before school and over the summer; we donated a backpack with field journals and a pair of binoculars so that student could collect data about the owls' behavior. In fall, we hope to get this data from the teacher.

The third lesson, about bats, was presented on May 14th and 16th. We talked to students about how important bats are in keeping insect populations under control, and did an activity to model how many insects a small colony of bats can eat in one night. Then we went outside to play a game demonstrating echolocation, as well as how mother bats find their young by sound and smell in the colony. We discussed ways to encourage and protect bats. We emphasized that kids should not be frightened of bats, but also should never touch a bat if they find one.

Teachers told us that the program was helpful to them in terms of meeting science standards, and shared stories of students discussing the lessons after we left. They were very pleased with the program, and asked if we could continue it next year.

Appendix A contains the parent letter we sent; Appendix B contains the complete lesson plans.
Appendix A: Parent Letter

Southern Sandoval County
Arroyo Flood Control Authority

BOARD OF DIRECTORS
John Cheney
Mark Camplin
James F. Fahey, Jr.
Steven M. House
Donald A. Rudy

Charles Thomas, P.E.
Executive Engineer

March 31, 2013

Dear Maggie Cordova Parents and Guardians,

Your 3rd grader's class has been selected to participate in a new pilot program sponsored by Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA). SSCAFCA is dedicated to safety and we want to make sure Rio Rancho kids know when it is safe to explore our area's natural arroyos. As part of the educational standards, we want to inform students about habitats in their neighborhoods and what animals make their homes in arroyos.

About Us:
Our mission is to protect citizens and property by maintaining and operating flood and storm water control facilities that manage our watersheds prudently for future generations. SSCAFCA is dedicated to educating students, adults and the Southern Sandoval County community as a whole on the issues of flood control and watershed management. We also work to enhance the quality of life in Southern Sandoval County by creating appealing multi-use facilities and encouraging low impact use of natural arroyos, such as walking, biking, and watching wildlife. As part of these goals, our new education program will teach students about the arroyo's value as wildlife habitat.

About the Program:
Our educator will visit the school to teach three lessons over the next several weeks. For at least one of them, we will walk across the street to the Black Arroyo to learn about the natural habitat. Throughout all of these lessons, we will emphasize when it is safe to be in or around a sandy arroyo.

1. Animal and Plant Adaptations — We will learn about the plants and animals that live in our arroyos, and how they are adapted to survive in the desert climate.
2. Burrowing Owls — We will learn about burrowing owls, their lives, their habitat, and why their populations are threatened in some areas.
3. Bats — We will learn about how many mosquitoes a bat can eat each night, and how they control insect populations naturally in our arroyos, ponds and areas that attract large amounts of flying bugs.

We hope you will enjoy talking with your child about what they are learning! If you have any questions about the program, please feel free to contact me at ecomm@sscifica.org.

Sincerely,

Catherine Conran
Educational Outreach Director

1041 Commercial Dr. S.E. • Rio Rancho, New Mexico 87124
(505) 892-RAIN (7246) • FAX (505) 892-7241
www.sscifica.com
Appendix B: Lesson Plans

Activity Guide for 3rd Grade – Animal and Plant Adaptations

1. What are we trying to teach the students in this activity?
Arroyos are cool places where animals live, animals and plants are adapted to live in the desert.

2. How can we tie this activity to our teaching goals:

<table>
<thead>
<tr>
<th>Our Goals</th>
<th>Where we can relate our goals to this activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animals live in arroyos</td>
<td>Look for evidence of animals.</td>
</tr>
<tr>
<td>We should visit arroyos carefully</td>
<td>Talk about when it is safe.</td>
</tr>
<tr>
<td>Picking up dog poop keeps germs out of our river</td>
<td>We'll probably see poop, talk about how it can make animals sick.</td>
</tr>
</tbody>
</table>

Supplies:
- Thermometers
- Clipboards
- Poster of leaf adaptations
- Wax paper
- Paper towels
- Tape

3. How can we tie this activity to standards?
- Measure energy (temperature change)
- Posing a question, using numerical data, various methods to display results
- Animals and plants have adaptations that improve chances of survival
- Classifying animals and plants
- Living things cause changes to their environment, some detrimental, some beneficial

5. How should this activity be organized?

I. Pre-activity (10 minutes)
- Do you ever visit/play in arroyos? What do you do?
- What are arroyos for? Managing storm water to keep our town from flooding when we get a heavy rain. Show first flush video.
- Talk about arroyo safety – don't go into arroyos when you see clouds in the sky.
- Because our arroyos are natural, with sandy sides and bottom, they are safer.
- In Albuquerque, the arroyos have concrete sides and water travels so fast, it is really dangerous to ever go in arroyos. Some arroyos come from the canyon where it might be raining but you can't see.
- Our arroyos are home to all kinds of animals and plants, so they are a wonderful place to enjoy nature. What kinds of animals do you think might live in the arroyo?
- Walk out to arroyo

II. Lizard activity (15 min)
- 5min Look for evidence of animals. What kind of evidence? Scat, tracks, holes.
- What kind of animals live in holes (besides snakes)?
- What do you think makes it difficult to live out here? Heat, sunburn, not much water, cold at
night. Animals and plants have special **adaptations** (special things about their bodies) that make it easier for them to live in this habitat.

- How do they get water? From plants, from condensation under rocks.
- How could they avoid heat? Stay in burrows or shade during the day, active at night.
- Some animals love the heat, though! Lizards are cold-blooded, which doesn't mean they are actually cold. It means their body temperature is determined by the environment. They need to absorb heat from their surroundings to function.
- Each student take a thermometer. This is a lizard, and it needs to maintain its body temperature at a certain level: fence lizard 35C (95F), whiptail 38.6C (101F). How can it keep from getting too hot? How can it keep from getting too cold? Lizards regulate their body temperature through behavior.
- Plants do kind of the same thing – hold one palm out flat, one sideways. Which feels hotter? Prickly pear cactus pads grow sideways instead of flat to keep themselves cool!

IV. Plant activity (15 min)

- What do plants need in order to survive? Water, sunlight, air, soil
- What makes it difficult for plants in the desert? It's so hot and there's so little rain.
- How do plants get water? **Show evapotranspiration diagram.** It's kind of like when we're hot, we sweat. But if we lose too much water from sweating we get dehydrated.
- How do they keep cool? Remember prickly pear? **Show pictures of hedgehog and prickly pear cacti.** Desert plants can shade themselves! Hedgehog cactus has lots of spines that shade the surface and also blocks the wind.
- The leaves of many desert plants are **adapted** so that they don't lose too much water.
- **Show leaf adaptations poster** (fuzzy, small, curled, waxy, green stems but no leaves)

If weather is ok:

- Out in arroyo, we'll do an investigation.
- How many of the plants we see will have these adaptations? Hypothesize.
- To be fair, we can't just pick the plants we like. Standing in one spot, collect the first 6 different leaves you see.
- Draw each one, and describe what adaptation it has.
- How many of your 6 leaves have one of the adaptations listed?
- Why don't all have it? Some plants avoid the heat by just growing and producing seed really fast before the weather gets hot, and then they just die off and leave their seeds to grow next year!
- Search for seeds.

If windy, inside activity:

- Let's investigate one way they keep water. **Dab water on board, cover one spot with paper towel, one spot with wax paper.** Which do you think will evaporate faster?
- **Show prickly pear picture.** Make model of prickly pear pad: paper towels with wax paper taped around the outside. **Show cut prickly pear pad.**
- Maybe do experiment: soak wax-covered and non wax-covered leaves in water and time how long they take to dry.

V. Conclusion (10min)

- Arroyos are for flood control, and we shouldn't play in them when clouds are in the sky.
• But they are cool places where animals and plants live, and we can visit when it's clear weather.
• Animals and plants are adapted to live in the desert climate.
• What we do in arroyos affects the plants, and animals' habitats. What happens to the Arroyo when people put trash in it? Where does the trash go? Should we ride ATVs up the sides? That's something humans do to change our environment for the worse.
• Picking up dog poop is important because it can make animals sick. Where does the water go when it flows down the arroyo? The Rio Grande! Keeping dog poop out of the river is one way humans can change our environment for the better.
• Walk back to classroom
Leaf Adaptations

1. Fuzzy leaves or lots of spines
2. Small leaves
3. Curled leaves
4. Waxy leaves
5. Green stems but no leaves!
Activity Guide for 3rd Grade – Burrowing Owls

1. What are we trying to teach the students in this activity?
Burrowing owls live in arroyos, ATVs and erosion can wreck their homes.

2. How can we tie this activity to our teaching goals:

<table>
<thead>
<tr>
<th>Our Goals</th>
<th>Where we can relate our goals to this activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animals live in arroyos</td>
<td>Burrowing owls live in holes, eat mostly insects, are cute, and their habitat is threatened. We should never disturb them, and it is illegal. They are protected by the Migratory Bird Act.</td>
</tr>
<tr>
<td>We should visit arroyos carefully</td>
<td>Only go in arroyos when you don't see rain clouds. Don't ride ATVs up the sides of the arroyos because you may destroy burrowing owls' homes!</td>
</tr>
<tr>
<td>Picking up dog poop keeps germs out of our river</td>
<td></td>
</tr>
</tbody>
</table>

Supplies:
- 15 owl masks (made from paper towel tubes and cardboard)
- 100 grasshoppers, various colors
- 200 beetles, various colors
- 25 mice, various colors

I. Pre-activity (10 minutes, in classroom)
- When is it safe to go in a sandy-bottomed arroyo? When there are NO clouds in the sky. Don't go into concrete-lined channels anytime!
- Remember last time we saw lots of evidence of animals? One of their adaptations was to hide in burrows where it's cooler.
- There's a really cool type of owl called the burrowing owl, that lives in burrows. Sometimes it digs its own, but often it takes another animal's burrow after it moves out.
- Remember we talked last time about how we should not disturb animals' homes? I want you guys to think of yourselves as stewards of the arroyos and the animals that live in them. Since you are learning so much, I hope you will share what you know about nature with your family and friends and make sure they know how cool these animals are.
- Also, it is illegal to disturb them. The burrowing owl and many other birds are protected by the Migratory Bird Act, which means you (and your parents) get in big trouble and have to pay a big fine if you bother them or even take a feather.

II. Owl presentation (outdoors)
- See bird and learn about its life, migration, and habitat (Tavo)

III. Supplementary Activity (outdoors)
- We're going to pretend to be owls and hunt for food.
- An adult burrowing owl needs to eat almost half its body weight each day. Imagine if you ate that much! For an owl, that is 50-75 grams of food each day.
And, if they are raising young, each owlet needs 15 grams of food each day. So if they have 6
chicks, each parent needs to bring in an extra 30 grams of food. So that's 80-105 grams total
that they need.

Put on masks. Owls cannot move their eyes in their sockets like we can, so they have to turn
their entire head. Team activity – 6-7 kids at a time will be one owl? See how this works and
adjust as needed.

Now look for prey (time for 2min). Was it easier to find brightly colored prey or lighter-colored
ones? That's another adaptation desert animals have – camouflage to hide from owls.

Add up points (grasshopper-5, beetle-2, mouse-250). Did you survive? Owls work hard!

V. Conclusion

Burrowing owls are really amazing and we'd like the 3rd graders to be stewards of the owls. You
are their protectors, so let everyone know how cool they are and that it's illegal to disturb them.
The more we learn about nature, the more we want to protect it.

We have an owl backpack with a pair of binoculars and pictures of the owls at different ages for
our new “Owl Club” - if you are interested in learning more about the owls, you may want to
join! There is a pair of owls nesting in the arroyo that you can watch in the morning before
school.
Activity Guide for 3rd Grade – Bats

1. What are we trying to teach the students in this activity?
Bats are cool, we should not hurt them. We can protect them and make houses for them.

2. How can we tie this activity to our teaching goals:

<table>
<thead>
<tr>
<th>Our Goals</th>
<th>Where we can relate our goals to this activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animals live in arroyos</td>
<td>Bats live around arroyos and eat mosquitoes (which carry disease)</td>
</tr>
<tr>
<td>We should visit arroyos carefully</td>
<td>We should respect bats because they do important things for us – pollinate, eat bugs</td>
</tr>
<tr>
<td>Picking up dog poop keeps germs</td>
<td></td>
</tr>
<tr>
<td>out of our river</td>
<td></td>
</tr>
</tbody>
</table>

Supplies:
- 3 lbs birdseed or beans
- 6 blindfolds
- 6 cotton balls, w/ variety of scents (vinegar, cinnamon, garlic, vanilla, perfume, banana?
  Caution: Teachers should also be aware of any food or odor sensitivities or allergies)
- Bat posters

3. How should this activity be organized?

I. Pre-activity (10 minutes)
- Show bat puppet. This is a big brown bat. Remember we talked about ways animals are adapted, what adaptations do you see on this bat? Wings, ears. What do you think they eat? They catch bugs with their wings or tail.
- How are bats different from birds? **Show wing pictures.**
- Bats are mammals just like us! What does that mean?
- People may think that they are dirty and diseased, or that they suck blood, and have actually tried to exterminate them. But... they are actually very clean, like cats. Only a few tropical bats feed on blood, and not many bats have rabies. The advantages of having these creatures around are far greater.
- As pollinators of flowers and distributors of seeds, they play an important ecological role. Without bats, we wouldn't have bananas, peaches, mangoes, cashews, many cacti/agave.
- As predators of insects, they benefit us by devouring pests. All bats native to the U.S. are insectivores. They typically consume about half their weight in insects each night, preferring moths, beetles, mayflies, midges, and mosquitoes (the closest thing to vampires among us).
- Have each kid scoop out how much a bat would eat. (BBB 23g, so 11g seeds ~1 Tbs)
- A colony of 1000 bats (like BBB)can eat 4 tons of insects per year. Without bats, we would be overwhelmed by insects. A bat can travel about 6 miles in any direction from its roost.
- Are there very many other animals that eat insects at night? Bats fill a special niche in the ecosystem.
- Bats are threatened – people are destroying their homes, have spread a fungus that infects them, using pesticides to kill insects poisons them.
- Where do they go in the winter? Some hibernate in winter (need special undisturbed places) and some migrate (need habitat along the way).
II. Go out to arroyo - Are You My Baby?

Millions of bats can sometimes be found in a single cave, many of them mothers and their newborn pups. Mothers usually give birth in the spring to a single baby, and because bats are mammals, each mother nurses her young several times a day.

Scientists have found that in spite of the numbers and the darkness bat mothers manage to find their own pups. Each mother is able to locate her baby by recognizing its scent and call. In the game below, your students can play the roles of bat mothers and babies trying to find each other in the noisy darkness.

Make sure students realize that speed is not the key to success in this activity.

1. Select six bat mothers and six babies.
2. Give each baby a scented cotton ball (see scent list for suggestions). Each bat's mother should become familiar with the smell.
3. Next, assign each baby a distinctive call, such as a simple pattern of tongue clicking. Mother and baby should practice the pattern several times to ensure recognition of sound.
4. Blindfold the mothers.
5. The remaining students are also babies but without a scent or assigned call. Arrange all the babies in an open space with the six "scented" babies scattered throughout the group. All babies will remain stationary.
6. Help the blindfolded mothers to the edge of the group. On your signal, they should move slowly about the group in an effort to find their own baby. All the babies should call, clicking at random without a pattern—except for the six babies, who must use the pattern they practiced with their "mothers."
7. If a mother approaches a scented baby, the baby must hold out the cotton ball toward the mother's nose. No other contact should be made.
8. The winner is the mother and baby who find each other first. When pairs find each other, they should leave the circle. The game is over when all mothers and babies are reunited.

V. Conclusion - Bats are good! We can protect them and attract them.

Bats are threatened
- Of 27 species of bats in NM, 1 endangered, 3 threatened, 19 are “species of concern”

What we can do:
- Avoid using pesticides.
- Conserve living and dead hollow trees for evening, pallid, big brown, and other cavity-roosting bats.
- Create positive public relations for bats by exploding old myths and misunderstandings and informing your family and friends about their ecological importance and the threats they're up against.
- Build a bat box at your house! It can also double as a bird house! Imagine . . . bats and birds living together in one box. They often coexist in snags and artificial structures, and get along remarkably well, because they work separate shifts — nocturnal and diurnal.
• Bat garden - start by enticing night-flying insects with plants that bloom both day and night.
• Lights in your schoolyard left on at dusk to encourage moths and other nightflying insects and, consequently, foraging bats.
• Build a shallow pond that appeals to mayflies, caddis-flies, and other insects that start life in freshwater and emerge as adults. Guidelines appear here: “Build a Dragonfly Pond”.
APPENDIX B4
<table>
<thead>
<tr>
<th>Program or event</th>
<th>Date(s) of event</th>
<th>Audience</th>
<th>Notes on Audience</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bark in the Park</td>
<td>9/15/2012</td>
<td>adults and children</td>
<td>450 attendees at the gate</td>
<td>450</td>
</tr>
<tr>
<td>CORR Toss No Mas</td>
<td>9/22/2012</td>
<td>adults and children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CORR Tree Steward Volunteer training</td>
<td>10/23/2012</td>
<td>adults</td>
<td>20 participants</td>
<td>20</td>
</tr>
<tr>
<td>Howl and Prowl</td>
<td>10/28/2012</td>
<td>adults and children</td>
<td>350 at the gate, promoted &quot;scoop the poop&quot; had participants sign the pledge for bag</td>
<td>350</td>
</tr>
<tr>
<td>American Recycle Day Ester Bone Memorial Library CORR</td>
<td>11/15/2012</td>
<td>adults and children</td>
<td>mixed audience mostly adults</td>
<td>60</td>
</tr>
<tr>
<td>Earth Day- CORR</td>
<td>4/20/2013</td>
<td>adults and children</td>
<td>great turn out promoted &quot;scoop the poop&quot; had participants sign the pledge for bag dispenser</td>
<td>275</td>
</tr>
<tr>
<td>Great American Clean up- CORR</td>
<td>5/4/2013</td>
<td>adults and children</td>
<td>111 total tons of trash and debris removed</td>
<td>1038</td>
</tr>
<tr>
<td>Paws and Stripes Event</td>
<td>6/29/2013</td>
<td>adults</td>
<td>educate folks on impact of pet waste, dog</td>
<td>275</td>
</tr>
<tr>
<td>Riverxchange</td>
<td>year long 2012-2013</td>
<td>5th grade students</td>
<td>550 students and 23 teachers</td>
<td>573</td>
</tr>
<tr>
<td>Arroyo Classroom Pilot program</td>
<td>spring semester 2013</td>
<td>3rd grade</td>
<td>175 students and 7 teachers</td>
<td>182</td>
</tr>
<tr>
<td>Children's Water Festival</td>
<td>11/28 and 29 2013</td>
<td>4th grade students</td>
<td>all Rio Rancho public school 4th grade classes attend in alternating years do to the size along</td>
<td>750</td>
</tr>
<tr>
<td>High School Video project</td>
<td>1/13 to 5/13</td>
<td>grades 9-12</td>
<td>students for Bernalillo, Rio Rancho and Sue Cleveland High Schools produced stormwater</td>
<td>25</td>
</tr>
<tr>
<td>Elementary School Students Achieve For Excellence (S.A.F.E.) program</td>
<td>11/14/12, 12/15/13, 1/9/13, 2/28/13</td>
<td>grades 2-4</td>
<td>mixed grades and size of program ranged from 50 to 100 students</td>
<td>270</td>
</tr>
<tr>
<td>Architecture, Construction and Engineering High School (ACE)</td>
<td>5/13 and 6/13</td>
<td>grades 9-12</td>
<td>three classes combined</td>
<td>75</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>4343</strong></td>
</tr>
</tbody>
</table>
**ROSKOS FIELD RENOVATION**

**Element 1: Rehabilitation of old Wetlands**

*Element Objective:*
Prior to the rehabilitation effort, the wetlands element of the Roskos Field demonstration project was choked with cattails, maintained a static water level, and was difficult to maintain. New configuration will provide lower maintenance needs and, after plant community objective established, no supplemental watering required.

*Demonstration Objective:*
Demonstrate to the public the usage of land contour management and selective planting of drought tolerant plants in runoff and landscape management.

*Scope of work –*

1. Remove wetlands type vegetation, reshape topography and puncture underlying synthetic liner to allow surface water to infiltrate.
2. Reshape side slopes of the area into swales for runoff water harvesting. Add straw bales, along swales to retain shape of swales and retain runoff water, amend soil to support new plants, provide ollas for plant irrigation, and replant with drought tolerant, native vegetation.
3. Shape bottom of old wetlands feature into a dry river-bed or arroyo-type configuration. Add larger (6”-8” cobbles) along the normal flow line of the channel (bottom) and smaller rock (2”-4” along the side slopes along the high water flow line. Rock is to minimize soil loss during runoff events.

**Element 2: Shade structure on north end of wetlands**

Construct a new shade shelter at the north end of the new Arid-LID demonstration area. Shade structure will incorporate roof-top water harvesting features and store water for usage in the adjacent landscaping via drip irrigation.

*Element objective:*
Provide shade for park users and vantage point to enjoy landscaping in new Arid-LID demonstration area.

*Demonstration Objective:*
Illustrate to general public the usage of building elements that can be incorporated into construction for capturing, storing, and distributing roof-captured rain water.

*Scope of work –*

1. Clear and level existing site in preparation for constructing shade shelter.
2. Pour foundation footers and construct steel shade structure per plans.
3. Pour connecting sidewalk and slab for under shelter.

**Element 3: Rain gutters/downspout for existing gazebo structure**

Install new rain gutters and downspout on existing gazebo structure south of old wetlands cell. Rainwater will be directed across existing concrete surface to landscaping on south side of old wetlands cell.

*Element objective:*

Control and centralize roof runoff from existing gazebo roof structure.

*Demonstration Objective:*

Illustrate to general public the usage of directed, overland flow of roof runoff to irrigation landscaping.

*Scope of work –*

1. Install rain gutters and downspout on existing gazebo structure. Direct downspout to existing concrete surface and, using existing grade, direct surface runoff to existing landscaping.
2. Remove soil in existing landscaping area for runoff retention.

**Element 4: Repurposing of forebay element of existing system**

Turn existing concrete forebay structure into dry riverbed system lined with grasses and wildflowers. Eliminate ponding of water in the north cell of the forebay and reduce water ponding capacity in the south cell of the forebay to a depth equal to the invert of the existing storm drain (approximately 4 inches).

*Element Objective:*

Lower long-term maintenance needs at this location and reduce potential for standing water in structure. Reduction in standing water should greatly reduce mosquito issues and provide the potential for evaporation to eliminate standing water issues.

*Demonstration Objective:*

Illustrate to the general public the concept of depressing landscaping islands in public infrastructure.

*Scope of work –*

1. Remove existing cattails and wetlands plants from the concrete structure. Puncture existing liner and dewater soils outside of concrete structure.
2. Cut 10’x10’ hole in floor of north cell of forebay to allow water to percolate thru this surface. Cut 2 foot wide notch into concrete wall between north and south cells of forebay. Notch will be cut down to invert of outflow stormdrain in south cell. Grate will be fabricated to hold soil installed in north bay from going into south bay. Grate will be fabricated and installed over stormdrain.
3. Loosen soil under 10’x10’ cut in concrete. Add rock (from Tree Farm Pond #2) into 10’x10’ hole to provide gravel pack in opening. Place 1-foot of sand (from Sportsplex Dam) across entire north cell of forebay to act as a drain for water to flow to the 10’x10’ opening. Place 1-foot of top soil over sand in north cell of forebay for planting purposes.

4. Seed area with sunflowers and native grass seed. Provide first season irrigation water to start plant growth.
Figure 1: Demonstration of depressed infrastructure and usage of plant material in infrastructure for trash and pollutant removal

Figure 2: Demonstration of bio-swales and landscape irrigation using rainwater harvesting
Figure 3: Demonstration of on residential scale on site ponding for landscape watering and drip irrigation techniques

Figure 4: Demonstration of roof rainwater capture and directing of roof runoff to landscaping (water flows over concrete pad to landscape feature)
APPENDIX C1
Figure 1: Volunteer at Keep Rio Rancho Beautiful event

Figure 2: Another volunteer helping during Keep Rio Rancho Beautiful
Figure 3: Pile of trash removed during Keep Rio Rancho Beautiful
APPENDIX C2
18th Annual Water Conservation Conference

Our Water, Our Future: Communication and Cooperation Across Disciplines

The 18th annual water conservation conference is an interdisciplinary collaborative effort of The Xeriscape Council of New Mexico and Arid Lands LID.

Hosted by both organizations, the conference will attract more than 250 land and water use professionals.

February 28, 2013

7:00 am - 8:00 am  Continental Breakfast & Check In
8:00 am - 8:30 am  Introduction

8:00 am - 3:00 pm  Conference

8:30 am - 9:30 am  Charles Fishman
Big Thirst: The Secret Life and Turbulent Future of Water

9:30 am - 10:15 am  Bruce Thomson
How Much Water We Have, How It's Used, How It's Managed Per New EPA Guidelines and Future Challenges

10:15 am - 10:30 am  Break

10:30 am - 11:15 am  Dr. David Gutzler
Annual climate report

11:15 am - 12:00 pm  Julio Betancourt
Climate Variability Affects Vegetation and Surface Hydrology

12:00 pm - 1:30 pm  LUNCH
1:30 pm - 2:30 pm  Mia Lehrer
River Restoration & Community Revitalization: A Case Study

2:30 pm - 3:15 pm  Steve Harris
Rio Grande Restoration

3:15 pm - 3:30 pm  BREAK

3:30 pm - 4:15 pm  Judith Phillips
Paving and Planting: Landscape Partners in Surviving Climate Extremes

4:15 pm - 5:00 pm  Chuck Easterling
Designing to Manage Stormwater as a Landscape Asset

March 1, 2013

7:00 am - 8:00 am  Continental Breakfast & Check In

8:00 am - 8:15 am  Introduction

Conference Archives

17th Water Conservation & Xeriscape Conference
February 23 - 24, 2012
8:15 am - 9:15 am  Woody Tasch  
Slow Money: Investing as if Food, Farms and Fertility Matter

9:15 am - 10:00 am  John Fleck  
Media's Role in Making Water Issues Understood

10:00 am - 10:15 am  BREAK  

10:15 am - 11:00 am  Van Clothier  
Rainwater Harvesting

11:00 am - 12:00 pm  Roy Hertweck  
Architect/Planner at Sandia National Laboratories

12:00 pm - 1:00 pm  Lunch  

1:00 pm - 1:45 pm  Dana Karcher  
Davey Resource Group, iTree tools, urban forestry and low impact development

1:45 pm - 2:45 pm  Miguel Santistevan  

The 18th Annual Water Conservation Expo  
March 2, 2012 - March 3, 2013

Conference sponsors
Is Adaptation Possible?: Meeting the Challenge of Climate Change in the Ever-more Arid Southwest

2:45 pm - 3:30 pm  Fran Hardy
My Evolution as an Environmental Artist

conference, register
Conference, Xeriscape

Related Conferences

The 18th Annual Water Conservation Expo

Sign Up for Our Email Newsletter

Enter your email address

Xeriscape Updates

XeriscapeNM: http://t.co/Lqb6ZT4uMO. As a fine artist, Fran’s work focuses on the natural world especially native plants and it’s preservation.
1 day ago

XeriscapeNM: http://t.co/VrGfVCn0Tx AIRE: non-profit org reconnect people with the land, their food &

Contact Us

Address: PO BOX 6186, Albuquerque, NM 87119
Email: xquestions@xeriscapenm.com
Message Phone: 505-468-1021
Donate

Join the conversation

For information on More Water Conferences

Like Us Online

Xeriscape Council of New Mexico Copyright © 2012 Bright Graphics/Electric Astronaut All rights reserved.

Photography by Hunter Ten Broeck and Judith Phillips.
APPENDIX D1
SWPPP
Training Event

June 27th, 2013
1:00pm-5:00pm

O’Niell’s
4310 Central Ave Se
Albuquerque, NM 87108

Presenters:
-Sarah Holcomb, NMED
-Tim Slatunas, Superior StormWater Services

Topic:
-Current changes to the construction general permit

Please RSVP by Monday June 17th, 2013

RSVP As Soon As Possible, Space Is Limited!

Email: Danielle@superiorstormwater.com

Phone: 505.433.3693

Food and beverages will be provided throughout the event
APPENDIX E1
Figure 1: Trash screen at Tract 17 Pond inlet, after July 3 storm
Figure 1: New gross debris removal fence at Sportsplex Dam outfall

Figure 2: New gross debris removal fence at Sportsplex Dam outfall
Figure 3: Another view of the gross debris removal fence at Sportsplex Dam outfall
APPENDIX E3
APPENDIX E4
Figure 4. Site Master Plan
APPENDIX E5
CALL TO ORDER.

The regular meeting of the SSCAFCA Board of Directors was called to order by Donald Rudy, Chairman, at 9:00 a.m.

ROLL CALL OF DIRECTORS.

Directors in attendance were John Chaney, Mark Conkling, Jim Fahey, and Donald Rudy. Steve House was noted as absent. Bernard Metzgar, SSCAFCA’s attorney, Charles Thomas, Executive Engineer, and members of the public were also present.

ANNOUNCEMENTS.

Announcements were made by Donald Rudy that all electronic devices needed to be turned off during the meeting and that the microphones are voice activated.

PLEDGE OF ALLEGIANCE.

The Board was led in the Pledge of Allegiance by Donald Rudy.

APPROVAL OF AGENDA.

Mr. Charles Thomas stated that one item from the Environmental Services Director portion of the meeting, the Action/Acceptance of selection of Bohannan Huston, Inc. for Professional Engineering Design Services, Alternatives Analysis Phase for the Lower Montoyas Arroyo Water Quality Feature, was stricken from the Agenda.

A motion was made by Jim Fahey to approve the Agenda as amended. It was seconded by Mark Conkling and passed unanimously.


A motion was made by Jim Fahey to approve the Minutes of March 15, 2013 as presented. It was seconded by John Chaney and passed unanimously.

PUBLIC FORUM.
STAFF REPORTS:

Executive Engineer:

1. Presentation on Venada Arroyo.

Mr. Charles Thomas stated that SSCAFCA had recently contracted with Easterling to do some conceptual design work and introduced Chuck Easterling. Mr. Chuck Easterling stated that they looked at the Venada Arroyo to review dam sites that had been acquired. The first sites they looked at were on Unser Boulevard at the upper end and the other was just upstream of Progress Boulevard. The total watershed area is about 25 square miles; this particular branch is about 8.5 square miles at the lower Venada end. The Venada Arroyo is a busy system.

He stated that they looked at the Unser site and it’s a traditional site for a dam and can be aligned with the road. SSCAFCA has almost all the right-of-way it needs to build the dam comfortably. A grading easement or slope easement might be needed. When they looked at the lower site, the challenge is that it’s not the best site topographically. In order to make it work some tracts of land will need to be acquired. The biggest problem is probably the fact that there is a 60,000 cfs probable maximum flood and not a lot of relief, so it’s a 1,500 foot long spillway. They did have an option where they could build a dropway in the channel and fix the grade at that location and then put in another drop structure to let the water into the basin, but the grade would be a foot or two lower so the water would run in first until it was full. The concept is good, however, because there is so much material in the area, they had to move a lot of overburden to get down to where they needed to be. They can dump the water into a hole, build a relatively low dam that will gravity drain without doing a lot of extra work. The arroyo system currently does not need a dam as large as you may ultimately need. It’s difficult to justify spending $7.6 million at one time when you only need a smaller dam right now. As development occurs, you build onto the dam. As you go downstream, multi-use possibilities start to open up.

Mr. Easterling stated that the off channel storage facilities function just like the flood plain when it captures the flooding. This site would mimic that. When an area is paved, the changes that it creates are dramatic. The average annual runoff from a site in existing conditions is about 1/10 of an inch per year. When something is paved it turns into 4.9 inches per year, which is a 48% increase. They presented in their report that the site would capture the first flush and have a big impact on water quality. As development occurs, the load that is put on the arroyos changes dramatically and the arroyos react in a way that’s compatible with the development that occurs adjacent to it. They start to meander, plugging up culverts, and it’s difficult to plan anything adjacent to them because of the sediment volumes everything is so unstable.
Mr. Easterling stated that one of the things they can do to manage the watershed is to mitigate the effects of development by having everybody having on-site ponding which operates exactly how it needs to operate, or these kind of off-channel storage facilities can be put throughout the watersheds because they can be effective wherever they are placed in the system since they catch the first flow. There’s not a lot of development in this watershed yet and four of these little facilities can be put in to meet SSCAFCA’s limit at 528. These sort of facilities will most likely affect the LEE lines farther downstream. If this is done throughout the watershed so the arroyo starts to see a load that’s similar to the historic load, you basically mitigate the impacts of the arroyo throughout and it will have a huge affect on the LEE lines. These can be used as “in lieu of” benefits with the developers.

Mr. Thomas stated that development is not progressing rapidly in this area so this plan does not need to be executed immediately. However, it gives a lot of flexibility to build the first pond where the development starts to happen first. It allows SSCAFCA some flexibility and is very exciting. As these are put in, SSCAFCA is protecting the downstream infrastructure from the necessity to remove sediment and mitigate the flow.

2. Legislative Update.

Mr. Larry Horan stated that the last day for the signing period for the Governor was April 5th. This session seemed to start off slow because there were 35 new members and there were also changes in leadership. The Governor’s agenda was education reform, driver’s license reform, and Obamacare and the health care exchange. These items took up a big chunk of the legislative time.

He stated that there was a reform on PIDS - public improvement districts. In the past year there was lots of controversy regarding Mariposa. This is because it was a PID that had uncapped property tax liability for the residents and once the developer pulled out of the project there were a bunch of homeowners who had uncapped property tax liability which could have gone up around 1,000%. One of the big issues is that developers are saying that a PID is a very good tool for them to have planned development communities, but homeowners want to have some predictability. One of the champions of that bill was Jason Harper, a new representative from Rio Rancho who did a really good job on the reform bill.

He stated that there were also some changes to the Procurement Code. One of those is that there is a requirement that you have a Chief Procurement Officer that is identified by a public agency and they will be responsible to go to some training and be responsible for all the procurement
from the State. There are also some changes in sole source procurement and what type of due
diligence you have to follow to identify someone as a sole source contract rather than going out to bid.

The other big issue was that there was a lot of push for some tax reform to help
generate jobs in New Mexico. The tax reform bill includes elimination of the hold harmless for cities
and counties that had various components to it, a corporate income tax reduction, mandatory combined
reporting for corporate income tax, a single sales factor change, and a fixed high wage jobs tax credits.
That bill didn’t get any momentum, but what happened on the last day, within the last 45 minutes of
the session, they took that omnibus tax bill (a 60 page bill) and the Senate amended it to fix film tax
credits, which is a bill that has passed both houses. Then they sent it back to see if the House would
concur with it. They acted on that bill at the very end of the session.

He stated that, with regard to the capital outlay bill, the legislature determined they
were going to spend $122 million on statewide projects. They took another $100 million and
distributed that amongst the House and the Senate for the members to individually fund their own
projects. SSCAFCA had two projects that had been proposed to its legislators. Early on,
SSCAFCA starts trying to identify projects that would be attractive to legislators and meet with its
individual legislators to see what kind of response they get. They are getting better at dealing with
the process. The support that SSCAFCA staff provides makes it really easy to go to the legislators
and give them the projects and something good.

He stated that one of SSCAFCA’s projects was for the Black Arroyo to do a pedestrian
bridge by Maggie Cordova Elementary and the other was the Lomitas Negras Water Quality Structure
to solve the Harvey Jones problem. SSCAFCA received $265,000 for the pedestrian bridge project
and $255,000 for the Lomitas Negras project. The Governor sends out questionnaires and asks for
information. Staff is really great at answering the questions and taking a proactive approach at
going to the legislators and give them support from various people. This helps to keep the projects from getting vetoed.

He stated that there is a change in the open meetings act. Instead of being required
24 hour notice publication it is now a 72 hour public notice requirement. The bonding cycle should
be around September or October which is when SSCAFCA will actually get the money for the
projects.

3. **Action/Acceptance of Agreement with Murray, Montgomery & O’Donnell for Federal
Lobbyist Services.**

   Mr. Charles Thomas stated that it has become apparent that SSCAFCA could benefit
by having a presence on the federal level to see if more funding can become available for projects.
Murray, Montgomery & O’Donnell has been active in New Mexico and did provide a presentation to the Board at last month’s meeting. An agreement has been negotiated and he asks for approval of the agreement. It is a one year agreement with an option to renew with an annual cost of $38,000.00.

Mr. Conkling stated that they have already had a preliminary meeting and the Murray firm is already formulating a plan of attack on how to deal with these issues.

A motion was made by Mark Conkling to accept the agreement as presented. It was seconded by Jim Fahey and passed unanimously.

4. Action/Acceptance of Memorandum of Understanding with City of Rio Rancho for City Center Facility Plan.

Mr. Thomas stated that staff wants to develop a comprehensive plan that addresses development within the City Center which also incorporates the Upper SLO and PDV Dam flow regime so that all three elements are incorporated together. This MOU has been reviewed and approved by legal counsel for both sides. The agreement basically states that SSCAFCA and the City will split the costs for the plan creation 50/50. There is funding authorized within the Plan to cover the City’s half of that project. Mr. Conkling stated that the contract has a deadline of September 30, 2013 which will push things through.

A motion was made by Mark Conkling to accept the MOU as presented. It was seconded by Jim Fahey and passed unanimously.

5. Discussion on Property Acquisition:

Summary of property acquired during current fiscal year:

Mr. Charles Thomas stated that SSCAFCA has acquired property in eight distinct areas. SSCAFCA was notified by the owners of property that was available in the Calabacillas that was adjacent to SSCAFCA’s holdings and SSCAFCA purchased about eight acres in that area. The largest piece acquired was 150 acres of arroyo within the Upper Montoyas Watershed. SSCAFCA acquired two properties for the Upper SLO Dam and acquired the single piece of property needed for the Saratoga Dam and staff is pursuing an easement agreement with the City for a portion of the adjacent property. SSCAFCA purchased four properties in the Trib A Dam footprint; several properties within the PDV Dam and all three properties for the Bernalillo Water Quality Feature. SSCAFCA also acquired five properties in the Black Arroyo Open Space Wildlife Park area with only one piece of property remaining to be acquired in that area. With these properties, SSCAFCA has acquired approximately 200 acres of land total during the past year.
Mr. Thomas showed the Board the properties which staff will be focusing on in the coming year. Staff would like to complete acquisition in the PDV and Upper SLO Dam areas. The Campeche Pond has been identified as a significant regional feature that will be needed in the Unit 17 area and acquisition of those six lots is being pursued. Staff would like to complete the purchase of the properties in the Trib A Dam area. There is one remaining property in the Alberta Phase II project. Once all the property is acquired in the PDV Dam there is a section between Paseo del Volcan and Loma Colorado that is platted to the center line of the arroyo so staff will pursue acquisition of properties in that area as well.

Mr. Thomas stated that SSCAFCA should be able to acquire all the properties, given the current level of funding authorization that staff has with the existing bonds that have been issued. The cost should not exceed $1 million, but he doesn’t have an exact number.

Action/Acceptance to acquire playa property in Calabacillas Watershed.

Mr. Thomas stated that one of the projects staff is working on is developing the basic hydrology for the Calabacillas Watershed Management Plan. After the GIS was run, the presence of natural playas was discovered within the watershed. A playa retains all of the rainfall within a specific area so there is no outlet. It’s a natural retention pond created from the native topography. He is not aware of any regulations which would prohibit SSCAFCA from keeping that water. If traditional development were to go forward, this natural feature would be eradicated and that flow which had been retained in a natural location would be added back into the system, so it would increase the overall flow beyond the historic level, not only through the increase in impervious surface, but also because this had never gone into the basin in the first place. Staff proposes that the Board add acquisition of these playa areas into SSCAFCA’s property acquisition strategy to retain the playas as natural open space features in perpetuity.

Mr. Rudy stated that he would like to have them identified in SSCAFCA’s Drainage Management Plan. Mr. Thomas stated that Gerhard produced a map and the entire jurisdiction was looked at. Surprisingly, staff did not see the same level of density of these features in the rest of the watersheds. It seemed to be localized to the Calabacillas. There is one of significance and it is right in the middle of the Edinburgh facility and it is slated to be erased. He stated that now will be the most fiscally responsible time to acquire this property rather than in the future.

A motion was made by Mark Conkling to add the playa property to SSCAFCA’s strategy of acquisition. It was seconded by Jim Fahey and passed unanimously.
Action/Acceptance of Resolution 2013-7 to Proceed with final acquisition of property for the Upper SLO and PDV Dam.

Mr. Charles Thomas stated that this Resolution authorizes staff to proceed with final acquisition of property for the Upper SLO and PDV Dam. Staff has been attempting to negotiate on all of these properties and the purchases need to be finalized to establish the facility there. There are several properties which may have legal issues on them.

A motion was made by Jim Fahey to approve Resolution 2013-7 as presented. It was seconded by Mark Conkling. Roll call vote: John Chaney, yes; Mark Conkling, yes; Jim Fahey, yes; Donald Rudy, yes. The motion passed 4-0.


Mr. Charles Thomas stated that there is a map provided in the packets that identifies the areas of development and there has been an increase in the level of activity this month. Many of those are relatively minor and insignificant with regard to a drainage perspective. The Questa Master Plan actually reduces the density of the development and adds a neighborhood park. The Rachel Matthew development, just west of 528 along the Montoyas, is a development being proposed for about 1/6 of the total property which would require some drainage improvements to tie into the Montoyas. The two Corrales South development issues were a summary plat for lot consolidation and a zone map, both of which were fairly minor. The Hawk Site is a more significant project. SSCAFCA has an easement on the northern end of the Hawk Site development that is rather strangely shaped. The developer is now proposing to completely reconfigure that development area and place a different retention feature in the area. The final one was a lot line adjustment at Commercial Center. Basically the drainage had been impacted by a fence that had been installed on the lot lines so they are trying to match the drainage pattern to the existing structures.

7. Roskos Pond Improvement Project Presentation.

Mr. Charles Thomas stated that when staff started looking at rehabilitation of Roskos Pond they started looking at repurposing the flood control features that are in this area.

Mr. Jim Service stated that the numbers and the project scope have been identified. Roskos Field is a joint project with the City of Rio Rancho as a multi-use facility. The field is a
drainage control structure, but it was decided to do a demonstration wetland project. Over time, the ducks had left the wetlands with a bunch of cattails. Once they start, they take over. When the demonstration project was done, it was stocked with mosquito fish, but because of all the turtles and gold fish that had been dumped into the pond there was a huge propagation of gold fish and some pretty good sized turtles and the mosquito fish population declined. The amount of sludge that was in the four bay was an eye opener. The maintenance cost and annual clean-up were both escalating each year.

Mr. Jim Service stated that there is one place in Albuquerque that takes sludge because of the EPA connotations to it. All of the cattails have been removed and the four bay has been exposed. He described the plan for fixing Roskos Field so that water will be able to go into the discharge bay and go to what was the former wetlands. He can’t figure out a way to put in a rain barrel without it being vandalized or stolen. Some rocks will be put at the entrance of the four bay to cut down the velocity coming off the parking lot, go across the four bay planted area with grass and sunflowers. The connecting pipe will go up to the newly created area. In the bottom will be a dry river bed surrounded by different shades of cobble. In the middle trees will be planted. In the top circle will be the shade structure using corrugated metal pipe as two pillars and use them as a water containment apparatus to drain it back into the wetlands and use that as a water harvesting technique. The cost for everything will be about $185,000.00. The cost for the last eight years is a little under $100,000.00 - and that’s just for maintenance. A write up will be placed on the website, as well as this presentation.

Mr. Thomas stated that the shade structure is designed to handle a rain event of 2.5 inch storm, which is just under the modeled 100 year storm. Ms. Conran stated that the benefit of this sort of project fits in more with the environment and the climate at this particular time. The sludge will now go through the sunflower area so that the plants will take up a lot of the toxins instead of having to dig it out. It will also be designed to show how people can use the landscaping in their yards. But, it is also a flood structure and is still protecting citizens. Mr. Thomas stated that SSCAFCA is also getting rid of the health concern of the “mosquito pit” that the forebay had become because of the overgrowth. The annual maintenance costs will also decrease because the system will be self-supporting and cleaning.

**Environmental Services Director:**

1. Draft Black Arroyo Master Plan Presentation.

Dave Gatterman introduced George Radnovich of Sites Southwest. Mr. Radnovich stated that he is a landscape architect and a planner. Sites Southwest was hired by SSCAFCA to do
the Master Plan for the arroyo open space area. He stated that the yellow area on the map is the zone that the Corps wants to protect, which the Master Plan does. The blue area will end up being a ponding area at some point in the future as funds become available. The first thing they did is look at the opportunities and constraints on the site. They also looked at the site from a wildlife perspective and had their biologist go into the field to determine where animal habitats are located. They looked at it from the perspective of trails. All of the dash lines are existing trails. They tried to use the existing trails as much as possible rather than create new ones. They also looked at it aesthetically and the yellowish circles are view sheds. They tried to determine where potential entry points are into the open space. They looked at noise and possible buffering from the neighborhoods. There are two water sources for vegetation for the open space. One is the arroyo itself and the other is the water utility overflow for the well that is on the west side of the open space. The water utility well deposits about 10,000 gallons every other day into the arroyo. He stated there is an area set aside for the Maggie Cordova School, along with water harvesting and access control.

Mr. Radnovich stated they divided the area into four basic areas: 1) a set aside for education and passive play by students from the school; 2) the environmental mitigation zone to keep trails and access to it away from that area; 3) the general open space area itself; and 4) the pond area at the furthest southeast corner of the open space. Within each of the areas they have different uses. They believe that vehicular access could be in the area of the cul-de-sacs. There is a desired path there already which could be formalized and the largest bridge could be put in that area. They suggested to have a pull-out where people could get off of 14th Street to drop off their kids out of traffic. Unser creates quite a bit of noise for the open space, so the green buffers on the map will be used as noise control and vegetation for visual buffering in those areas to create a less auditory impact to the open space. Along the main trail, they tried to place them where there was already quite a bit of traffic.

Mr. Radnovich stated that instead of fencing off the environmental mitigation zone, they decided that it made more sense to control access along the entire perimeter of the open space. The border will follow the boundary of the open space all the way around except for the area where two parcels are hold outs and there must be access to their property. There should also be access control in the arroyo itself because somebody on an ATV or motorcycle could get in. This access is right at the upper headwater of the mitigation zone. Along the arroyo they suggest using some water harvesting devices for the project to control sediment and keep some of the stormwater from leaving the area. The water from the City well becomes nonpotable water as soon as the flush occurs and that water can be used. If they can direct the water from the flushing into the grow-out nursery and then have it flow naturally to feed the trees, the water can be used effectively and efficiently.
Mr. Radnovich stated that the little orange squares will be used for exercise stations to increase people’s health as well as the land’s health. He then showed the Board the types of bridges that could be used to cross the arroyo. He went over other amenities and ideas that could be contained in the area.

Mr. Radnovich stated that up to now they have had two public meetings and one agency coordination meeting with the City of Rio Rancho and Maggie Cordova School representatives. Everybody seems to be on board with the project. They plan to have one more final Master Plan meeting to incorporate any ideas or comments that SCAFCA has. This project will be presented to the Maggie Cordova PTO on May 6th. Another presentation will be brought to the SCAFCA Board at the May 17th meeting.

Mr. Chaney asked about a cost of implementing the plan and who’s going to bear that cost. Mr. Gatterman stated that they will need to come up with unit costs on the different features that will be installed in the open space. The bridge and the associated parking lots and connecting trails could be paid for by the capital outlay appropriation and not a direct SCAFCA cost. Staff is also searching out other forms of funding for the trails that would be the potential federal government money. The idea is that for the other features that wouldn’t be covered by these other forms of funding that SCAFCA would reach out to the private community for donation and sponsorship. Mr. Radnovich stated that, as part of their scope, they will be developing a phasing plan, an implementation plan and a cost estimate. They are holding back on the cost estimates until there is close to final approval from everybody involved so that it is pretty stable to develop the cost estimate. The project is drawn from what is already there and just improving what’s already there, so it should not be too costly. The most costly portions would be the bridges, the trails and the access control around the boundary. Mr. Radnovich stated that they’ve done most of what they’re suggesting on other projects before so they should have a pretty good planning level cost estimate by the end of the work on the project.

Mr. Conkling stated that the original underlying economic infrastructure for this land is a place to which developers can contribute money in exchange for easements they need in their projects. This is called a land bank. Any time a developer needs an easement or drainage accommodations from SCAFCA, they can buy some of this property in exchange for the other property. Mr. Radnovich stated that all the entities he has been dealing with in regard to this project are very highly supportive of it and SCAFCA.

2. Action/Acceptance of contract amendment for Harvey Jones Channel construction.
Dave Gatterman stated this amendment is to provide for design for constructing the first phase of the channel construction on the Harvey Jones Channel. This will provide SSCAFCA with the first part of the optimum solution to change the channel to a trapezoidal channel to eliminate the sill. The intent is to use the money available in the capital outlay account and the SSCAFCA funds dedicated to this project to construct as much of the trapezoidal as possible. This will consist of removing the sill and then moving as far west as possible with the trapezoidal channel until the money runs out.

A motion was made by Mark Conkling to accept the contract amendment as presented. It was seconded by Jim Fahey and passed unanimously.

**Fiscal Services Director:**

1. **Recognition/Acknowledgment of the Fiscal Services Report for March 31, 2013.**

Deborah Casaus presented the Fiscal Services Report for March 31, 2013 in the Board’s packets. She stated that property tax collections are coming in as expected and there are no surprises. Budget projection should be achieved by the end of the year. General fund expenditures, fiscal year to date, are about 38% of the total budget and we’re about 75% through the fiscal year.

There were 31 single family residential permits issued by the City of Rio Rancho for the month of February 2013. She checked the website today and, as of today, there were an additional 53 issued for the month of March, which brings the total to 134 for the year versus 82 for the same time last year. That’s up about 63%. Interest earned on the State Treasurer’s funds was at a rate of .109%.

The Fiscal Services Report for March 31, 2013 was recognized and acknowledged by the Board.

2. **Action/Acceptance of Fiscal Year 2014 Preliminary Budget.**

Deborah Casaus stated that the Fiscal Year 2014 Preliminary Budget is in process. Some of the changes include a 1% increase in assessed valuation. Based on that, they increased the approximation by 1%, which should yield about $1,986,000.00 in revenue in the general fund. They propose keeping the mil rate the same at .828 mils for both residential and non-residential property. Those are subject to change based on DFA’s calculation of the mil rate and yield control. This will come around September after the final budget is submitted so those final mil rates won’t be in until then, but they will have a good idea when the final budget is submitted. There is a cost of living.
adjustment for salaries and wages at 2.1%. That is based on the same calculation of the CPI. Also included is performance incentives for all permanent employees ranging from about 2.9% to 5.4%.

Mr. Chaney stated that the Budget Committee suggested that the performance bonus be a one time incentive performance bonus to see the performance continue in the future. With regard to the incentive bonus, Mr. Fahey stated that since a lot of work is now being done in house and SSCAFCA has saved much more than any bonus would be, then it made sense to give the bonuses. The amount saved by performing work in house is in the neighborhood of $681,000.00. The thought is that some of that savings could be shared with the employees. Mr. Conkling stated that his feeling is that the structural change has been achieved and there is no reason to believe that it won't be there from now on. It is unlikely that SSCAFCA will go back to its old ways. If you take the savings achieved, then that amount goes forward without an annual budget and should be part of the new salaries. He suggested combining a permanent recognition of the structural change with annual incentives for opportunities. Mr. Rudy stated that he does not like the bonus idea at all. He would rather make it a permanent raise to the salaries. When you have a gain of this sort, the performance of the staff is only a part of that. If the performance is outstanding, he would like to treat them as their performance is outstanding rather than have it attached to a particular opportunity that came about in a certain year. The problem with giving a high raise every year is that eventually you are paying a lot of money every year for staff, as opposed to a performance bonus which does not necessarily affect the yearly budget in a great way.

Ms. Casaus stated that the budget is due by June 1 based on the statute. She proposed that if the budget meets the Board’s approval, it can be approved with that one item pending that can go to committee and it can be adjusted based on that. She stated that the health insurance premiums are increasing this year by 9.4% which is split between employer and employee. There will be an increase in the PERA contribution of about 1.5% on the employee side. There will be an increase on the employer side but not until 2015 which will be .4%. The operation and maintenance is funded at $766,000.00 and includes sediment removal, large storm clean out ($400,000.00) and trash and dumping, in addition to general O & M costs. The Improvements and Fencing Budget is $385,000.00 and will be used for planned fencing and facility improvements. A big change in the budget this year is for right-of-way. It is being reduced from $350,000.00 to a little less than $20,000.00. Staff is going to try to make all of the right-of-way purchases out of the construction fund, which is the capital fund budget and use the general fund budget for easements, surveys, etc. The general fund reserve will remain at $750,000.00, which includes the 1/12 requirement from DFA, as well as the additional $460,000.00 that SSCAFCA continues to keep in the reserve for emergencies. The debt service property tax is estimated to be about $3 million. This is the same rate as in fiscal year 2013. The construction budget is expected at about $6.5 million to be carried over. This is comprised mostly of the 2012 bond issue and a little remaining funds from the 2011 bond issue.
BOARD OF DIRECTORS REGULAR MEETING

APRIL 19, 2013

There are projects in the works to spend that money in addition to the other money received from appropriations.

A motion was made by Mark Conkling to approve the 2014 Preliminary Budget except for employee salaries. It was seconded by Jim Fahey and passed unanimously.

*Field Services Director:*


Jim Service stated that there was a meeting on Wednesday with the City, the contractor and the inspectors that are on the job. The contractor will start on Monday and it should be completed by the second week of May. After that, the dedication ceremony will be discussed. With that opening project, staff was going to incorporate the wall and the art in one fell swoop. Total project cost will be about $25,000.00 and is being done in house. The cost for doing this with outside services was about $80,000.00.

**CHAIRMAN’S REPORT.**

Mr. Rudy stated that he has been working with the COG Water Board and the Water Assembly, both of whom work on the state water resources plan. In the state budget, there was an allocation for starting an update of that. They are going to be doing two regions at a time. They have not yet determined which ones.

**BOARD OF DIRECTOR’S COMMENTS.**

None.

**COMMITTEE REPORTS.**

None.

**ATTORNEY’S REPORT.**

None.

**PROPERTY MATTERS.**
1. Action/Acceptance to purchase – Unit 21, Block 114, Lot 8 – 0.58 acres – PDV Dam
2. Action/Acceptance to purchase – Unit 17, Block 85, Lot 19 – 0.50 acres – Campeche Pond.

A motion was made by John Chaney to approve the purchase of the properties as presented. It was seconded by Jim Fahey and passed unanimously.

FOR YOUR INFORMATION:

1. March 13, 2013 correspondence to Governor Susana Martinez requesting support for Senate Bill 60/House Bill 337, section 21, items 6 and 7 for the Black Arroyo Pedestrian Bridge and the design and construction of the Lomitas Negras water quality structure and park.


OTHER BUSINESS.

- Next Regular Board Meeting is on Friday, May 17, 2013 at 9:00 a.m.

ADJOURNMENT.

A motion was made by Jim Fahey and seconded by John Chaney to adjourn the meeting. It was carried unanimously. Meeting adjourned at 12:15 p.m.

DONALD RUDY
CHAIRMAN

STEVE HOUSE
Secretary

DATE APPROVED: 5/17/13

C:\my documents\data\ssca\ca\2013\minutes 4-19