

## **2007 Taos Water Quality Sampling Report – Rio Hondo, Rio Fernando and Rio Pueblo de Taos**

**Lead: Sentinels-Rios de Taos**

**Support: Amigos Bravos and Rivers and Birds**

**Abstract:** Surface water quality sampling was conducted in the Taos NM area between February 2007 and July 2007. Samples were collected from 8 sites in the Rio Hondo, 3 sites in the Rio Pueblo de Taos, and 3 sites in the Rio Fernando de Taos. During May 2007, very high *E. coli* results were obtained from two sites in the lower Rio Hondo and two sites in the lower Rio Pueblo de Taos. These results were well above water quality standards and levels that are safe for swimming. During the July sampling event one sample located in the Rio Pueblo de Taos exceeded water quality standards for *E. coli*. All other samples met water quality standards for all tested constituents.

**Introduction:** This sampling project was initiated by Sentinels – Rios de Taos 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. 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. Sentinels-Rios de Taos contacted Rivers and Birds in Arroyo Seco to invite them and the youth that they work with to participate in the project. National representatives from Sierra Club's Water Sentinels program traveled to Taos and gave several trainings to the Sentinels-Rios de Taos' volunteers. Sampling was initiated in February of 2007 by Sentinels- Rios de Taos with assistance from Amigos Bravos and Rivers and Birds.

**Methods:** Surface water quality samples were collected from 8 sites in the Rio Hondo, 3 sites in the Rio Pueblo de Taos and 3 sites in the Rio Fernando de Taos (Appendix A). Samples were kept on ice until they were processed by Sangre de Cristo labs in Alamosa Colorado. Laboratory samples were collected for nitrates, biological oxygen demand, total dissolved solids, and *E. coli*. All laboratory samples were collected and processed with a 24hr holding time limit. 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 (Appendix B). Because there was initially some concern about water quality problems in the Upper Hondo due to activities in Taos Ski Valley, samples in the Upper Rio Hondo were collected at the height of ski season during the last week of February and the first week of March. The weather was clear during all sampling events.

### **Results:**

**Overall:** Four samples taken on May 21, 2007 showed very high levels of *E. coli* that were well above the applicable water quality criteria that are protective of swimming (235 cfu/100mL in the Rio Pueblo and the Rio Fernando and 410 cfu/100mL in the Rio Hondo). One sample taken on July 24<sup>th</sup> exceeded water quality standards. This sample

was from the Rio Pueblo de Taos near the junction with the Rio Grande. All other samples and field measurements taken at these locations met water quality standards. All other samples taken at other locations and dates met all water quality standards including the criteria for *E. coli*. Samples from the upper watersheds of the Rio Hondo (Valdez and above) and the Rio Pueblo de Taos (near Rio Pueblo Boundary) all showed no detection of *E. coli*. (Appendix C).

### **Rio Hondo:**

February 22<sup>nd</sup>: Three laboratory samples were collected in the Rio Hondo ( Rio Hondo below the Phoenix Grill, Cuchilla Campground and the Kaufman Property) and analyzed for *E. coli*, nitrate, BOD, and TDS. Field readings for pH and dissolved oxygen were also taken. Samples indicated water quality standards for all other tested parameters were being met. There was no detection for all *E. coli* samples. (Appendix C)

March 5<sup>th</sup>: Four laboratory samples were collected in the Rio Hondo (Rio Hondo below the Phoenix Grill, small tributary from Bavarian, Bridge near daycare center at TSV, and just above Riverside Property which is below Village of TSV sewage treatment plant) and analyzed for *E. coli*, nitrate, BOD, and TDS. Field readings for temperature, pH, DO, and conductivity were also taken. Samples indicated water quality standards for the all of parameters tested were being met. There was no detection for all *E. coli* samples (Appendix C).

April 21<sup>st</sup>- May 5<sup>th</sup>: Field readings for temperature, pH, D.O and conductivity were conducted at multiple locations in the Rio Hondo No water quality standard exceedances were recorded during this period (Appendix C).

May 21<sup>st</sup>: Three laboratory samples were collected in the Rio Hondo (Cuchilla Campground, 20 yards upstream from bridge in lower Hondo, and 10 yards upstream from confluence with Rio Grande) and analyzed for *E. coli*, nitrate, BOD, and TDS. Field readings for temperature, pH, DO, and conductivity were also taken. Very high levels of *E. coli* were detected at the two lower sites. At the site 20 yards upstream from the bridge in lower Hondo the *E. coli* concentration was so high it was over the detection limit of 1,000 cfu/100 mL. Further downstream 10 yards before the confluence with the Rio Grande the *E. coli* concentration was at 895 cfu/100mL. Both of these samples are well above the *E. coli* water quality standard of 410 cfu/100 mL for a single sample for the Rio Hondo. *E. coli* was not detected at the upstream site (Rio Hondo Campground). No other tested parameters, either in the laboratory samples or field samples, were above water quality standards (Appendix C).

July 24<sup>th</sup>- Four laboratory samples were collected in the Rio Hondo (Cuchilla Campground, near crossing with highway 522, 20 yards upstream from the bridge in lower Hondo and 10 yards upstream from confluence with the Rio Grande) and analyzed for *E. coli*, nitrate, BOD, and TDS. Field readings for temperature, pH, DO, and conductivity were also taken. No water quality standard exceedances were recorded during this period. (Appendix C)

### **Rio Pueblo:**

May 21<sup>st</sup>: Three laboratory samples were collected in the Rio Pueblo de Taos (near bridge over Paseo del Pueblo Norte and downstream from Taos Pueblo; near the crossing of Ranchitos Rd. and Culebra Rd - near Los Cordovas; and close to the confluence with Rio Grande) and analyzed for *E. coli*, nitrate, BOD, and TDS. Field readings for temperature, pH, DO, and conductivity were also taken. Very high levels of *E. coli* were detected at the two lower sites. At the site near the Ranchitos Rd. and Cuelbra Rd. crossing an *E. coli* concentration of 665 cfu/100mL was detected. The sample taken near the confluence with the Rio Grande showed an *E. coli* concentration of 640 cfu/100mL. Both of these concentrations are well above the water quality standard for *E. coli* for the Rio Pueblo de Taos of 235 cfu/100mL for a single sample. No other tested parameters, either in the laboratory samples or field samples, were above water quality standards (Appendix C).

July 24<sup>th</sup> - Three laboratory samples were collected in the Rio Pueblo de Taos (near bridge over Paseo del Pueblo Norte and downstream from Taos Pueblo; near the crossing of Ranchitos Rd. and Cuelbra Rd - near Los Cordovas; and close to the confluence with Rio Grande) and analyzed for *E. coli*, nitrate, BOD, and TDS. Field readings for temperature, pH, DO, and conductivity were also taken. The sample taken near the confluence with the Rio Grande showed an *E. coli* concentration of 384 cfu/100mL. This concentration is above the water quality standard for *E. coli* for the Rio Pueblo de Taos of 235 cfu/100mL for a single sample. No other tested parameters, either in the laboratory samples or field samples, were above water quality standards. Although the temperature reading at the lower site was right at the standard of 20 degrees (Appendix C).

### **Rio Fernando:**

May 21<sup>st</sup>: Three laboratory samples were collected in the Rio Fernando ( near Divisidero Trail in Taos Canyon; near crossing of Paseo del Pueblo Sur; and at Fred Baca Park) and analyzed for *E. coli*, nitrate, BOD, and TDS. Field readings for temperature, pH, DO, and conductivity were also taken. While some low levels of *E. coli* were detected at all three sites no tested parameters, either in the laboratory samples or field samples, were above water quality standards. (Appendix C)

July 24<sup>th</sup>: Two water laboratory samples were in the Rio Fernando (near Divisidero Trail in Taos Canyon and at Fred Baca Park). There was no water at F2 (near crossing of Paseo del Pueblo Sur). While some low levels of *E. coli* were detected at both sites no tested parameters, either in the laboratory samples or field samples, were above water quality standards (Appendix C).

### **Discussion:**

The levels of *E. coli* found in the downstream segments of the Rio Pueblo and Rio Hondo were high and potentially dangerous to public health. While these high levels were found during one only one of the two sampling events for those sites in the Rio Hondo and for the middle site in the Rio Pueblo; and twice for the lower site in the Rio Pueblo, and high levels could be due to seasonal runoff from snowmelt, and therefore not typical of year round concentrations, further investigation and possible action to inform the public may be merited. Action to inform the public of these high levels of *E. coli* may especially be merited in the Rio Hondo where many children and families immerse themselves in the lower sections of the Rio Hondo, especially near the confluence with the Rio Grande. Families have been observed cooling food such as watermelon in these lower sections of the Rio Hondo. Because of the high contact levels in the lower Rio Hondo actions may need to be taken to protect public health. Further testing is needed to determine whether these are typical levels of *E. coli* in both the Rio Hondo and the Rio Pueblo de Taos.

It is interesting to note that no water quality violations were observed at the sites in the upper parts of the watersheds. At no point during the three sampling events in the Rio Hondo were *E. coli* violations observed above Valdez. On May 21<sup>st</sup>, the only date that *E. coli* sampling was conducted further downstream, there were high levels of *E. coli* in the lower sites but still a no detect at the Cuchilla Campground which is upstream of the forest boundary. On May 21<sup>st</sup>, somewhere between the Cuchilla Campground and lower Hondo, substantial loading of *E. coli* occurred.

No other water quality problems were detected from the testing. Temperature is an ongoing problem in the Upper Rio Grande watershed. Fields reading on July 24<sup>th</sup> showed that temperatures were either right at the standard or slightly lower than the standard. Further tests during the hotter times of the year will better help determine if temperatures standards are being exceeded. High temperatures negatively impact aquatic life such as trout.

Again, these high levels of *E. coli* were only detected during one sampling event in the Rio Hondo and two sampling events in the Rio Pueblo de Taos. Additional testing is needed. Because the high levels of *E. coli* were detected during the spring sampling event the high levels could be from spring runoff collecting fecal matter from livestock near the river. Septic tanks are another potential source of the high *E. coli* levels.

### **Conclusion:**

- The levels of *E. Coli* found on May 21<sup>st</sup> in the downstream segments of the Rio Pueblo and Rio Hondo were high and potentially dangerous to public health. Samples taken in July do not show water quality exceedances for these sites with the exception of the lower site on the Rio Pueblo de Taos. The high levels of *E. coli* found on May 21<sup>st</sup> at these sites could be due to seasonal runoff from snowmelt and therefore not typical of year round concentrations, further investigation and possible action to inform the public may be merited.

- The sampling results indicate that the high levels of E. coli found in the Rio Hondo and Rio Pueblo are a result of E. coli loading in the lower sections of the watershed.
- Additional testing is needed to determine if there is a persistent E.coli problem in the Rio Hondo and Rio Pueblo.

SENTINELS-RIOS de TAOS WATER SAMPLING SITES  
ON THE RIO FERNANDO

- 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
- 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.
- F3 About 25 yards downstream from Paseo del Pueblo Sur, by ABC Lock. On the south bank, by a concrete bar.
- F4 Fred Baca Park, about 50 yards downstream from the footbridge at the bend. On northwest side. of stream.

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.
- P 2 About 15 yards downstream from bridge at Ranchitos Road and Culebra Road. On north side of stream by survey sign.
- 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.

ON THE RIO HONDO

- H 1 Above Phoenix Restaurant, which is upstream from the Bavarian Inn
- 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.
- H 2 B Branch coming from Bavarian Inn just before it empties into the main Rio Hondo.
- H 2C About 10 yards upstream from the bridge near the day care center in the Ski Village. On the north bank.
- H 2D 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.
- H 3 Cuchilla Campground, just downstream from entrance road. North bank.
- H 4 Kaufman Property. About 20 yards downstream from footbridge. South bank.
- 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.
- H 6 About 10 yards upstream from confluence with Rio Grande.

## **APPENDIX B**

### **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)

##### **Sampling Locations**

Sampling sites may change in attempt to identify sources of pollution. Some identified sampling sites include:

###### **ON THE RIO FERNANDO**

- F1 About 10 yards downstream from the west bridge by the USFS parking lot at the Divisidero/South Boundary trailhead. On the north bank
- 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.
- F3 About 25 yards downstream for Paseo del Pueblo Sur, by ABC Lock. On the south bank, by a concrete bar.

- F4 Fred Baca Park, about 50 yards downstream from the footbridge at the bend. On northwest side of stream.

### **ON THE RIO PUEBLO**

- P1 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.
- P2 About 15 yards downstream from bridge at Ranchitos Road and Culebra Road. On north side of stream by survey sign.
- P3 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.

### **ON THE RIO HONDO**

- H1 Above Phoenix Restaurant, which is upstream from the Bavarian Inn
- H2A 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.
- H2B Branch coming from Bavarian Inn just before it empties into the main Rio Hondo.
- H2C About 10 yards upstream from the bridge near the day care center in the Ski Village. On the north bank.
- 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.
- H3 Cuchilla Campground, just downstream from entrance road. North bank.
- H4 Kaufman Property. About 20 yards downstream from footbridge. South bank.
- H4A Just downstream from Route 522 bridge, north bank
- H5 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.
- H6 About 10 yards upstream from confluence with Rio Grande.

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, and local newspapers and publications. Sampling results will be stored in the Sierra Club Sentinels--Rios de Taos data base.



## **Project Organization**

### *Project Coordinator Contact information:*

Eric E. Patterson  
Box 334  
Valdez, NM 87580  
505-776-2833  
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	
Annouk Ellis	Jeanne Green	
Roberta Salazar	Flowers Espinosa	

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 Clean Water Circuit Rider and Policy Analyst  
Box 238  
Taos, NM 87571  
505-758-3874  
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 data base.

**Quality Assurance of Field Analysis**

Measurements will be made using the following equipment:

- CHEMets Dissolved Oxygen Kit, Model K-7512
- Fisher Alcohol Thermometer, Model 15021B
- Oakton Conductivity ECTester Meter, Model 5-0082
- LaMotte Wide Range pH Test Kit Model P-5985 Code 2119

<b>PARAMETER</b>	<b>DETECTION LIMIT</b>	<b>ACCURACY</b>
Dissolved Oxygen	1 to 12 mg/L	+/- 1 ppm
Temperature	-10° to 110° C	+/- 1° C
Conductivity	0 to 1990 µS/cm	+/-10 µS/cm
pH	5.0 to 8.5 ph units	+/-0.3 pH units

Field instruments will be calibrated according to manufacturers' instructions <24 hours prior to each sampling event. The conductivity meter will be calibrated using a known standard solution. Chemicals used for dissolved oxygen and pH analysis 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.

<b>METHODS FOR LABORATORY ANALYSIS</b>		
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 10029
Nonpotable water	BOD	SM 5210B