



**2022 Water Sentinels Rios de Taos
Water Quality Sampling Report**
*Rio Hondo, Rio Fernando, Red River, Rio Pueblo de
Taos, and the Rio Grande*



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. In 2021, the parciantes on the Rio Embudo in Dixon joined the team with five sampling locations in that area, and concerned citizens in Santa Fe began sampling the Pecos river in three locations. Fourteen previous sampling reports have been prepared for sampling that occurred in 2007 - 2021. This report covers the sampling conducted in 2022.

Methods:

Surface water quality sampling was conducted in the upper Rio Grande watershed in July, August, and September 2021. Samples were collected from 5 sites in the Rio Hondo, 5 sites in the Rio Pueblo de Taos, 5 sites in the Rio Fernando de Taos, 4 sites in the Red River, and 5 sites in the Rio Grande and 6 sites on the Rio Embudo in September only. (Appendix A and Appendix C). Below is a detailed map of the water collection sites. Green = Red River, Red = Rio Hondo, Purple = Rio Grande, Blue = Rio Pueblo, and Black = Rio Fernando. [Find embudo map from robert](#)



Figure 1: Map of Taos, NM area water sampling locations.

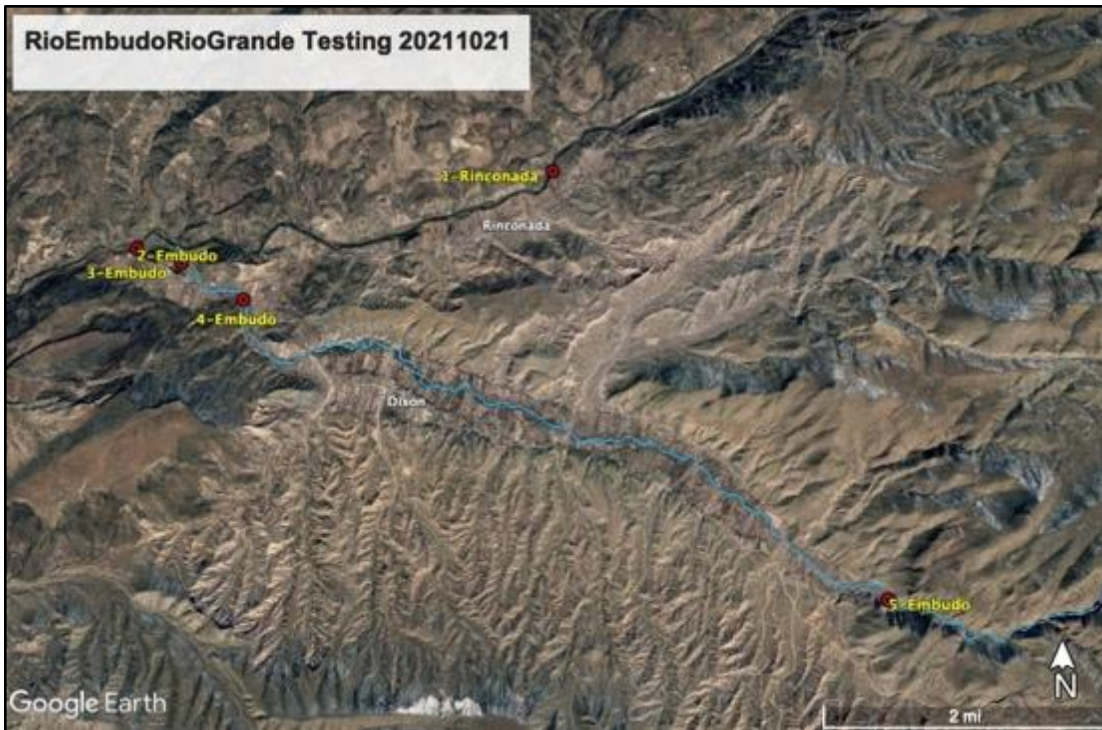


Figure 2: Map of Rio Embudo area sampling locations.

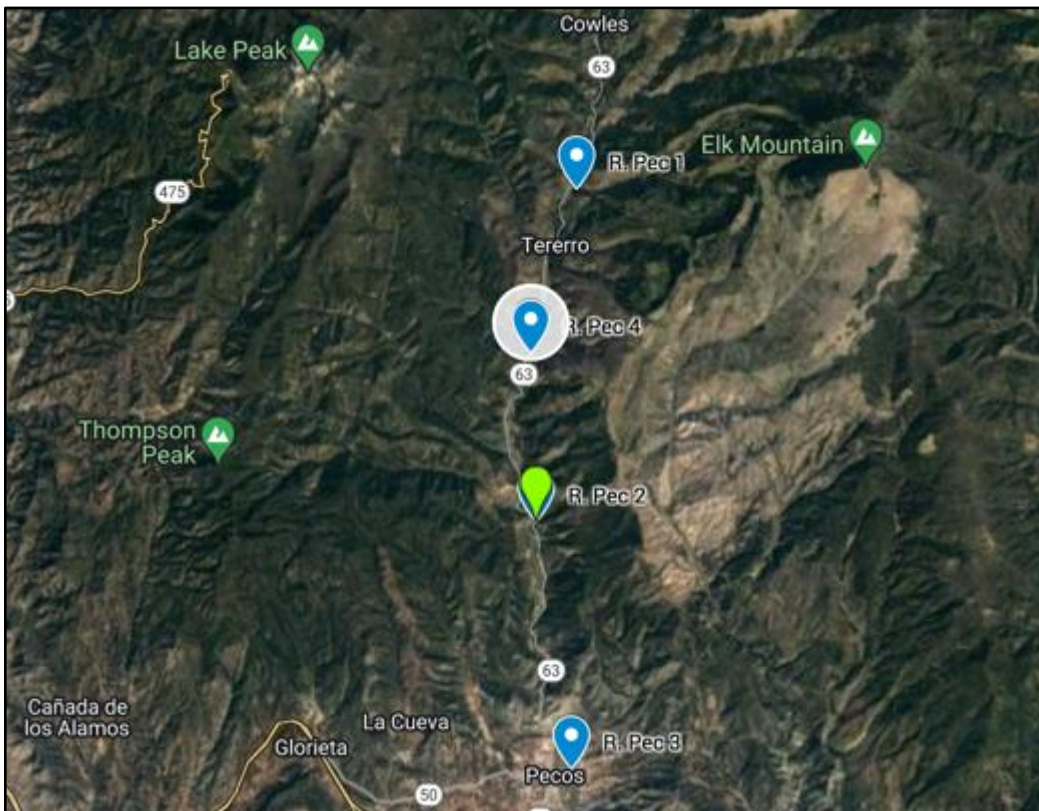


Figure 3: Map of Pecos River sampling locations.

All samples were kept on ice until they were processed by Sangre de Cristo labs in Alamosa Colorado. IDEXX Laboratory samples were collected for *E. coli* and processed at the Amigos Bravos lab. For some samples, nitrates, phosphates, hardness, aluminum, and other metals 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.

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 mg/L (equivalent to 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. 49-50 of the NM Standards for Interstate and Intrastate Surface Waters). For a hardness of 100, a common value here, the standards are: 3,420 ug/l acute; 1,370 ug/l chronic. For a hardness of 200 the standards are: 8,840 acute; 3,540 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:

Water quality standard exceedences and interesting trends for each sampling date and river are discussed below. Streamside readings of temperature, DO, pH, and electrical conductivity are taken at all sites. Parameters analyzed by the lab vary and are described for each site and date. A list of the full sampling results for 2022 can be found in Appendix C.

Rio Hondo:

July 20, 2022: Samples were collected from five sites in the Rio Hondo (H2B, H2B3, H2C, H2E, and H6). *E. coli*, was measured at all sites. Nitrate and phosphates were measured at all sites. Nitrate levels were slightly elevated (0.23 to 0.55mg/l). We are pleased to report that phosphate levels were low (<.20 at all sites) after several years of alarming levels. Electrical conductivity however continues to be high since construction began at the Ski Valley in 2014. Levels ranged from 1,511-1658 ms/cm. These levels are approximately 3 times over the standard.

August 24, 2022: Samples were collected from four sites in the Rio Hondo (H2B, H2B3, H2C, H2E). H6 could not be sampled due to the John Dunn Bridge construction closure. *E. coli* was measured at all sites. H2E was sampled only for *E. coli* and nitrates. Electrical conductivity was normal at H2B but continued to be 3 times over the standard at H2B3 and H2C.

September 6, 2022: Samples were collected from the same four sites in the Rio Hondo (H2B, H2B3, H2C, H2E). H6 could not be sampled again due to the John Dunn Bridge construction closure. Nitrates, phosphates and ammonia were sampled at H2B and H2E. Nitrate levels were slightly elevated at 0.30 mg/l and 0.55 mg/l respectively. Phosphate levels were low again at <0.20mg/l. Electrical conductivity was again over 3 times the standard at all 4 sites.

Rio Pueblo:

July 20, 2022: Nitrate, phosphate, and *E. coli* were analyzed for all five sites (P1, P1A, PS2, PS3, P4). Phosphate (1.51mg/L), nitrate (1.46mg/L), and conductivity levels (827ms/cm) were elevated at PS2, the Taos Waste Water Treatment Plant effluent. The phosphate level of 1.51mg/L is 15 times over the usual standard. Downstream from this effluent at site PS3, electrical conductivity and *E. coli* were above the standard at 435.2 CFU/100ml, and 559ms/cm. Closer to town at site P1A, *E. coli* levels continued to exceed standards at a level of 980.4 – 4 times over. This site has shown *E. coli* contamination for decades.

August 24, 2022: Nitrate, phosphate, ammonia, and *E. coli* were analyzed for all five sites (P1, P1A, PS2, PS3, P4). Phosphate (5.23mg/l) and nitrate (18.7mg/l) were alarmingly elevated at PS2, the Taos Waste Water Treatment Plant effluent. Site P1A continued to display bacteria issues with an *E. coli* exceedance of 1553.1 CFU/100ml at P1A, more than 6.5 times over the limit.

September 6, 2022: Nitrate, phosphate, ammonia, and *E. coli* were analyzed sites PS2 and PS3. Phosphate, nitrate, and conductivity levels were again extremely elevated at PS2, the Taos Waste Water Treatment Plant effluent. The values were 782ms/cm conductivity, 4.17mg/l phosphates, and 11.30 nitrates. Site P1, by the carwash showed an *E. coli* exceedance of 378.4 CCFU/100ml.

Rio Fernando de Taos:

July 20, 2022: The yearly sites of FLJ, FRE, F1, and F4 were sampled for streamside parameters and *E. coli*. *E. coli* was above the standard at the La Jara riparian pasture (FRE-727ms/cm)

August 24, 2022: The same four sites were sampled. *E. coli* levels were above the standard in the upper watershed, and Fred Baca Park (FLJ-770.1 CFU/100ml, FRE-290.9CFU/100ml, and F4-1299.5 CFU/100ml). Electrical conductivity was above the standard at Fred Baca Park (804ms/cm), El Nogal trailhead (767ms/cm), and the Riparian pasture (930ms/cm)

September 6, 2022: The same four sites were sampled. *E. coli* levels were back below the standard. Electrical conductivity was above the standard at El Nogal Trailhead at 753ms/cm. Dissolved oxygen was low (below the standard) at the riparian pasture (5), El Nogal trailhead (5), and Fred Baca Park (3).

Red River:

July 20, 2022: Data were collected at all four sites in the Red River and analyzed for *E. coli*, total recoverable aluminum, and hardness. Aluminum results at RR1, the fish hatchery, exceeded both acute and chronic standards. Aluminum results at RR2, RR3, and RR4 all exceeded the chronic standards.

August 24, 2022: Data were collected at all four sites in the Red River and analyzed for *E. coli*, total recoverable aluminum, and hardness. Aluminum results were low above the mine, RR1 and RR2 this time, and slightly elevated below the mine(RR3 and RR4). It is difficult to tell from the NMED standards table if the chronic standard is exceeded but the numbers definitely come close.

September 6, 2022: Laboratory samples were collected at sites RR2 and RR3 and analyzed for *E. coli*, total recoverable aluminum and hardness. Aluminum was not above the standards at either site.

| Red River Site | Date | Hardness | Recovered Aluminum (ug/L) | Exceedence |
|----------------|---------|----------|---------------------------|-------------------|
| RR1 | 7/20/22 | 118.6 | 4,506.00 | Acute and chronic |
| RR1 | 8/24/22 | 105.2 | 267.00 | None |
| RR2 | 7/20/22 | 192.5 | 5,965.00 | Chronic |
| RR2 | 8/24/22 | 145.5 | 851.00 | None |
| RR2 | 9/6/22 | 165.7 | 532.00 | None |
| RR3 | 7/20/22 | 174.6 | 7,013.00 | Chronic |
| RR3 | 8/24/22 | 143.2 | 1,928.00 | Maybe chronic |
| RR3 | 9/6/22 | 172.4 | 610.00 | None |
| RR4 | 7/20/22 | 176.8 | 5,014.00 | Chronic |

| | | | | |
|-----|---------|-------|----------|---------------|
| RR4 | 8/24/22 | 152.2 | 1,457.00 | Maybe chronic |
|-----|---------|-------|----------|---------------|

Figure 2: Aluminum and hardness values for the Red River in 2022. Standards table excerpts: Hardness = 220: 10,100 acute; 4,030 chronic ug/l; For a Hardness = 200: 8,840 acute; 3,540 chronic ug/l; Hardness = 100: 3,420 ug/l acute; 1,370 ug/l chronic.

Rio Grande:

Samples were taken at the John Dunn Bridge (RG2) on July 20th, and in Rinconada (Rin1) on September 6th. Both sites were sampled for nitrates, phosphates, ammonia, and aluminum. No parameters were above water quality standards.

Rio Embudo:

Several acequia parciantes reached out to us in 2021 about sampling their acequias and the Rio Embudo, the source of their water. Five sites were sampled once on October 20, 2021 and again in 2022. This year, all sites were sampled on 9/6/22 for all streamside parameters, pH, and nutrients. No concerns or exceedences were found.

Pecos River:

Sites on Willow Creek and the Pecos River (R. Pec 1- R. Pec 3) were sampled on 9/20/22 for streamside parameters and iron and manganese. There was a forest fire in the area that made sampling on the other sample days not possible. These heavy metals are being examined to examine the impacts of past mining in the area and to collect baseline data for potential new mining in the area in the future. There are no acute standards for Iron. Results ranged from Non Detect at Willow Creek to 0.061 and 0.067mg/L downstream. Manganese levels were all below the standards and ranged from 0.0061 to 0.012mg/L

Conclusion/Recommendations:

- 1) Sampling done in the Rio Hondo for the past 10 years began to show regular electrical conductivity exceedences in 2014. Electrical conductivity was approximately 3-4.5 times over the standard at those sites beginning in 2019 and continuing into 2022. These findings indicate that the area is being impacted by ski valley construction, which continued to be prevalent in 2022. **Amigos Bravos suggests increased monitoring of Ski Valley construction activities to ensure proper construction mitigation.**
- 2) Phosphate levels were very high in 2020 and again 2021, up to 47 times over the limit coming out of the Taos Ski Valley waste water treatment plant in 2021 (H2C). These levels were back to lower levels of <0.20mg/L in 2022. Nitrate levels were elevated at some sites in 2018, 2019, 2020 at Lake Fork creek at the Bavarian Inn, on the Hondo near the Children’s center, and below the Taos Ski Valley Waste Water Treatment plant. These levels were also lower and down to reasonable levels this year. Amigos Bravos will continue to monitor these levels each year.
- 3) Fred Baca Park continues to have serious water quality problems with *E. coli*, electrical conductivity and dissolved oxygen. This year seemed to show

improvement, with *E. coli* levels only being exceeded in August and not every sample day. Wetland restoration at the Taos Land Trust wetlands should continue to help with this issue. Willows are also growing up along the banks in this area, and shade will help the temperature from rising and therefore lowering dissolved oxygen.

- 4) The upper Rio Fernando continues to be impacted by elevated levels of *E. coli* during the use of the area for cattle grazing in 2022. Amigos Bravos continues to work to further fence out the cattle in that area and restore the wetlands so that the stream is more resilient to cattle impacts. **We continue to invite any input/assistance from the NMED on how to mitigate cattle impacts in this area.**
- 5) Site P1A (locally known as Merris Spring) has been known by the NMED to have septic tank pollution for over 20 years, with results confirmed by Amigos Bravos many times. The Rio Fernando 319 watershed based plan also studied this area intensely and found the problem to be on-going and alarming. Sources found with Microbial Source tracking were primarily from humans and birds. **Amigos Bravos is talking with the NMED to create a project to address the direct *E. coli* input at this location.**
- 6) There was an exceedance of *E. coli* in the upper Rio Pueblo (P1). This has happened sporadically over the years but has not shown a clear pattern. We will continue to monitor this and see if we can discern a yearly occurrence. There were not any *E. coli* exceedances at this site last year. The last *E. coli* exceedance at this site was in October of 2018.
- 7) While some aspects of water quality have generally improved since 2011 in the perennial arroyo to the Rio Pueblo (PS2), which receives flow from the Taos wastewater treatment plant, electrical conductivity, nitrates, and starting in 2021, phosphates continue to greatly exceed the standards given to neighboring waterways. The nitrate level of 18.7mg/L in August was nearly double the level of 10mg/L allowed in drinking water. The level continued to be high on the following sample day in September at 11.3mg/l. Phosphate levels also reached levels as high as 5.23 in August, which is 52 times the water quality standard. These findings are also consistent with 2020 sampling, where phosphates were high in June and nitrates were high in the fall. **We suggest that the NMED more closely monitor the Waste Water Treatment plant outflow and hold them accountable to standards applied to neighboring rivers.**
- 8) 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 that year compared to previous years. In 2019, it exceeded chronic and acute criteria in June at an extremely high value of 10,050ug/L. In June 2020, site RR3 again exceeded acute and chronic criteria at a level of 5,660ug/L. In 2022, the level was well above chronic standards, and close to exceeding the acute standard. RR1 exceeded the chronic and acute standard this year. **We suggest that the NMED conduct further sampling and consider again listing this river as impaired for aluminum criteria based on previous years.**

- a. 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.

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
- Total Suspended Solids

Sampling Locations

Sampling sites may change each year in an attempt to identify sources of pollution. Sites sampled in 2022 are shown in **bold**.

SENTINELS-RIOS de TAOS WATER SAMPLING SITES

ON THE RIO FERNANDO

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 Also called MS1. 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 Pueblo de Taos. Take Los Cordovos 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"
W 105 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 bank
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: Pilar Village Bridge

RG4: The Gaging Station in Pilar

RG5: The Rio Grande Spring Pipe

RG6: The Taos Junction Bridge

ON THE RIO EMBUDO

1-Rinconada

Rinconada 1

(36.223700°, -105.868857°)

2-Embudo

Embudo 2 (Lou and Kay's)

(36.215422°, -105.924470°)

3-Embudo

Embudo 3 Below NM68

(36.213854°, -105.918447°)

4-Embudo

Embudo 4 (Above NM68)

(36.209867°, -105.910076°)

5-Embudo

Embudo 5 (Above Joe Ciddio's)

(36.178023°, -105.825003°)

6-Embudo

Embudo 6 (Just below Sancodrade acequia presa)

ON THE PECOS RIVER

R. Pec 1: Willow Creek near the confluence with the Pecos.

R. Pec 2: The Pecos river at Dalton Campground

R. Pec 3: Pecos river at the Bridge of Hwy 223 in Pecos

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 ACCURACY | DETECTION LIMIT | |
|-------------------------------|------------------------|-------------|
| 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 20 mg/L | 0 to 400 mg/L calcium carbonate | +/- |

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 |
| Nonpotable water | Aluminum | 200.9 |

Containers, Volumes, Preservatives, and Holding Times

| Parameter | Optimum Volume | Container Type | Preservation Method | Holding Time |
|---------------------------------------------------------------------------------|--------------------|----------------|---------------------|-----------------|
| Total Nitrogen (Calculation: TKN + (NO ₂ + NO ₃ 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 |
| | | | | |