BOSQUE ECOSYSTEM MONITORING PROGRAM (BEMP) MONITORING REPORT FOR 2017

2017 ANNUAL STORMWATER QUALITY TEAM TECHNICAL REPORT

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Stormwater Quality Team BEMP Contract

Key personnel and contact information:
Kim Eichhorst, BEMP Co-Director; kimde@unm.edu; 505.277.0758
Dan Shaw, BEMP Co-Director; Dan.shaw@bosqueschool.org; 505.898.6388 ext. 129
Katie Higgins, BEMP Stewardship Coordinator, Katie.higgins@bosqueschool.org; 505.898.6388
Amanda Lindell, Office Manager, Amanda.lindell@bosqueschool.org; 505-898-6388
I. INTRODUCTION

Water quality is of critical importance to the many species, some endangered (e.g., the Rio Grande silvery minnow (*Hybognathus amarus*)), that inhabit the Rio Grande and to the surrounding populations that rely on the river as a major source of water. According to model scenarios presented in the Fourth National Climate Assessment released by the U.S. Global Change Research Program, temperatures are projected to increase in the Southwest by 3.72 to 4.80 °F by the mid-century, depending on the emissions scenario. Most of this warming is predicted to take place in winter, which will impact the amount of winter snowpack and the following spring runoff, an important contribution to the Rio Grande. Although the Southwest is predicted to experience more frequent heavy precipitation events, the region is also expected to see an overall decrease in precipitation. The predicted changes in temperature and precipitation for the Southwest will likely lead to fewer high spring flow events within the Rio Grande and an overall decrease in discharge throughout the year, increasing the potential for water shortages (USGCRP, 2017). Understanding the water quality of the Rio Grande, and what contributes to that quality, will be of extreme importance if there is to be less water within the river. If water sources remain contaminated at the current rate, the resulting lower flows will increase the concentration of contaminants and possibly make it unfit for certain uses. Maintaining a river that meets the water quality standards set by the US Environmental Protections Agency (EPA) and the New Mexico Environment Department (NMED) is dependent on understanding the factors that impact water quality through long term monitoring, especially in a rapidly changing climate.

Between May of 2010 and June of 2012 BEMP was funded by AMAFCA to monitor the water quality of the Rio Grande, in and around Albuquerque. Previous reports have found that *E. coli* levels often exceeded the NMED and EPA standards during the summer months, where from north to south *E. coli* levels increased as the Rio Grande ran through Albuquerque and downstream from Albuquerque’s wastewater treatment plant. In 2017, five sites were selected for monitoring with the intention of improving the understanding of water quality and what drives changes in water quality for the Rio Grande as it enters, flows through, and leaves Albuquerque. The purpose of the 2017 sampling for the Stormwater Quality Team monitoring was two-fold;
1. to determine if the trend of increasing *E. coli* levels from north to south continued and if this increase could be tied to other water quality parameters, and
2. to train student interns on how to collect water quality data, mentor select students through independent study projects related to river water quality, and to provide opportunities for those students to share what they learned with others.

In this report we present the raw data, photographs, and an analysis of our findings. The 2017 *E. coli* data can be found on page 5 and in Fig. 2 on page 6. An analysis and discussion of the 2017 *E. coli* data and comparison to previous collections can be found on page 15 and in Fig. 9 on page 17.

II. METHODS

A. Water Quality Sampling

Throughout 2017, five sites (Fig. 1) were sampled each month, during one calendar day, to monitor water quality within the Rio Grande. The five sampling sites are located at the following sites:
1. State Land Office (SLO) BEMP site, located near the Valle de Oro National Wildlife Refuge and north of the I-25 Bridge,
2. Montaño BEMP site, south of the Montaño Bridge,
3. Badger BEMP site, south of the Alameda Bridge,
4. north of the North Diversion Channel (N. Div. Channel or N. Diversion Channel), and
5. north of the US 550 Bridge (Coronado).

Table 1 includes the latitude and longitude for each site location. The sites sampled for the Stormwater Quality Team in 2017 were sampled from south to north beginning at the State Land Office (SLO) and moving on to Montaño, Badger, North Diversion Channel (N. Diversion Channel), and completing collections at Coronado.

Table 1. Site name, latitude (lat), and longitude (long) for the water quality sampling sites in 2017.

<table>
<thead>
<tr>
<th>Site Name</th>
<th>LAT</th>
<th>LONG</th>
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<tbody>
<tr>
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</tr>
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<td>Badger</td>
<td>35.195569</td>
<td>-106.641622</td>
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<tr>
<td>Montano</td>
<td>35.145288</td>
<td>-106.683070</td>
</tr>
<tr>
<td>State Land Office</td>
<td>34.967198</td>
<td>-106.685649</td>
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<tr>
<td>N. Diversion Channel</td>
<td>35.255230</td>
<td>-106.591100</td>
</tr>
</tbody>
</table>
Surface water samples were collected at each site and kept in an ice bath until the sample could be transported to an outside laboratory for analysis. At the laboratory, each sample was analyzed for E. coli and total coliform by the New Mexico State Lab. At the time of sampling for E. coli and total coliform, several in-situ water quality parameters were also measured and upstream photographs were taken. Measurements such as the turbidity, dissolved oxygen (DO), conductivity, specific conductance, water pH, and water temperature were taken using four instruments. Conductivity and specific conductance were measured using the YSI Model 30 Handheld Salinity Conductivity, and Temperature System, turbidity was measured using the LaMotte 2020we Portable Turbidity Meter, DO was measured using the 550A Dissolved Oxygen Instrument, and pH was measured using the Mettler Toledo SevenGo. All instruments were calibrated according to the instruction manual prior to field sampling. Each of these instruments also recorded the temperature of the water at the time of sampling. During 2017 a new DO meter, YSIPro20i, and pH meter, Seven2Go, were introduced in October and May, respectively. Basic atmospheric measurements, such as air temperature and barometric pressure were measured using a Kestrel Weather and Environmental Meter and Mingle Barometer Altimeter. The discharge of the Rio Grande is recorded from the USGS gage station located at the Albuquerque Central Bridge (gage ID 08330000) on the day of sampling. Lastly, observations of water appearance, general weather conditions, unusual odors, and the presence of watershed or in-stream activities and upstream water fowl were recorded.

Upon returning to UNM, upstream photographs (e.g., Image 1) were uploaded and labeled using the format “sitename_ddMonyyyy.jpg”, for example, the photograph taken at Badger on April 24, 2017 is labeled as “Badger_24Apr2017.jpg”. All photographs and raw data will be available upon request, and are expected to be available on the University of New Mexico’s Digital Repository in early 2018.
B. Education and Outreach

Education and outreach numbers were tracked for each sampling trip and for any event in which water quality data were shared. For each education or outreach event, the date, number of students, number of adults, the BEMP staff involved, the school that the students attend, and a brief description of the event were recorded. During monthly sampling, the education and outreach information was recorded alongside the sampling data. Other education and outreach events that used water quality data were recorded by the BEMP staff involved with that event. Each month, those numbers were reported to the BEMP’s Science Coordinator and were then incorporated into the Excel spreadsheet.

Image 2: Students from La Academia de Esperanza, Albuquerque Institute of Math and Science and the University of New Mexico participate in field data collection activities throughout 2017.

III. RESULTS

A. Water Quality Sampling

In 2017 E. coli levels were relatively low at each of the sites (Fig. 2A). The annual average E. coli levels, based on the monthly sampling, for Coronado, N. Div. Channel, Badger, Montano, and SLO were 27.3, 30.4, 42.1, 95.2, 373.0 MPN/100ml, respectively. Across all of the sites there was a slight increase in E. coli in April and July. The EPA limit for E. coli levels is set at 410 MPN/100ml for a primary contact stream in New Mexico (NMED 2010). There were four instances where E. coli levels exceeded the EPA limit. All four instances took place at SLO (southern end of Albuquerque) during the months of July, August, September, and October. E. coli levels were highest at SLO in July with a measured value of 1732.9 MPN/100ml.

The river temperature and discharge are presented alongside the E. coli as it is believed that temperature (e.g. Carillo et al., 1985) and discharge may have strong controls on E. coli levels. The relationship between E. coli, discharge, and temperature is discussed in more detail in section III. Discussion B. River E. coli. River temperature was taken by three instruments (DO meter, pH meter, and the conductivity meter). In the results, we only present the temperature readings from two of the instruments (the conductivity meter and the DO meter) since across all instruments the temperature readings are very similar. All temperatures readings are presented in the raw data.

There was very little variance in river temperature between sites each month (Fig. 2B). Temperatures increase from January until the middle of the year, peaking in July and August,
and decreased from their peak into December. All sites reach maximum temperatures in either July or August and minimum temperatures in either December or January.

During sampling, discharge in the Rio Grande increased from January to April, decreased from April to July, remained consistently low from July to October, and increased slightly from October to December (Fig. 2C). Discharge was greatest during spring sampling and reached its maximum in the month of April.

**Figure 2.** A.) *E. coli* levels sampled each month at Coronado, N. Div. Channel, Badger, Montano, and SLO. The dashed red line marks the EPA single sample limit of 410 MPN/100ml. Note the y-axis is on a logarithmic scale. B.) Temperature (°C) of the water at the time of conductivity sampling. C.) Discharge of the Rio Grande measured at the USGS gage station located at the Albuquerque Central Bridge (gage ID 08330000). Discharge measurements were considered provisional data by the USGS.

Conductivity followed a similar pattern across all sites, with a few exceptions (Fig. 3A). Since conductivity varies with temperature, the river temperature recorded at the time of conductivity was measured is presented beneath the conductivity measurement (Fig. 3B). From
January to May, conductivity remained relatively low and generally decreased slightly. The one exception during this time period was at the State Land Office, where in March conductivity increased by almost 50 µS before continuing to decrease. From June through August, conductivity increased with each month, reaching maximum levels in August for all sites. From September to December, conductivity decreased each month for all sites. Throughout 2017, conductivity was greatest at SLO with the exception of December, when conductivity at the N. Div. Channel was greater.

**Figure 3.** A.) Conductivity (µS/cm) sampled each month at Coronado, N. Div. Channel, Badger, Montaño, and SLO. B.) Temperature (°C) of the water at the time of conductivity sampling each month at Coronado, N. Div. Channel, Badger, Montaño, and SLO.
Specific conductance is calculated so that all measurements can be directly compared. The specific conductance is the conductivity normalized to 25°C and is calculated by the conductivity meter using the following equation:

\[
\text{Specific conductance (25°C)} = \frac{\text{Conductivity}}{1 + \text{TC} \times (T - 25)}
\]

where, TC is the temperature coefficient and T is the temperature of the solution at the time of sampling. The instrument is set to use a temperature coefficient of 0.0191 (YSI Incorporated, 1997).

The specific conductance across all sites generally followed a similar pattern with the exception of SLO (Fig. 4). For Coronado, N. Div. Channel, Badger, and Montano, from January to June, the specific conductance decreased approximately 125 µS/cm. From June to December the specific conductance at these sites increased, reaching levels similar to January 2017. Between September and November, there was a slight leveling out of the specific conductance before it increased slightly in December.

Although the specific conductance at SLO was greater throughout 2017, the overall trend matched the rest of the sites, except in March when the specific conductance at SLO increased by 9.3 µS/cm, rather than decreasing approximately 75 µS/cm as would be expected based on the rest of the sites. With the exception of December, the specific conductance was greatest in 2017 at SLO. In December specific conductance at N. Div. Channel exceeded the specific conductance at SLO by 16.7 µS/cm.

![Figure 4. Specific Conductance (µS/cm), conductivity normalized to 25°C, sampled each month at Coronado, N. Div. Channel, Badger, Montaño, and SLO.](image)

Two measures of DO were taken at each site; DO was measured in mg/L and in percent saturation. This paragraph describes the DO measured in mg/L. DO measurements each month at each site generally followed the same trend (Fig. 5A). From January to July, DO decreased from
approximately 11 mg/L to 6 mg/L. From July to December, DO increased back to approximately 11.5 mg/L. DO is greatest throughout the year at the Coronado site in December.

The river temperature and barometric pressure are presented alongside the DO measurement as temperature and barometric pressure are strong controls on DO levels. The relationship between DO, temperature, and barometric pressure is discussed in more detail in section III. Discussion B. River Dissolved Oxygen (DO). As with the temperature recorded using the conductivity meter (Fig. 3B), the river temperature across all sites is consistent each month. Temperatures increased from January to July and decreased from July and August to December (Fig. 5B). Barometric pressure is relatively stable throughout sampling, oscillating between 850 and 880 hPa for all months.

**Figure 5.** A.) Dissolved oxygen (mg/L) sampled each month at Coronado, N. Div. Channel, Badger, Montaña, and SLO. B.) Temperature (°C) of the water at the time of DO sampling. C.) Barometric pressure at the time of sampling.
This paragraph describes the percent saturation of DO (Fig. 6). Throughout 2017, the percent of DO generally decreased from January to July by approximately 15% across all of the sites. For all sites except Coronado, the percent of DO reached the annual minimum, between 71.6% and 74%, in July. From August to December, the percent saturation of DO generally increased, the greatest increase took place between July and August. Between July and August, the percent saturation of DO increased by approximately 10% across all sites. For SLO, Montaño, and Badger, DO oscillated between September and December, but overall increased into December. For Coronado and N. Div. Channel, between September and December there was little increase in the percent saturation of DO. The percent saturation of DO was greatest throughout 2017 at the Coronado site.

**Figure 6.** A.) Percent saturation of dissolved oxygen sampled each month at Coronado, N. Div. Channel, Badger, Montaño, and SLO. B.) Temperature (°C) of the water at the time of DO sampling. C.) Barometric pressure at the time of sampling.
For all five sites, pH remained between 7 and 9 (Fig. 7). The trend throughout 2017 was relatively similar between the sites with a few exceptions. The pH in January was the lowest for most sites, averaging approximately 7.3 for all sites except Montaño. Between February and June, the pH was relatively stable, approximately 8.1 across all of the sites, except for at Coronado in April when the pH dropped to 7.03. In July, the pH decreased to approximately 7.8 for all sites, except SLO where the pH increased to 8.95. From August to September, there was a slight decrease in pH across all sites.

![2017 Average River pH Log](image)

**Figure 7.** Average pH log sampled each month at Coronado, N. Div. Channel, Badger, Montaño, and SLO.

Waterfowl are reported as the minimum number of waterfowl observed upstream at a site since there are instances where the total number cannot be accurately counted but a minimum number can be estimated. In 2017 there were several sightings of upstream water fowl at each of the sites (Fig. 8). Most of the waterfowl were observed in January, February, November, and December. Of the five sites, waterfowl sightings were greatest at Badger, with at least 356 waterfowl observed. The least number of waterfowl was at the N. Div. Channel with only five observed waterfowl.
Figure 8. Estimated minimum number of upstream waterfowl observed each month at Coronado, N. Div. Channel, Badger, Montaño, and SLO.

From the observations of water appearance, general weather conditions, and unusual odors, there were a few worth making note of. Generally, weather conditions were calm and sunny or partly sunny on the day of sampling. However, there were a few months when winds were higher. In May, July, September, and November, slight winds or breezy conditions were noted at all or most sites. In February, conditions were windy during sampling at all sites. There were only two observations of unusual odors, the first was in August at Montaño where the source of the odor was identified as trash beneath the Montaño Bridge, and the second was in September at SLO when a light ammonia smell was detected downstream from the Southside Wastewater Reclamation Plant. There were only two observations of unusual water appearance, both at Coronado. In January the water was light green in color and in December the water appeared green again.

B. Education and Outreach

Throughout 2017, BEMP worked with a total of 351 students and 39 adults through various education and outreach activities (Table 2). BEMP’s water quality education and outreach numbers are broken down by percent in the following list:

- Monthly sampling - 16%,
- Sampling for school projects - 7%,
- Student presentations - 57%,
- BEMP staff presentations to students – 19%

We should note that for some of these activities, students may be counted multiple times throughout the year. In the raw data, there is currently a column (not shown in Table 2) that indicates whether or not the students participating were the same students as the previous month. BEMP is working to develop a new system to keep better track of the student numbers and when students are participating more than once in BEMP programs.
Students from La Academia de Esperanza who participated in the field sampling events multiple times prepared and presented the results of their data collection to other students from several different schools at the end of the 2016-2017 school year at the BEMP student Congress held at El Rancho de las Golondrinas. Additionally, students from the Nex+Gen Academy used some of the water quality data (specifically *E. coli*) and presented their analyses to students from Jefferson Middle School at the Valle de Oro National Wildlife Refuge.
Table 2. Student outreach numbers for 2017. School names have been abbreviated, **AIMS**: Albuquerque Institute of Math and Science, **BS**: Bosque School, **ECA**: Early College Academy, **JMS**: Jefferson Middle School, **LADE**: La Academia de Esperanza, **Nex+gen**: Nex+gen High School, **RRHS**: Rio Rancho High School, **UNM**: University of New Mexico.

<table>
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<tr>
<th>Date</th>
<th>Number of students</th>
<th>Number of adults</th>
<th>School</th>
<th>Activity performed</th>
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<td>25-Jan-17</td>
<td>1</td>
<td>0</td>
<td>UNM</td>
<td>Field data collection</td>
</tr>
<tr>
<td>28-Feb-17</td>
<td>5</td>
<td>0</td>
<td>LADE</td>
<td>Field data collection</td>
</tr>
<tr>
<td>29-Mar-17</td>
<td>5</td>
<td>1</td>
<td>LADE</td>
<td>Field data collection</td>
</tr>
<tr>
<td>24-Apr-17</td>
<td>5</td>
<td>1</td>
<td>LADE, AIMS</td>
<td>Field data collection</td>
</tr>
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<td>31</td>
<td>2</td>
<td>LADE</td>
<td>Presentation - BEMP and Watershed Watch Congress event</td>
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<td>70</td>
<td>10</td>
<td>LADE</td>
<td>Presentation - BEMP and Luquillo LTER Spanish Web Symposium</td>
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<td>Field data collection</td>
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<td>17-Jul-17</td>
<td>69</td>
<td>8</td>
<td>Nex+gen</td>
<td>Hydrology VDO research project launch - Explaining what hydrology projects could develop into and presenting previous projects and examples they could select a project from.</td>
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<td>Field data collection</td>
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<td>Field data collection for VDO school project (not monthly river sampling)</td>
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<td>None</td>
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<td>Nex+Gen, JMS</td>
<td>Nex+Gen senior groups working with BEMP on a VDO water quality project presented their projects to Nex+Gen and JMS students.</td>
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<td>Field data collection</td>
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<td>19-Dec-17</td>
<td>1</td>
<td>0</td>
<td>UNM</td>
<td>Field data collection</td>
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</table>
IV. DISCUSSION

Based on the in-situ measurements of water quality in the Rio Grande, water quality within Albuquerque appears to be within water quality standards for most of the 2017 year, and possibly improving relative to data collected between 2010 and 2012. From 2010 to 2012 BEMP collected in-situ water quality data at four different sites, similar in location to the five sites selected for sampling in 2017. The samples collected from 2010 to 2012 were taken at the following sites:

1. BEMP’s Savannah site, near the Montano Bridge,
2. BEMP’s Badger site, south of the Alameda Bridge
3. Shirk Lane, near BEMP’s SLO site, and
4. north of the US 550 Bridge (Coronado).

The sampling at these sites from May 2010 to June of 2012 was funded by AMAFCA/the Stormwater Quality Team. Comparing the in-situ measurements from 2017 to those collected from 2010 to 2012, several changes are noticeable. Between 2010-2012 and 2017, E. coli (Fig. 9), turbidity (Fig. 12), specific conductance (Fig. 11) all decreased and the DO content increased (Fig. 10). The pH (Fig. 13) and water temperature (Fig. 14), on the other hand, were relatively unchanged between the two sampling periods. Some of the changes in in-situ water quality data are discussed in more detail below.

A. River E. coli

E. coli appears to be dramatically lower in 2017 (Fig, 9). The EPA limit for a single E. coli coliform sample has been established at 410 MPN/100ml, of all five sites, this limit was exceeded only at SLO, during the months of July, August, September, and October in 2017. In 2011 E. coli samples were collected three to five times per month from May through October. During the months of July, August, September, and October in 2011 there were several times when all four sites exceeded the EPA limit, not just the site to the south of Albuquerque’s Wastewater Treatment Plant (Eichhorst, 2011). In July and August, all four sites exceeded the EPA limit, in September, all sites except Coronado exceeded the EPA limit, and in October, only Badger and the Shirk Lane site exceeded the EPA limit. E. coli certainly appears lower in 2017, with only one site exceeding the EPA limit, but a higher frequency of sampling might find that in 2017, the sites north of Albuquerque’s Wastewater Treatment Plant exceeded the EPA limit from July through October as well.

Levels of E. coli within a river are strongly tied to temperature and discharge. Increases in the level of E. coli in 2017 primarily fell during periods of high air and water temperatures, June through September, and low river discharge, January, February, and June through October. While previous studies have attributed increased E. coli levels with large storm events (Joint Biological Assessment, 2015), none of the instances of high E. coli levels in 2017 can be attributed to storm events. In the three days prior to sampling, there was little if any precipitation recorded at the Albuquerque International Sunport (not shown) (Weather Underground).

B. River Dissolved Oxygen (DO)

DO and river temperature have a negative relationship where, when river temperatures increase, the DO in the river decreases. As a result of the temperature dependence, DO levels are seasonal, during the cooler months, DO is high, and during the warmer months DO is low. This can be seen in both the measurements taken from 2010-2012 and in 2017 (Fig. 10). While DO is also dependent on atmospheric pressure, the dependence is nowhere near as great as it is with
temperature. Compared to 2010-2012, DO has increased in the Rio Grande, though only slightly, approximately 0.6 mg/L.

C. River Temperature
The temperature of the Rio Grande is positively linked to air temperature and between 2010-2012 and 2017, there appears to be little difference in the river temperature. The profile of the river temperature follows that of the air temperature and as a result, the river temperature is seasonal. Even though there is seasonality to the water temperatures and they are strongly dependent on air temperature, there are many other factors that control the temperature of the Rio Grande. River temperatures are also dependent on the depth of the water, incoming solar radiation, and turbidity. From the data that are available, it is not possible to suggest whether the temperatures of the Rio Grande will increase with the expected increase in air temperatures. Since both DO and \textit{E. coli} are strongly linked to the temperature of the Rio Grande, temperature will be important to continue to monitor.

D. Water Quality south of Albuquerque’s Wastewater Treatment Plant
For most of 2017, water quality has been the lowest at SLO;
1. Both specific conductance and turbidity were high, suggesting that there were many more dissolved solids and suspended solids in the Rio Grande at SLO relative to the other sites.
2. DO was low, which may generate an environment that is less suitable for aquatic plants and animals.
3. SLO was the only site to exceed the EPA’s single sample \textit{E. coli} limit and it did so four times throughout 2017.

The lower quality of water at SLO is most likely due to the fact that the site is directly south of Albuquerque’s Wastewater Treatment Plant. While higher quality water is being removed from the Rio Grande and diverted into Albuquerque, the water below the Wastewater Treatment Plant in the southernmost part of Albuquerque is of lower quality. There should be continued efforts to improve the quality of water that is being returned to the Rio Grande and sent south from Albuquerque’s Wastewater Treatment Plant.

E. Water Quality and the Endangered Rio Grande Silvery Minnow
Based on census data, the endangered silvery minnow populations have been in decline in recent years (Joint Biological Assessment, 2015), not including this past year. Ideally, the Rio Grande would have prolonged and elevated flows (Dudley et al., 2015), low turbidity (Joint Biological Assessment, 2015), warmer river temperatures that do not exceed 36ºC (Buhl, 2008), minimal variance in daily river temperature (Joint Biological Assessment, 2015), DO well above the lethal threshold of 0.6 mg/L (Buhl, 2008), and pH between 6.6 and 9.9. In 2017, water quality appears to have improved for the silvery minnow; there was high spring runoff in April and May of 2017 which resulted in high numbers this year and may lead to increased recruitment in 2018. River temperatures and pH remained within the thresholds in 2017, turbidity decreased, possibly helping to increase the availability of food, and DO levels stayed well above the lethal threshold. Ideally, the improved water quality of the Rio Grande within Albuquerque will lead to larger, healthier, wild populations of the silvery minnow.
Figure 9. *E. coli* levels for samples collected in 2017 (black circles) and in 2011 (blue triangles) at all sites. The dashed red line marks the EPA single sample limit of 410 MPN/100ml. Note the y-axis is on a logarithmic scale.

Figure 10. Dissolved oxygen (mg/L) for samples collected in 2017 (black circles) and in 2011 (blue triangles) at all sites.
Figure 11. Specific conductance for samples collected in 2017 (black circles) and in 2011 (blue triangles) at all sites.

Figure 12. Minimum turbidity for samples collected in 2017 (black circles) and in 2011 (blue triangles) at all sites. Note the y-axis is on a logarithmic scale.
Figure 13. River pH for samples collected in 2017 (black circles) and in 2011 (blue triangles) at all sites.

Figure 14. River temperature (C) for samples collected in 2017 (black circles) and in 2011 (blue triangles) at all sites.

V. CONCLUSIONS

Most measures of water quality appear to be improving relative to 2010-2012, but whether this relationship continues to hold true will become more apparent with longer term monitoring efforts. The expected changes in climate for the southwestern United States, specifically the increases in air temperature and decreases in annual snowpack (Gutzler 2013),
will likely impact the quality of our water resources, making long-term monitoring efforts crucial to understanding the health of the water resources in the Middle Rio Grande.

BEMP’s raw data and photographs are available upon request, and in early 2018 they will be available on the UNM Digital Repository.
VI. REFERENCES CITED


