2018 Taos Water Quality Sampling Report
– Rio Hondo, Rio Fernando and Rio Pueblo de Taos

Summary:
Surface water quality sampling was conducted in the Taos NM area in June, September, and October, 2018. Samples were collected from 5 sites in the Rio Hondo, 4 sites in the Rio Pueblo de Taos, 4 sites in the Rio Fernando de Taos, 4 sites in the Red River, and 1 site in the Rio Grande. All sample sites were monitored for dissolved oxygen, temperature, electrical conductivity, pH, and *E. coli*. Several sites near the Taos Wastewater Treatment Facility were also monitored for nutrients. Sites on the Red River were monitored for hardness and total Aluminum. Water quality standards were exceeded at least once in every river.

Water levels were extremely low throughout the 2018 sampling season. It was a very dry year conducive to wild fires. The threat was so high that Carson National Forest lands were closed for several weeks during the summer. The impact of these extremely low water levels should be considered throughout this document.

Rio Fernando Results: The Rio Fernando frequently failed to meet standards for electrical conductivity. High *E. coli* levels and high electrical conductivity at Fred Baca Park area continue to be a problem in the summer months. Phosphate and Nitrate levels were checked at all sites in 2017 and 2018. While there was one high phosphate level at Fred Baca Park in 2017, there were no exceedences of nutrient levels at any of the sites in 2018. Sampling results in 2018 again confirm the New Mexico Environment Department's previous listing of the lower segment of the Rio Fernando de Taos *E. coli* in the upper two segments, and for *E. coli*, Nutrient/Eutrophication Biological Indicators, Sedimentation/Siltation, Specific Conductance, and Temperature in the lower segment. High *E. coli* levels also continue to plague the upper and lower Rio Fernando sites.

Rio Pueblo Results: In 2018 we continued to monitor the impact of the Taos wastewater treatment plant on the Rio Pueblo and on a small perennial unnamed stream that flows from the wastewater treatment plant. The results from the perennial unnamed wastewater stream had high electrical conductivity readings, phosphate, and nitrate levels. While there are still not an electrical conductivity standard or nitrate for the unnamed perennial stream, levels are well above the water quality standards usual for waters in this region. *E. coli* levels were above water quality standards farther upstream at P1 and P4. We also saw very low dissolved oxygen levels and high electrical conductivity at these sites.

Red River Results: Aluminum levels continue to be high in the Red River. Chronic criteria for aluminum was exceeded at RR3 from 2014-2017. Chronic criteria cannot be exceeded more than once every 3 years. While chronic criteria was not exceeded in 2018, the hardness was higher, which raised the standard considerably. Please see the Red River section for more information on aluminum levels.

Rio Hondo Results: While 2017 results presented a very clean year on the Rio Hondo, 2018 showed several electrical conductivity and phosphate exceedences. These values are likely influenced by a low water year in combination with increased construction activity at the Taos Ski Valley. We will continue to monitor this closely.

Introduction:

This sampling project was initiated by the Sierra Club group Sentinels – Rios de Taos due to a concern that inadequate data were available to accurately assess the health of the Rio Hondo, Rio Fernando, and Rio Pueblo de Taos watersheds. Sentinels – Rios de Taos contacted Amigos Bravos in 2005 with concerns about water quality in local watersheds. Specifically, there was some concern about nutrient loading in the upper Rio Hondo. With Amigos Bravos' assistance Sentinels-Rios de Taos identified sampling locations and developed a monitoring plan. National representatives from Sierra Club's Water Sentinels program traveled to Taos and gave several trainings to the Sentinels – Rios de Taos' volunteers. Sentinels – Rios de Taos initiated sampling first in February of 2007 with assistance from Amigos Bravos. In 2012 four sites in the Red River were also monitored. Eleven previous sampling reports have been prepared for sampling that occurred in 2007 - 2017. This report covers the sampling conducted in 2018.

Methods:

Surface water quality sampling was conducted in the Taos NM area in June, September, and October 2018. Samples were collected from 5 sites in the Rio Hondo, 4 sites in the Rio Pueblo de Taos, 4 sites in the Rio Fernando de Taos, 4 sites in the Red River, and 1 site in the Rio Grande. (Appendix A and Appendix C). All samples were kept on ice until they were processed by Sangre de Cristo labs in Alamosa Colorado. Laboratory samples were collected for *E. coli*. For some samples, nitrates, phosphates, hardness, or aluminum were also analyzed. All laboratory samples were collected and processed within an 8-hour holding time. EPA approved methods and holding times were used to analyze the samples (Appendix B). Field measurements for pH, temperature, dissolved oxygen and conductivity were conducted. Field measurements of hardness were collected for all samples that were analyzed for aluminum (Appendix B).

Nitrates and phosphates are measured at many of the sites. Segment specific criteria for Nitrate are not set. There are numeric criteria for Nitrate for Drinking Water Supply use only and that limit is 10mg/L. In surface water however, lower levels of nitrates contribute to algae blooms and lower the pH of the water. These effects start around 3ppm. Nitrogen compounds can be as high as 0.5mg/L in rainfall. Other sources include fertilizers (agriculture and lawn types), animal waste, and human waste. Nitrate levels above 3 ppm are indicative of pollution running off the land and into aquatic habitats.

The concentration of aluminum in natural waters can vary significantly depending on various physicochemical and mineralogical factors. Dissolved aluminum concentrations in waters with near-neutral pH values usually range from 1 - 50 μg/L but rise to 500–1000 μg/L in more acidic waters or water rich in organic matter. At the extreme acidity of waters affected by acid mine drainage, dissolved aluminum concentrations of up to 90,000 µg/L have been measured. The current New Mexico Water Quality Standards

provide a table for maximum aluminum values, which are now dependent on hardness following the 2010 updates. They provide values for both acute and chronic criteria (see (3) Table of Selected Values, pg. 45-46 of the NM Standards for Interstate and Intrastate Surface Waters). For a hardness of 100, a common value here, the standards are: 3,421 ug/l acute; 1,370 ug/l chronic . For a hardness of 220 (common result in 2018), the standards are: 10,071 acute; 4,035 chronic ug/l.

Acute criteria is for toxicity involving a stimulus severe enough to induce a response in 96 hours of exposure or less. Compliance with acute water quality criteria is determined from the analytical results of a single grab sample and cannot be exceeded. Chronic criteria effects include, but are not limited to, lethality, growth impairment, behavioral modifications, disease, and reduced reproduction. Compliance with chronic water quality criteria is determined from the arithmetic mean of the analytical results of samples collected using the appropriate protocols. Chronic criteria cannot be exceeded more than once every three years.

Results:

A list of the full sampling results for 2018 can be found in Appendix C.

Rio Hondo:

June 13, 2018: Laboratory samples were collected from 5 sites in the Rio Hondo. All 5 samples were analyzed in the lab for *E. coli.* Phosphate and nitrate were also measured. Field readings for temperature, pH, conductivity, and dissolved oxygen (DO) were taken at these 5 locations. Phosphate levels were above the water quality standard at the Ski Valley Children's Center and the Ski Valley water treatment plant effluent pipe (H2E and H2C - Appendix C). While there are not segment specific Nitrate standards, these same sites (Ski Valley day care and Ski Valley effluent pipe discharge) were at levels of 0.47 and 0.53 ,which is higher than 2017 nitrate levels and approaching levels that encourage algal growth. Phosphate levels were two times higher than the standards allow. This indicates that organic pollution is occurring at these two sites. Conductivity was 4.5 times the allowable standard at H2C, near the Children's Center at the Taos Ski Valley. H6, near the confluence with the Rio Grande had a pH level of 9.06.

September 11, 2018: Laboratory samples were collected from 5 sites in the Rio Hondo. All 5 samples were analyzed in the lab for *E. coli.* Phosphate and nitrate were also measured. Phosphates levels were over the limit at H2C and H2E, the only places tested for it. Nitrate levels were non-detectable. Field readings for temperature, pH, conductivity, and dissolved oxygen were taken at all sites. Electrical conductivity was exceeded at H2C again and also at H2B3, at the Sutton Place Bridge in the Taos Ski Valley (Appendix C). The levels were about 4.4 times higher than the standard.

October 11, 2018: Laboratory samples were collected from 5 sites in the Rio Hondo. All samples were analyzed in the lab for *E. coli.* Phosphate and nitrate were also measured. Phosphate was 0.2mg/L (twice the limit) at H2C (Children's Center at Ski Valley). Field readings for temperature, pH, conductivity, and dissolved oxygen were taken at these 5 locations. Electrical Conductivity was again exceeded but at a different site. Water near

the Bavarian Inn (H2B) displayed an electrical conductivity 4.6 times higher than the standard (Appendix C).

Rio Pueblo:
June 13, 2018: Laboratory samples were collected from 4 sites in Rio Pueblo de Taos and analyzed for *E. coli.* Nitrate, phosphate and ammonia amounts were analyzed for all four sites. Field readings for temperature, pH, DO, and conductivity were taken. Conductivity at P4, PS2, and PS3 were all above the standard. Phosphate levels at P1 and PS3 were elevated above the standard by 2-5 times. Nitrate levels at PS2 were 1.32mg/L, approaching the 3ppm level that encourages algal blooms. It is important to note that there are no official standards for phosphate/phosphorous or electrical conductivity at PS2 and PS3. Ammonia levels were all within reasonable levels.

September 11, 2018: Laboratory samples were collected at 4 sites in the Rio Pueblo de Taos and analyzed for *E. coli*. Phosphate, nitrate and ammonia levels were taken from three of the four sites because PS2 was dry and could not be sampled. Phosphate, nitrate and ammonia were all within usual standards. Field readings for temperature, pH, DO, and conductivity were taken at sites with water. Upper Ranchitos Road at Paseo del Pueblo Norte (P1) had a very low dissolved oxygen reading of 1, well below the standard of 6. P1, P4 and PS3 all had elevated conductivity readings (445, 425, and 493 microsiemens/cm respectively), although no official standards exist for conductivity at these sites. *E. coli* levels at the bridge by Los Cordovas (P4) were about 3.3 times the standard (Appendix C).

October 11, 2018: Laboratory samples were collected at 4 sites in the Rio Pueblo de Taos and analyzed for *E. coli*. Phosphate, nitrate, and ammonia levels were analyzed at all sites. Field readings for temperature, pH, DO, and conductivity were also taken at all sites. The nitrate level was again high at PS2 (unnamed perennial stream below the wastewater plant) with a reading of 1.11 mg/L. PS3 showed a slight elevation in nitrate level of 0.31. Electrical conductivity at PS2 measured at 818, which is well above the standard that applies to the other river segments (400-500 microsiemens/cm) that we sample in this project. This has occurred at this site for the past several years. Conductivity levels were also high at P4 and PS3. (Appendix C). *E. coli* levels were exceeded at P1 and P4, showing levels of 1413.6 and 325.5 CFU's/100ml. The standard is 235 CFU's/100ml.

Rio Fernando de Taos:
June 13, 2018: Laboratory samples were collected at four sites in the Rio Fernando and analyzed for *E. coli,* phosphates and nitrates and aluminum. Field readings for temperature, pH, DO, and conductivity were also taken. FRE, the riparian exclosure was dry so a slightly different location where water had come back into the river was tested. *E. coli* levels were high at both sites in the upper watershed (FLJ and FRE). Conductivity was high and dissolved oxygen was low at FLJ as well. F1 and F4 had electrical conductivity levels of 654 and 889 microsiemens/cm (400ms/cm standard) and did not test above water quality standards for other parameters (Appendix C).

September 11, 2018: Laboratory samples were collected at the same four sites in the Rio Fernando and analyzed for *E. coli*, nitrates and phosphates. Aluminum levels were not taken again. Field readings for temperature, pH, DO, and conductivity were also taken. La Jara canyon at the top of the watershed was low in dissolved oxygen (4.5, standard is 6) and high in *E. coli* (410.6 and standard is 235 CFU/100ml). FRE downstream did not exceed any parameters. El Nogal (F1) exceeded in dissolved oxygen, and electrical conductivity. Fred Baca Park (F4) exceeded in dissolved oxygen, *E. coli* and electrical conductivity. *E. coli* levels at F4 were 3.2 times higher than the allowable standard.

October 11, 2018: Laboratory samples were collected at three sites in the Rio Fernando and analyzed for *E. coli,* nitrate, and phosphate. The El Nogal Trailhead site (F1) was dry and so not sampled. Field readings for temperature, pH, DO, and conductivity were also taken at the three sites with water. Electrical conductivity measurements were above the standard at the riparian exclosure and Fred Baca Park (FRE and F4). Fred Baca Park also displayed high *E. coli* levels 2 times higher than the standard. The pH standard was exceeded at F1, just above the upper limit of 8.8.

Red River:
On June 13, September 11 and October 11 2018, samples were collected from four sites (RR1, RR2, RR3 and RR4) on the Red River. All of the sites were tested for hardness, aluminum, dissolved oxygen, electrical conductivity, pH and temperature. All of the sites met water quality standards for aluminum for the first time in several years. Hardness levels were higher than normal, meaning higher aluminum levels are allowed according to the standards.

June 13, 2018: RR2 and RR3 were above electrical conductivity standards. RR4 was not sampled. All sample sites met aluminum standards. Hardness levels were higher than usual this year ranging from 160-420 instead of 100-240 as in previous years.

September 11, 2018: RR1 was not sampled. All three sampled sites were about double the electrical conductivity standard. No other tested parameters, either in the laboratory samples or field samples, were above water quality standards (Appendix C).

October 11, 2018: RR1 was not sampled. All three sampled sites were about double the electrical conductivity standard. No other tested parameters, either in the laboratory samples or field samples, were above water quality standards (Appendix C).

Rio Grande:

Samples were taken at one location on the Rio Grande on June 13th and October 11th. This site is just downstream of the confluence of the Rio Hondo and the Rio Grande. pH was at 9.02 in June, above the standard. No other exceedances of water quality were found at this site.

Discussion:

Rio Hondo
In 2018 the Rio Hondo struggled with phosphate levels near the Taos Ski Valley children's center and the Ski Valley effluent pipe discharge. Electrical conductivity was also very high at Sutton Place Bridge, the children's center, and the Bavarian Inn. Phosphate levels began showing high levels in 2017. This is likely influences by increased operations and construction at the Taos Ski Valley in the last 2 years. We will monitor these levels closely in 2019 and begin discussions with the Taos Ski Valley if necessary.

Rio Fernando
Amigos Bravos and Sentinels Rios de Taos have been collaborating to collect water quality samples and prepare the attached reports for rivers in the Taos area, including the Rio Fernando de Taos, for the past 12 years. Our sampling results show numerous electrical conductivity and *E. coli* water criteria exceedances in the Rio Fernando. Furthermore, sites FLJ, F1, F4 had dissolved oxygen levels lower than the standard range and electrical conductivity levels well above standard levels.

The abundant *E. coli* exceedences that have been documented on this river have been discussed in previous reports. Amigos Bravos is pleased to be working with the NMED on a Watershed Based Plan for *E. coli* in this river. We are also collecting Microbial Source Tracking research at five *E. coli* hotspots on the river. These results will be available in the fall of 2019.

Rio Pueblo de Taos
While there is no standard electrical conductivity standard for the lower Rio Pueblo de Taos (PS2) and therefore no exceedances of standards, the electrical conductivity readings at site PS2 continue to be some of the highest recorded in the four river systems sampled. The levels were well above the standards that apply to similar river systems such as the Rio Hondo and Red River where the electrical conductivity standard is <=400 microsiemens/cm.

PS2 (waste water effluent) had high nitrate levels on both testing days and exceeded the phosphate standard at other streams by 5.5 times on October 11th. P4 (near confluence with Rio Grande del Rancho) and P1 (near Paseo) had *E. coli* exceedences this year. These sites did not have any exceedences last year. This was likely influenced by a very dry year in the area.We will continue to monitor this closely before taking any action.

Red River
Aluminum levels were not exceeded at any site for the first time in many years in 2018. This is in part due to the higher hardness levels measured. We will continue to monitor this closely.

Site RR3**:** It is important to note that in 2017, site RR3 was in exceedance of chronic standards for the 4th year in a row.

History at site RR3: The levels found on August 14, 2013 fell in the range of 1,781-2,306µg/L. In 2014, RR2, RR3 and RR4 were all in exceedence of acute criteria

standards for aluminum, and all 4 Red River sites exceeded levels for chronic criteria aluminum standards. In July 2015, Aluminum levels were >2,400µg/L, and in 2016 they were 4,100 µg/L in June at RR3. In 2017, aluminum was measured at 4,524 µg/L in November.

Rio Grande
pH levels were slightly elevated in June 2018. We will continue to keep 1-2 Rio Grande sites on our sampling plan for the next few years.

Conclusion/Recommendations:

- Sampling done in the Rio Hondo for the past nine years has not shown major or recurring water quality exceedances. Nitrate levels were elevated in places and will continue to me monitored. Electrical conductivity was also high, indicating increased runoff into the stream.
- Fred Baca Park continues to have serious water quality problems with *E. coli,* dissolved oxygen, and electrical conductivity. Efforts should be made to further identify sources and restore water quality at the Fred Baca site.
- The upper Rio Fernando continues to be impacted by elevated levels of *E. coli*, as well as electrical conductivity, following the use of the La Jara canyon grazing pasture. Cattle grazing and wildlife use on Forest Service land has been suggested as a source of contamination. The Rio Fernando Watershed Based Planning Process that Amigos Bravos is currently undergoing will allow us to determine the sources of *E. coli* contamination for future years. Efforts should be made to decrease *E. coli* loading in the upper watershed.
- Electrical conductivity readings in the lower Rio Pueblo de Taos continue to be high in 2018, as they have been for the past several years. An electrical conductivity standard should be considered for the lower stretch of the Rio Pueblo de Taos during the next Triennial Review process. Nitrate levels were also elevated in the Rio Pueblo, especially at PS2. This is another important element of the river's water quality that will be monitored in 2019.
- Phosphate levels in the lower Rio Pueblo de Taos were high in the past several years, though standards are not exceeded since there is no standard applied to this section of the Rio Pueblo. In 2018, levels were only found to be high on one day and at one testing site, PS2. The nutrient that seems to be a growing issue in this area of the river is nitrate, although both will continue to be monitored.
- While some aspects of water quality have improved since 2011 in the perennial arroyo to the Rio Pueblo, which receives flow from the wastewater treatment plant, electrical conductivity, nitrates, and occasionally phosphates continue to greatly exceed the standards given to neighboring waterways.
- Site RR3 (Bridge by Hwy 522) on the Red River exceeded the chronic criteria for aluminum 4 years in a row in 2017. While it did not exceed this standard in 2018, the hardness levels were extremely elevated this year compared to previous years.
- The huge difference between the Aluminum standard that applied to the Red River prior to 2010 and the current standard continues to be of concern. Many samples in 2013-2015 were above the 2010 standard and below the 2013

standard. More investigation should be done to determine if the current 2013 standard is actually protective of designated uses in the Red River. Amigos Bravos fought for more protective standards during the 2015 New Mexico Triennial Review of Water Quality Standards but the standards remain the same.

APPENDIX A

SENTINELS--RIOS de TAOS

QUALITY ASSURANCE PROJECT PLAN (QAPP)

Project Description

The goal of the Sentinels--Rios de Taos water monitoring project is to provide additional water quality data to local, state, and federal decision makers, as well as the public at large. This project was initiated due to a concern that inadequate data was available to accurately assess the health of the Rio Hondo, Rio Fernando, and Rio Pueblo de Taos watersheds. The cumulative impact of point and nonpoint sources of pollution will be characterized by collecting data on those parameters that are basic indicators of water quality and watershed health. Surface water samples collected by volunteer monitors will be analyzed for some or all of the following constituents:

- Nitrates
- Phosphorous
- Total Dissolved Solids
- E. Coli
- pH
- Conductivity
- Dissolved Oxygen
- Temperature
- Biological Oxygen Demand (BOD)
- Aluminum
- Hardness
- Residual Chlorine
- Ammonia

Sampling Locations

Sampling sites may change each year in an attempt to identify sources of pollution. Sites sampled in 2018 are shown in **bold.**

SENTINELS-RIOS de TAOS WATER SAMPLING SITES

ON THE RIO FERNANDO

FLJ	**About 200 yards from the parking spot for La Jara Canyon off of Hwy 64, walk up Forest Road #5.** **N 36 25.160** **W 105 20.592**
FRE	**The riparian exclosure, just below the wooden sign for "Taos Canyon Riparian Pasture"** **N 36 24.231** **W 105 20.706**
F1A	Above Shadybrook Development, about 5 miles east of Taos, by bridge on road to Valle Escondido N 36 22' 19.76" W 105 23' 07.75" (GE)
F1B	About 200 meters downstream from Shadybrook, by NF La Sombra campground. N 36 22' 10.45" W 105 28' 08.51" (GE)
FAP1	Small stream . Sample upstream of Apache Canyon Road about 15 feet below fence line. N 36 23' 08.09" W 105 19' 33.43"
F 1	**About 10 yards downstream from the west bridge by the USFS parking lot at the Divisidero/South Boundary trailhead. On the north bank.** **N 36 22' 32.56"** **W 105 32' 49.92"**
F2	About 10 yards upstream from Paseo del Pueblo Sur, across street from ABC Lock. On the north bank. We'll usually use this site only when a storm is in progress. N 36 23' 54.99" W 105 34' 38.76" (GE)
F3	About 25 yards downstream from Paseo del Pueblo Sur, by ABC Lock. On the south bank, by a concrete bar. N 36 23' 55.02" W 105 34' 39.25" (GE)
F4	**Fred Baca Park, about 50 yards downstream from the footbridge at the bend. On northwest side. of stream.** **N36 23' 56.8"** **W105 35' 23.2"**
F5	Taos Land Trust Land, near office on La Posta Road. Location near road as you enter driveway

F6	Taos Land Trust Land, down past the shed near their office in wetland area.

ON THE RIO PUEBLO

P 1	**About 27 yards downstream from the stop sign on Upper Ranchitos Road at Paseo del Pueblo Norte. On north side of stream by the car wash.** **N36 25' 13"** **W105 34' 23"**
P1A	Perennial spring about 100 feet from where it feeds into Rio Pueblo de Taos. Right where spring comes out of culvert that goes under Upper Ranchitos Rd about 200 feet from intersection with Ranchitos Rd. N 36 24' 16.01" W 105 35' 53.35
P1B	Ranchitos Rd. Near bridge by Callegon Rd and SR 240 (near Hacienda de los Martinez). Mile Marker 4. N 36 24' 1.30" W 105 36' 25.71"
P1C	Ranchitos Rd near mile marker 13 go down dirt road to the left by road to Blackstone Ranch. N36 23' 34.6" W 105 37' 26.4"
P 2	About 15 yards downstream from bridge (right near turn to Los Cordovos Rd) at Ranchitos Road and Culebra Road. On north side of stream by survey sign. N 36 23' 23.74 W105 37' 50.46"
P2A	Brad Hockmeyer and Janet Gauthier's property on the Rio Pueble de Taos. Take Los Cordovas Rd. south towards the wastewater treatment facility. Take a right at number 118C. Take this drive all the way to the end making a sharp right at the Webber's property to continue onto the geodesic domes. Park at the domes and walk down to the river from here. N 36 23'11.78" W 105 39'03.37"
PS1	mainstem of Rio Pueblo de Taos about 200 yards upstream from the town of Taos wastewater effluent discharge arroyo. Valerie Graves is the property owner. Sample on rocky point bar in the middle of her property. N 36 22' 50.47" W105 39' 44.30"
PS2	**Perennial effluent dependent arroyo (town of Taos wastewater discharge). Turn right onto Thomas Romero Rd and then an immediate right onto Paintbrush Rd. Sample immediately after the gate (which is usually left open) in the arroyo.** **N 36 22' 32.05"** **W 105 39' 25.36"**

PS3	**Rio Pueblo de Taos about a quarter mile downstream from the confluence of the town of Taos wastewater arroyo and the Rio Pueblo. Drive on Thomas Romero Rd, past the open gravel pit on right until you reach the small subdivision. The road is usually gated past this point. Take a right at the subdivision and then your first right (on small dirt road) at the large map sign then take your first right again onto a small two track that crosses a couple of rough patches and then winds down to the river. Park on grassy open area upstream from the gazebo.** **N 36 22' 41.26"** **W 105 40' 05.63"**
P 3	About 10 yards upstream from the road barrier from the parking lot on the northeast corner of Taos Junction Bridge area. On east bank of stream. N 36 20' 19.63" W 105 43' 47.36" (GE)
P4	**Keith and Cathy Black property. Just upstream from P2(bridge by Los Cordovas)**

ON THE RIO HONDO

H 1	Above Phoenix Restaurant, which is upstream from the Bavarian Inn N 36 34' 30.67" W 105 26' 20.47" (GE)
H 2A	Rio Hondo just upstream from where the branch coming from Bavarian Inn (after going through the culvert under the trail) empties into the Rio Hondo. N 36 34' 41.38" W 105 26' 25.62 (GE)
H2B	**Branch coming from Bavarian Inn just before it empties into the main Rio Hondo.** **N 36 34' 41.90"** **W 105 26' 25.88" (GE)**
H 2C	**About 10 yards upstream from the bridge near the day care center in the Ski Village. On the north bank.** **N 36 35' 47.23** **W 105 27' 15.19" (GE)**
H2B2	Across from Phoenix switch back @ culvert between two dirt roads. N 36 34' 33.14' W 105 26' 21.31" (GE)
H2B3	**Sutton Place Bridge, downstream by about 25 yards. This bridge is near the Stray Dog Cantina.** **GPS location not taken yet- new site to 2017**

H2C2	Directly above Taos Ski Valley Effluent Pipe N 36 35’ 46.85” W 105 27’ 41.76” (GE)
H2D	Just above the Riverside property, about 175 yards downstream from the stop sign at the intersection of the Village of TSV maintenance road and Route 150. North bank. N 36 35’ 41.78” W 105 28 16.37” (GE)
H2E	**Rio Hondo directly downstream of effluent pipe** **N36 35’ 47”** **W105 27’ 43”**
H2F	Taos Ski Valley effluent pipe N 36 35’ 46.77” W 105 27’ 42.29” (GE)
H 3	Cuchilla Campground, just downstream from entrance road. North bank. N 36 32’ 32.08 W 105 33’ 22.90 (GE)
H 4	Kaufman Property. About 20 yards downstream from footbridge. South bank. N 36 32’ 14.8” W 105 38’ 43.4”
H4A	Just downstream from Route 522 Bridge, north bank. N 36 32’ 07.1” W 105 40’ 02.7”
H 5	About 20 yards upstream from bridge in Lower Arroyo Hondo, just before the road crosses the Rio Hondo and goes uphill towards New Buffalo. North ban N 36 31’ 58.62” W 105 40’ 55.43”
H 6	**About 10 yards upstream from confluence with Rio Grande.** **N 26 32’ 02.12** **W 105 42’27.26” (GE)**
HVB	N 36 31’ 58.5” W 105 35’ 04.0”
HVG	5 M downstream from bridge on lane to Jackie Garcia property N 36 32’ 07.6” W 105 34’ 12.2”.

ON THE RED RIVER

RR1	**Junebug Campground, approximately 10 miles east of Questa on HWY 38.**

N 36 42’ 28.25”
W105 26’ 04.92

RR2 **Goat Hill Campground, approximately 3 miles east of Questa on Hwy 38.**
N 36 41’ 20.65”
W105 32’ 27.73

RR3 **By the bridge at Hwy 522 in Questa.**
N 36 41’ 33.69
W105 36’ 44.50

RR4 **Below Red River Fish Hatchery, approximately 0.5 miles down the foot trail.**
N 36 40’ 57.14”
W 105 39’ 19.11”

ON THE RIO GRANDE DEL RANCHO

RGDR1 Right above bridge on Partrick Larkin’s property.

ON THE RIO LUCERO

RL1 Rio Lucero, private land.

ON THE RIO GRANDE

RG2: Just above the confluence of the Rio Hondo and the Rio Grande, near H6.

RG3: In Pilar, NM just below the Rio Pueblo and Rio Grande confluence.

Testing results will be sent to Region 6 of the Environmental Protection Agency (EPA), the State of New Mexico Environmental Department's Surface Water Quality Bureau, Amigos Bravos, and local newspapers and publications. Sampling results will be stored in the Sierra Club Sentinels--Rios de Taos database.

APPENDIX B

Project Organization

Project Coordinator Contact information:

Eric E. Patterson
Box 334

Valdez, NM 87580
575-776-2833
eepatt@gmail.com

The project coordinator ensures all components of the project identified by this QAPP are completed in an efficient and timely manner. This includes oversight on sample collection, delivery, analysis, and reporting.

Sample Collector Contact Information

Eric E. Patterson, contact person (see above)

Mary Pickett	Nora Patterson	Rachel Conn
Gary Grief	Dorothy Wells	Betsy Wolf
Annouk Ellis	Jeanne Green	Moira O'Hanlon
Roberta Salazar	Flowers Espinosa	Shannon Romeling

Sample collectors will conduct sample collection activities according to the methods identified by this QAPP. Responsibilities include:

- Calibration, maintenance and utilization of field equipment for analysis of dissolved oxygen (DO), temperature, pH, and conductivity.
- Obtaining needed sample containers and preservatives for sampling events.
- Following quality assurance procedures for sample collection identified by this QAPP.
- Filling out chain of custody (COC) forms.

Sample Transport Contact Information

Eric E. Patterson (see above)

Sample Transport will ensure that water samples are delivered to Sangre de Cristo Laboratory, Inc., Alamosa, CO, or another EPA certified laboratory, in a secure and timely manner. Responsibilities include:

- Keeping samples secure between sampling site and the laboratory.
- Maintaining COC document according to procedures identified.
- Delivering samples within specified holding times.

Sample Analysis/Laboratory Contact Information:

Sangre de Cristo Laboratory, Inc., an EPA certified laboratory
Tierra del Sol Industrial Park
2329 Lava Lane
Alamosa, CO 81101

Sample Analysis Staff will ensure that samples are analyzed in a manner that provides the most accurate data possible. Responsibilities include:

- Analyzing samples according the methods identified in Standard Operating Procedures (SOPs).
- Analyzing samples within established holding times.
- Reporting results to Project Coordinator

Data Reporting Contact Information

Rachel Conn, Amigos Bravos Projects Director
Box 238
Taos, NM 87571
575-758-3874
rconn@amigosbravos.org

Data reporting will ensure the data collected by the project is stored appropriately and disseminated to interested parties. Responsibilities include:

- Organization of final report on data collected by the project.
- Dissemination of report to specified local, state and federal agencies.
- Dissemination of report to newspapers and other local news media and presentation of
- project information to the public upon request.
- Entering data into Sierra Club's Water Sentinel database.

Quality Assurance of Field Analysis

Measurements will be made using the following equipment:

- CHEMets Dissolved Oxygen Kit, Model K-7512 – tested dissolved oxygen

- Euteck Instruments PCTestr 35 from Oakton – tested pH, temperature, and electrical conductivity
- Hach Model 5-EP MG/L #1454-01 test kit – tests hardness (calcium carbonate)

PARAMETER	DETECTION LIMIT	ACCURACY
Dissolved Oxygen	1 to 12 mg/L	+/- 1 ppm
Temperature	0° to 50° C	+/- 0.5° C
Conductivity	0 to 1999 µS/cm	+/-10 µS/cm
pH	0.00 to 14.00 ph units	+/-.001 pH units
Hardness	0 to 400 mg/L calcium carbonate	+/- 20 mg/L

Field instruments will be calibrated according to manufacturers' instructions <24 hours prior to each sampling event. Chemicals used for dissolved oxygen will be replaced according to expiration dates provided by the manufacturer. Samples will be collected using the containers, preservatives, volumes and holding times identified in Appendix A.

Field Sample Collection Procedures

Samples will be collected:

- Midstream just below the water's surface.
- Facing upstream to avoid disturbances caused by the sample collector.
- Upstream of minor temporal or spatial impacts, such as bridges and campsites.
- Free of floating debris.
- Using appropriate sample containers and preservatives specified in Appendix A.

Samples will be tagged appropriately with identifying number/information and delivered to appropriate laboratory personnel accompanied by appropriately completed and signed Chain of Custody (COC) forms.

Quality Assurance of Laboratory Analysis

Quality assurance of laboratory methods is the sole responsibility of the sample analysis/laboratory coordinator previously identified. Samples will be analyzed using methods contained in the laboratory's Standard Operating Procedures. These are located at Sangre de Cristo Laboratory, Inc. and can be obtained from the sample analysis coordinator upon request.

METHODS FOR LABORATORY ANALYSIS

MATRIX	PARAMETER	METHOD
Nonpotable water	Total Dissolved Solids	EPA 160.1
Nonpotable water	Nitrates	EPA 300.0
Nonpotable water	Total Phosphorus	EPA 365.2
Nonpotable water	E. Coli	EPA 10030
Nonpotable water	BOD	SM 5210B
Nonpotable water	Ammonia	4500NH3D
Nonpotable water	Residual Chlorine	300.5
Nonpotable water	Phosphate	420.1
Nonpotabe water	Aluminum	200.9

Containers, Volumes, Preservatives, and Holding Times

Parameter	Optimum Volume	Container Type	Preservation Method	Holding Time
Total Nitrogen (Calculation: TKN + (NO2 + NO3 as N)	250 mL	Plastic, Glass	Cool	**48 Hours**
Total Phosphorus	250 mL	Plastic, Glass	Cool	**24 Hours**
Total Suspended Solids (also called Non Filterable Residue)	500 mL	Plastic, Glass	Cool	**24 Hours**
E. coli or Fecal Coliform	150 mL	Sterile Bottle	Cool	**8 Hours**
Dissolved Oxygen	Determined On-Site			**None**
Temperature	Determined On-Site			**None**
Conductivity	Determined On-Site			**None**

SAMPLE #	DATE	COLLECTION TIME	TEMP, C.	pH	DISSOLVED OXYGEN	ELECTRICAL CONDUCTIVITY	PHOSPHATE	E. COLI	NITRATE	AMMONIA	HARDNESS	ALUMINUM
-	-	-	-	-	ppm	microsiemens/cm	mg/L	COLONIES/100ML	mg/L	mg/L	ppm	(total)µg/L
STANDARD	**-**	**-**	**<=23**	**6.6-8.8**	**>=6**	**<=500**	**<0.1**	**235**	**None**	**None**	**None**	**Hardness = 100: 3,421 acute; 1,370 chronic ug/l**
Rio Fernando												
F1	6/13/18	11:23 AM	14.8	8.65	8.5	654	ND	52.1	ND	-	-	24.00
F1	9/11/18	10:56 AM	13.6	7.1	1.5	588	ND	7.4	ND	0.08	-	-
F1	10/11/18	10:45 AM	DRY	-	-	-	-	DRY	-	-	-	-
F4	6/13/18	11:49 AM	15.4	8.72	9	889	ND	20.1	ND	-	-	16.00
F4	9/11/18	11:18 AM	14.2	7.71	3	763	ND	770.1	ND	0.07	-	-
F4	10/11/18	10:57 AM	10.2	7.55	2	556	-	488.4	-	-	-	-
FLJ	6/13/18	10:09 AM	12.4	8.2	4.5	476	ND	648.8	ND	-	-	22.00
FLJ	9/11/18	9:56 AM	7.4	8.47	4.5	497	ND	410.6	ND	0.08	-	-
FLJ	10/11/18	10:05 AM	5.7	7.75	4	533	-	191.8	-	-	-	-
FR-S	6/13/18	10:51 AM	17.8	8.35	8	273	ND	648.8	ND	-	-	50.00
FRE	9/11/18	10:17 AM	12.2	8.4	8	310	ND	133.3	ND	0.1	-	-
FRE	10/11/18	9:50 AM	5.1	8.39	6	330	-	68.3	-	-	-	-
Rio Pueblo												
STANDARD	**-**	**-**	**<=23**	**6.6-8.8**	**>=6**	**<=400**	**<0.1**	**235**	**None**	**None**	**None**	**None**
P1	6/13/18	10:50 AM	18.4	8.36	7.5	264	ND	42.6	ND	0.05	-	50.00
P1	9/11/18	9:18 AM	13.5	7.25	<1	452	ND	25.6	ND	0.08	-	-
P1	10/11/18	9:25 AM	8	8.6	2.5	342	<0.20	1413.6	ND	0.02	-	-
P4	6/13/18	10:27 AM	19.9	8.62	8	451	ND	98.5	<0.20	<0.02	-	-
P4	9/11/18	10:45 AM	15.5	8.3	8	425	-	770.1	-	-	-	-
P4	10/11/18	10:00 AM	9.8	8.5	6	445	ND	325.5	ND	<0.02	-	-
PS3	6/13/18	9:53 AM	20.9	8.88	8.5	522	ND	50.4	ND	<0.02	-	-
PS3	9/11/18	10:17 AM	15.1	8.61	11	493	ND	78.9	ND	0.03	-	-
PS3	10/11/18	10:30 AM	10.4	8.86	8	447	0.47	90.9	0.31	<0.02	-	-
Rio Pueblo												
STANDARD	**-**	**-**	**<=24**	**6.6-8.8**	**>=6**	**No Standard**	**No Standard**	**235**	**None**	**None**	**None**	**None**
PS2	6/13/18	9:26 AM	19.3	8.09	6	735	ND	172.5	1.32	<0.02	-	-
PS2	9/11/18	9:57 AM	DRY	-	-	-	-	DRY	-	-	-	-
PS2	10/11/18	10:20	15.7	8.42	5.5	818	0.55	9.7	1.11	<0.02		
Rio Hondo												
STANDARD	**-**	**-**	**<=23**	**6.6-8.8**	**>=6**	**<=400**	**<0.1**	**410**	**None**	**None**	**None**	**None**
H2B	6/13/18	9:57 AM	6.2	8.26	8.5	180	-	1	-	-	-	-
H2B	9/11/18	9:42 AM	8.8	8.51	7	22	-	4.1	-	-	-	-
H2B	10/11/18	9:40 AM	3.1	7.9	7	1,853	-	1	-	-	-	-
H2B3	6/13/18	10:32 AM	7.1	8.66	-	179	-	<1	-	-	-	-
H2B3	9/11/18	10:07 AM	9	8.1	6	1,728	-	3.1	-	-	-	-
H2B3	10/11/18	10:15 AM	4.4	7.7	8.5	188	ND	<1	ND	-	-	-
H2C	6/13/18	10:47 AM	7.9	8.63	-	1,804	0.26	1	0.53	-	-	-
H2C	9/11/18	10:25 AM	10.8	8.14	6	1,793	0.3	2	ND	-	-	-
H2C	10/11/18	10:30 AM	4.6	7.8	8.5	190	0.2	<1	ND	-	-	-
H2E	6/13/18	11:09 AM	9.4	8.61	-	207	0.23	2	0.47	-	-	-
H2E	9/11/18	10:41 AM	11.1	8.03	8	213	0.33	2	ND	-	-	-
H2E	10/11/18	10:50 AM	4.8	7.7	8	208	ND	<1	ND	-	-	-
H6	6/13/18	12:01 PM	19.3	9.06	-	360	-	101.7	-	-	-	-
H6	9/11/18	11:34 AM	17.7	8.44	7	345	-	40.4	-	-		-
H6	10/11/18	11:50 AM	12.2	7.82	10	357	-	47.9	-	-	-	-
Red River												
STANDARD	**-**	**-**	**<=23**	**6.6-8.8**	**>=6**	**<=400**	**<0.1**	**235**	**None**	**None**	**None**	**Hardness = 220: 10,071 acute; 4,035 chronic ug/l**
RR1	6/13/18	10:20 AM	15.1	8.49	9	276	-	5.2	-	-	160	150.00
RR1	9/11/18	-	-	-	-	-	-	-	-	-	-	-
RR1	10/11/18	9:30 AM	-	-	-	-	-	5.2	-	-	-	-
RR2	6/13/18	10:52 AM	14.7	8.25	9	616	-	3.1	-	-	360	138.00
RR2	9/11/18	10:55 AM	12.6	8.09	9	696	-	11	-	-	400	230.00
RR2	10/11/18	10:00 AM	7.6	8.51	8	717	-	6.3	-	-	420	530.00
RR3	6/13/18	11:32 AM	17.5	8.04	8.5	467	-	15.8	-	-	220	68.00
RR3	9/11/18	10:33 AM	12	7.88	9.5	575	-	48.8	-	-	320	66.00
RR3	10/11/18	10:26 AM	10.8	8.11	9	642	-	39.3	-	-	340	630.00

RR4	6/13/18	-	-	-	-	-	-	-	-	-	-	-
RR4	9/11/18	10:00 AM	14.3	8.25	9	520	-	110.6	-	-	240	32.00
RR4	10/11/18	10:53 AM	13.7	8.27	8	506		15.8			220	200.00
Rio Grande												
STANDARD	**-**	**-**	**<=24**	**6.6-8.8**	**>=6**	**None**	**None**	**235**	**None**	**None**	**None**	**None**
RG2	6/13/18	12:12 PM	19.5	9.02	-	348	-	39.1	-	-	-	-
RG2	10/11/18	12:00 PM	12.2	7.57	9	329	-	<1	-	-	-	-