U.S. Environmental Protection Agency

Non-Point Source Assessment Report
April 2019

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1.0 OVERVIEW

The Pueblo of Laguna (referred to as Pueblo, or Laguna) is comprised of approximately 530,000 acres located in west-central New Mexico. Its eastern border is approximately ten miles west of Albuquerque, NM. The Pueblo is approximately 40 miles east to west and approximately 55 miles north to south. This report will outline the Pueblo's need for EPA Section 319 Non-Point Source Pollution Control funding. This non-point source (NPS) water pollution assessment report outlines the Pueblo's existing issues with NPS pollution sources and where more extensive NPS assessment and data is needed. The data in this report, gathered under the Pueblo's EPA Section 106 grant, is intended to establish a baseline of water quality from which to move forward and develop a NPS management program plan.

The major need is to gather more data specific to NPS pollution. While we recognize that there are several factors that contribute to or exacerbate NPS pollution on the Pueblo these sources have not been tested for chemical components that would outline the extent of the contamination. While many of the rivers and streams on the Pueblo suffer from severe sedimentation, high nutrient loads and loss of riparian vegetation, the extent of these, and others have not been fully examined. As demonstrated in the "results" section of this document, most of the Water Quality Standards set by the Pueblo are rarely, if ever met. This is of particular concern to the Pueblo.

Section 319 funding will allow the Pueblo to further assess our contamination sources and pollution loads and to address and manage them. Riparian vegetation and riverbank restoration are two ways in which the Pueblo intends to mitigate and contain our current NPS pollution.

2.0 INTRODUCTION

2.1 Reservation

The Pueblo of Laguna is one of 19 federally recognized Pueblo Tribes in New Mexico. Laguna was the first Pueblo to adopt a written constitution in 1908, which was later replaced by the Indian Reorganization Act of 1934, then amended in 1958, 1984 and in 2012. Laguna is located in West Central New Mexico, 50 miles west of Albuquerque, NM.

The Pueblo of Laguna is comprised of an original Spanish grant, tribally owned lands purchased subsequent to the original grants, lands acquired through executive orders and congressional acts. The Pueblo has recently purchased land and it is being held in trust by the US government. The total acreage today is 530,000 acres in Trust land, State land, and Bureau of Land Management leased tracts with hopes to purchase additional land in the future.

Laguna is situated within four New Mexico counties: Cibola, Valencia, Bernalillo, and Sandoval. The Pueblo is also spread between two primary watersheds: the Rio San Jose and the Rio Puerco. There are approximately 8,810 enrolled Tribal members of which approximately 4,200 reside in the six main villages within the reservation boundaries: Seama, Paguate, Encinal, Paraje, Laguna, and Mesita. All villages are located within the Rio San Jose watershed.

The land is currently used for agriculture, grazing, wood hauling, and hunting as well as residential, commercial and industrial uses. These areas are accessed with roads ranging from paved to primitive. The areas with primitive roads are traveled most during hunting season and by livestock owners.

In the past, village areas were used for farming and extensive shepherding occurred outside of the village boundaries. However, the most detrimental land use to date was the opening and use of the Pauguate-Jackpile Uranium mine from 1953 to 1982. Though parts of this landscape have been reclaimed it still adds significant pollution to local surface water.

2.1.1 Physical Description

Geology

The regional geology is a mix of sedimentary, mostly Jurassic age, deposition with Tertiary volcanic deposits from the Mt. Taylor volcanic complex, and a series of laminar flows in the Rio San Jose Valley. Laguna is situated primarily on the Colorado Plateau. It is characterized by high mesas, canyons and evidence of past volcanic activities, and partially on the eastern edge of the San Juan Basin, which is bounded by the Rio Grande Rift System. The Rio Grande Rift is a spreading center, while the Colorado Plateau is a relatively stable section of the North American tectonic plate characterized by stratified rocks cut by deep canyons.

Vegetation

The Pueblo is located in three Ecoregions: Semiarid Tablelands, Conifer Woodlands and Savannas, and at higher elevations Montane Conifer Forests. Semiarid Tablelands consists of scattered juniper and pinyon-juniper woodland, with alkali sacaton, shadscale, fourwing saltbush, and mixed grama grasses. Conifer Woodlands and Savannas are dominated by pinyon-juniper woodlands with some Gambel oak, blue grama, junegrass, galleta, bottlebrush squirreltail, and at higher elevations some alligator juniper, and ponderosa pines. Montane Conifer Forests are predominately ponderosa pine and Gambel oak, some Douglas-fir, white pine, and aspen trees. The Pueblo's land use is based upon the vegetative cover. The land is divided up into grazing, hunting, recreational, and farmland units.

Hydrology

Precipitation averages ten inches per year for the majority of the Pueblo making water a limited, and highly valuable resource. Primary surface waters consist of the spring and runoff fed Rio Paguate, Encinal Creek, and Water Canyon Creek. These surface waters flow into the Rio San Jose which discharges into the Rio Puerco. An estimated 373 miles of rivers, streams, and springs recharge shallow alluvial aquifers that are the main supply of domestic drinking water for the entire Pueblo.

Drinking water wells are mechanically screened in the shallow alluvial aquifers and surface water pathways with the exception of Paguate and Encinal Villages. Water for the Village of Encinal is collected from Encinal Creek surface water springs, which infiltrates from snowpack and rain through a minimum of two basalt units, and likely through a sandstone unit. Excess water is piped to the San Jose valley to improve the drinking water quality of the degraded valley water system. The surface waters of the Rio Paguate are of the same nature as Encinal Creek. The water is filtered and treated for distribution to the Village of Paguate. Therefore, the Pueblo's drinking water aquifers and the supply system are vulnerable to contamination from surface sources. This contamination is more likely to occur with the increase in road construction, both paved and primitive, an increase in large paved lots, an increase in population and other aggravating factors. Currently, the Pueblo's Utility Authority utilizes chlorine injectors and is addressing the potential influence of surface water on groundwater.

Hydrogeology

Two primary watersheds drain the Pueblo; the Rio Puerco and the Rio San Jose. The Rio San Jose drains from west to east converging with the Rio Puerco, which drains from north to south. The Rio Puerco flows to a confluence with the Rio Grande. Together, the Rio San Jose and the Rio Puerco form sub-basins within the Rio Grande Basin. The Rio Puerco is considered one of the main tributaries of the Rio Grande, joining the Rio Grande near Bernardo basin; however, because there is very little or no flow in the Rio Puerco, water often does not make it through this system to the Rio Grande except in high flow rain events.

2.1.2 Potential Pollution Sources

The primary goal of the Pueblo's Water Quality Program is identifying, reducing, and preventing water pollution on tribal lands. The data obtained from sampling under the Clean Water Act (CWA) § 106 Grant funds is being used to develop a trend analysis that will assist in the future decision making process in drought management,

monitoring of uranium migration from Paguate-Jackpile mine, and for development of the Laguna Planning Program's Tribal Climate Resilience Plan. The data will also be used to determine impairments and sources of impairment of tribal streams to accurately assess the non-point source pollution concerns. The data will ultimately be used to develop best management practices (BMPs) for reducing and controlling these pollution sources, as well as keeping other areas free of contamination.

There are numerous possible pathways for the discharge of pollutants into the water supply. The main non-point source concern comes from surface run-off. The many paved surfaces in Laguna, primarily to Interstate 40 corridor, have the potential to cause hazardous run-off from vehicles, spills, and other land applied or spilled materials. Metal contamination from the upstream superfund sites, and past mining operations are a large concern for the Pueblo. Another source of concern is regulated, point-source effluent discharge into the Rio San Jose from upstream users such as the City of Grants, and tribally at the Dancing Eagle Casino, and into the Rio Puerco from the Route 66 Casino. In the event of leakage or overflow, sewage lagoons in the watershed are sources of possible contamination especially those within close proximity to surface water. Livestock waste and agricultural chemicals applied upstream of the Pueblo are of great concern.

In an area that is prone to high intensity rain storms intermingled with very low flow during summer months, and limited riparian vegetation, sedimentation becomes a problem. Many of our river and stream channels are severely eroded causing extensive sedimentation downstream. This also results in the widening and straightening of stream channels, exacerbating the effect of high flow events, causing water to run faster across the river and stream systems. This contributes to more bank loss and downstream flooding where sedimentation is most severe. For example, the Rio Puerco and Rio San Jose watersheds supply more than 70 percent of the suspended sediment that settles above the Elephant Butte Reservoir on the Rio Grande, five miles north of Truth or Consequences, NM.

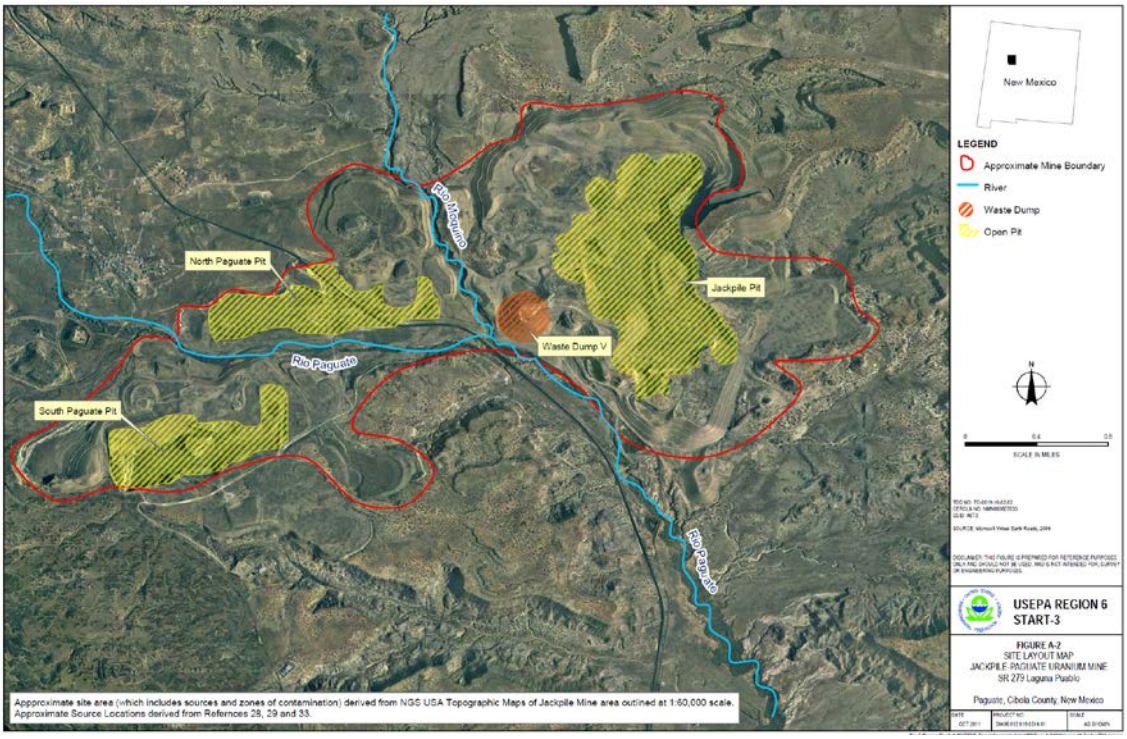
The loss of riparian vegetation due to generations of overgrazing, drought, and the introduction of invasive species has an overall deleterious impact on surface water quality and increases NPS pollution as sedimentation. Invasive species, such as the tamarisk (salt cedar), are displacing native species and species that are culturally significant like willows as it continues to spread and dominate the riparian landscapes. The state of New Mexico released the tamarisk beetle and uses aerially applied herbicides to combat the spread of tamarisk. As the beetle defoliates, and herbicides widely kill the tamarisk the watersheds are left vulnerable to rapid bank erosion, channel widening and straightening when native riparian species are too slow to return.

Paguate-Jackpile Uranium Mine

The Paguate-Jackpile Uranium mine is located in an area of canyons and arroyos to the southeast of the village of Paguate. The total leased area encompassed approximately 7,868 acres. The surface area mined was approximately 2,700 acres including open pit mines, waste dumps, and ore stockpiles. During operation over 400 million tons of earth was excavated producing approximately 25 million tons of Uranium ore. The mine is partially reclaimed; however, discharges from the mine impact the water quality of the Rio Moquino and the Rio Paguate within and downstream of the mine (Map 1). Mesita Dam has shown elevated levels of total uranium, which may increase the human health risks due to cultural and ceremonial uses of these water bodies. Agricultural practices have largely ceased in the Village of Mesita.

On December 11, 2013 the former mine was listed on the National Priorities List of Superfund Sites. The Remedial Investigation and Feasibility Study (RI/FS) began in July 2018. The RI characterizes the nature and extent of the contamination, and assesses the potential risk to human and environmental health. The FS will identify, evaluate, and recommend technical options for further remediation of the site.

MAP 1: Paguate-Jackpile Uranium Mine and Surface Water



Drought Conditions

Historically, New Mexico has experienced prolonged and severe droughts. However, the current drought conditions are exacerbated by higher temperatures and an increase in human population. These conditions have added stress to regional water supplies. Many surface waters go dry during the summer months. Drought conditions reduce soil moisture which increases sheet flow action and reduces infiltration of precipitation. This accelerates head- and down-cutting streambanks and stream channels while increasing sedimentation, turbidity, total dissolved solid, and salinity which reduced dissolved oxygen level in Pueblos waters.

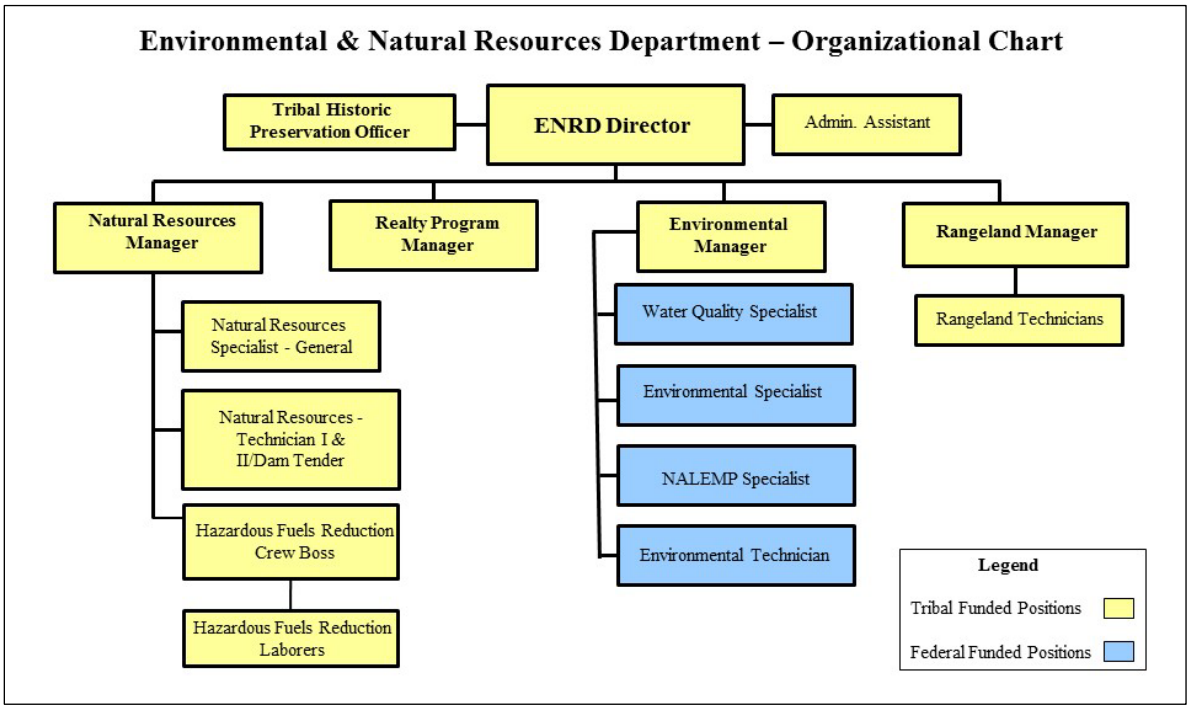
2.1.3 Current Sampling

Currently, to gauge the effects of some of the potential contaminants, the Pueblo's Water Quality Program uses a CWA § 106 grant to test surface waters reservation wide. The program tests 27 sites on a quarterly basis for physical parameters: temperature, specific conductance, conductivity, total dissolved solids (TDS), salinity, dissolve oxygen (DO) percent, DO concentration, pH, oxygen reduction potential (ORP), turbidity and barometric pressure. Of these sites, 15 are additionally tested for total kjeldahl nitrogen, total nitrogen, phosphorous, and *E.coli*. Of these 15 sites tested for analytical parameters, eight are further tested for total uranium, and in the past isotopic uranium. Testing for uranium is necessary due to the presence of the now abandoned Paguate-Jackpile mine. The Water Quality Program staff currently consists of a Water Quality Specialist and a half-time Environmental Technician. The Water Quality Program is encompassed within the Environmental Program (See Figure 1).

Although the physical and analytical parameters currently tested are important beginnings of an analysis on the non-point source (NPS) pollution occurring on Pueblo Lands, we would like to expand this testing to include obvious NPS pollution points. These points will include: parking lots discharging to arroyos, railroad track bi-ways, bridges, sediments from eroding stream banks, bacteria and nutrients from livestock; to do further assessments of how NPS pollution is effecting the Pueblo; to determine the sources of NPS pollutants, where these sources are and how they can be mitigated. We would also like to expand our testing to include metals (lead, copper, zinc, etc.), ammonia, chlorophyll-a, and chloride to better understand the extent and types of contamination. We are currently looking

into expanding our sampling to include volatile organics, which were previously tested until 2010, to get a better understanding of what is impacting our waters and in what ways.

FIGURE 1: Organizational Chart



2.2 Tribal Description

The Pueblo of Laguna is comprised of an original Spanish land grant, tribally owned lands purchased subsequent to the original grants, and lands acquired through executive orders and congressional acts. The Pueblo has recently purchased land and it is being held in trust by the US government. The total acreage today is 530,000 acres in Trust and in State and Bureau of Land Management leased tracts with hopes to purchase additional land in the future.

The land is currently used for agriculture, grazing, wood hauling and hunting as well as residential, commercial and industrial uses. These areas are accessed with roads ranging from paved to primitive. The areas with primitive roads are traveled most during hunting season and by livestock owners.

In the past, village areas were used for farming and extensive shepherding occurred outside of the village boundaries. However, the most detrimental land use to date was the opening and use of the Paguate-Jackpile Uranium mine from 1953 to 1982. Though parts of this landscape have been reclaimed it still adds significant pollution to local surface water.

Currently, under CWA § 106, the Pueblo's Water Quality Program tests points along the Rio San Jose, Rio Paguate and Rio Puerco as well as several springs, streams and intermittent rivers. This program has allowed the Pueblo to better understand where there are significant water shortages and where there is an abundance of clean water based on volume, contaminant loads, areas of concern and areas to be protected.

2.3 Goals and Objectives

The goal of this assessment and management plan is to ascertain where the Pueblo of Laguna has current NPS pollution problems, identify other potential sources, and develop plans on how to mitigate and control those impacts while keeping the high quality waters clean. The objectives of the assessment and management plan are: 1) provide an accurate depiction of the current status of the POL waters, 2) describe the land uses and environmental conditions

contributing to our current NPS issues, 3) derive solutions to restore our water ways and protect our waters from future contamination.

In order to meet these goals and objectives we intend to address the following categories and subcategories of NPS pollution. These goals and objectives can be achieved with the assistance of § 319 funds to address NPS pollution and mitigate its impacts while protecting our waters.

Category	Subcategory	Impairment Level
Uranium Mine Drainage		1
Agriculture	Grazing related, Streambank Erosion	1
Forestry	Streambank Erosion	1
Habitat Alteration	Channelization, Vegetated Buffer degradation	1
Roads, Highways, and Bridges	Contaminated runoff	2
Urban	Storm water	2
Other	Illegal Dumping	2

Level 1 – Confirmed impairment currently exists
Level 2 – Possible impairment: not yet confirmed by monitoring data

3.0 METHODOLOGY

3.1 Collection Methods

Our methodology for collecting the field data was approved by EPA region VI through a Quality Assurance Project Plan (QAPP) Q-Track #18-139 and Quality Management Plan (QMP) #18-267. Sampling is currently funded under our CWA 106 Surface Water Quality Grant. Sampling for physical parameters occurs at 27 sites across the POL. These sites include streams, rivers and springs. Of these 27 sites 15 are tested for Total Nitrogen, Total Kjeldahl Nitrogen, Phosphorous and *E.coli*. Furthermore, eight are currently tested for Total Uranium, and historic testing exists for Isotopic Uranium. All of the analytical samples, except for *E.coli* are sent to Hall Environmental Analysis Laboratory in Albuquerque, NM. *E.coli* is processed in-house using Idexx Quanti-Tray systems. Sampling is done quarterly and data has been compiled from 2007-2019.

To collect physical parameter data water quality program staff uses am YSI EXO1 Multiparameter Sonde. All field measurements are promptly recorded on field forms and stored in the instruments data loggers until transferred to program computers for permanent electronic storage. Parameter measurements and sample collection will be performed in a sequence from the least disturbing to the most disturbing techniques and in a manner that one procedure will not influence the data collected in subsequent procedures. Therefore, the procedures will be conducted in the following order:

1. Physical Parameter measurements,
2. Flow Measurement,
3. Analytical sample collection upstream from all previous disturbance

Physical parameter measurements will generally be taken with the Sonde resting on the bottom of the water body in the center of the stream. If the water body is large enough to provide complete and easy access, the probe may be suspended above the bottom in the flow to take measurements. In all cases, sampling techniques will ensure the safety of the staff.

Analytical parameter water samples are collected in clean containers provided by the analytical laboratory. All grab samples will be collected directly from the water using a dedicated, triple rinsed grab bottle that is decontaminated

between collection sites. When it is not possible to collect the water directly in the sample containers, a peristaltic pump is used to draw water from the water body into the sample container. The samples are stored on ice and transported to the lab for analysis. Sample collection depth is determined by total depth of the water body. When possible, waters less than 1½ feet deep are sampled approximately one-third of the way down the water column. If the water is extremely shallow, the sample is collected from the deepest accessible point. Waters deeper than 1.5 feet are sampled approximately one foot below the surface. Bottle lids remain on the sample bottle until the desired depth is reached. Samples are collected upstream from and out of the influence of sediments disturbed during flow measurement. The samples are collected by submerging the container into the center of flow with its mouth directed upstream and filling it to capacity. When water depth or access to the water body precludes the collection of "grab samples," a peristaltic pump is used to collect samples from as close to mid-stream as possible and deposited into suitable sample containers for preservation and transport to the lab.

3.2 Water Quality Standards

On September 30, 2014 the Pueblo of Laguna submitted our Water Quality Standards Application and Jurisdictional Statement to the EPA Region VI Headquarters. Treatment in a similar manner as a state (TAS) was granted on December 20, 2016. Water Quality Standards were approved on July 19, 2017.

3.3 Data Management

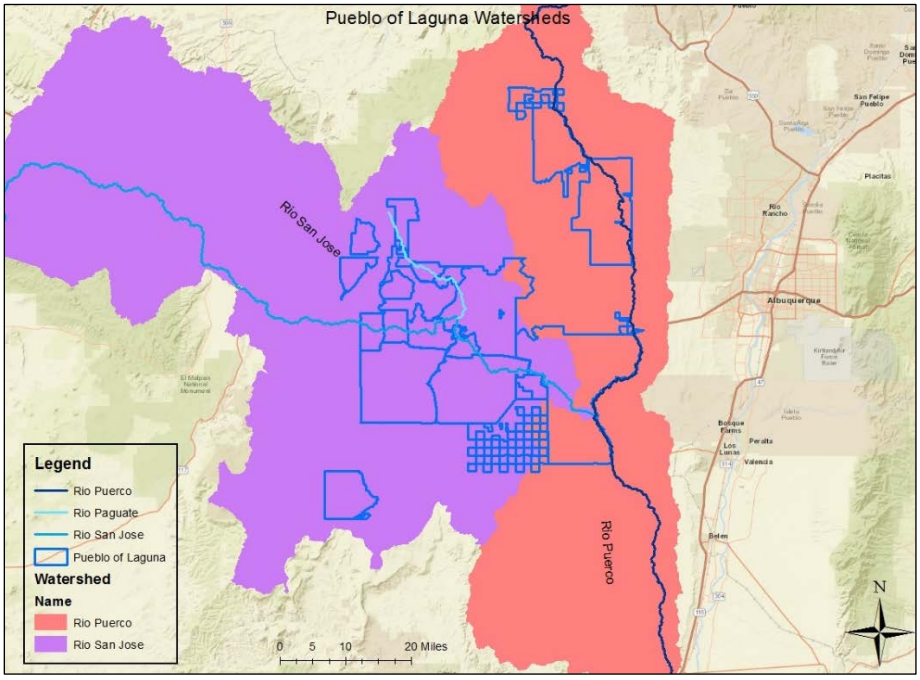
Data is currently collected and imported the Ambient Water Quality Management System (AWQMS) that is uploaded into the EPA Water Quality Exchange network (WQX). A database is also housed on program computers. The Water Quality Specialist compiles all data and does trend analysis on pertinent rivers and streams.

4.0 LAND USE SUMMARY

4.1 Existing Land Use

The Pueblo is situated in both the Rio San Jose Watershed (HUC 13020207) and the Rio Puerco (HUC 13020204). Although the Pueblo is primarily in the Rio San Jose watershed, the Rio Puerco watershed is important because the river itself forms much of the eastern boundary of the Pueblo (Map 2). Laguna currently has approximately 530,000 acres of land in trust and lease, over 500,000 of which is officially trust and reservation land.

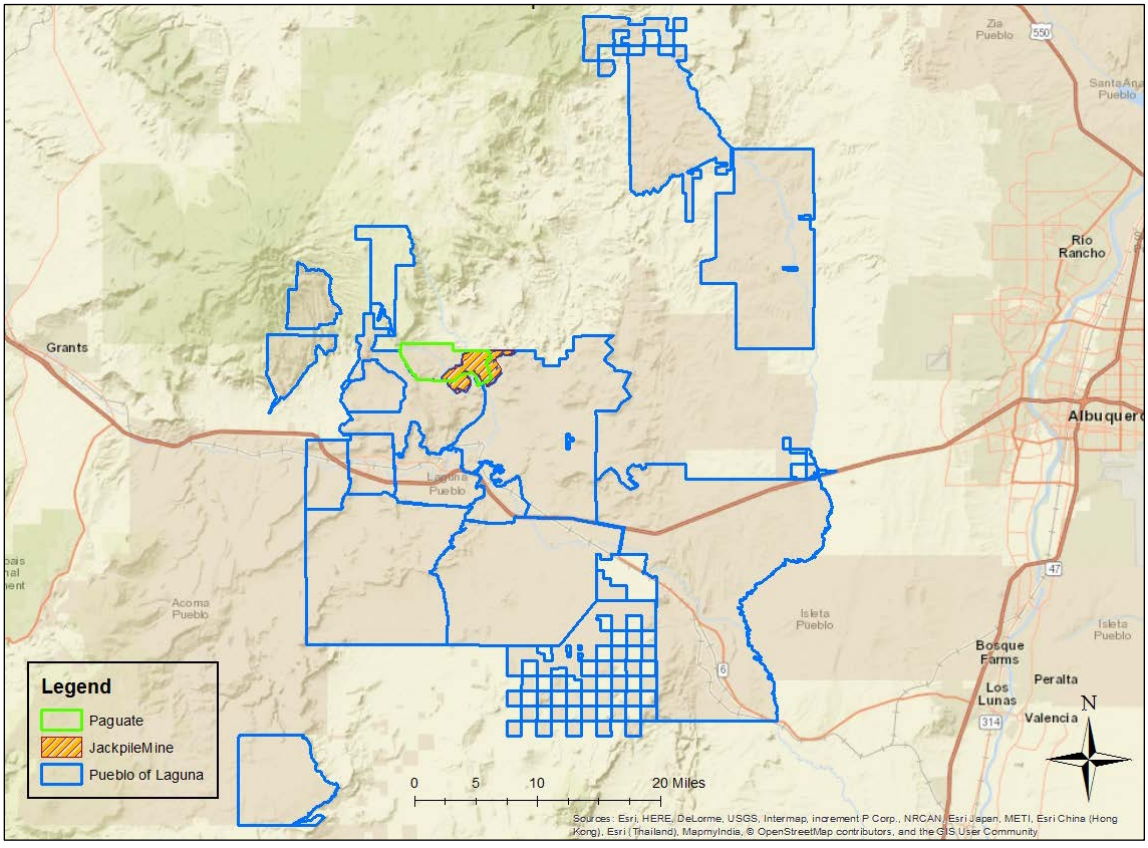
MAP 2: Pueblo of Laguna Watersheds



Land use on the Pueblo is comprised primarily of agriculture, grazing, residential, commercial, industrial, and hunting units. The Pueblo has an estimated enrollment of 8,800 members with approximately 5,200 living on designated reservation lands. The Pueblo's population is concentrated in the western portion of the reservation and is divided into six villages. Although, there is sufficient land throughout the reservation, cultural ties ensure that the villages and the homes within them are contained within very limited areas. The concentration of residential areas creates an increased risk for environmental issues in these areas such as anthropogenic and agricultural effluents such as oil, vehicle fuel, pesticides. Fecal matter from wildlife, livestock and pets have an increased likelihood of contaminating streams and rivers through runoff, as all of the residential and commercial areas are adjacent to streams and arroyos.

The Pueblo also houses a solid waste transfer station, three casinos, two travel centers, three gas stations, and two natural gas compressor stations (El Paso Gas and Transwestern), a transmix facility, and a number of smaller businesses. The Burlington Northern Santa Fe railway also has several rail lines traversing Pueblo land, as does Interstate 40, and State Route 6, four and two lane highways. This adds additional layers to possible chemical contamination and NPS pollution. Perhaps the biggest source of NPS pollution is the now retired Paguate-Jackpile Uranium mine. The mine is just southeast of the village of Paguate (Map 3). The original mine lease was for 7,868 acres. The disturbed area ended up being ~3,000 acres with ~2,700 having been reclaimed. There are also several adjacent mines that may impact the Pueblo's surface water quality, including the St. Anthony mine, JJ and L-Bar mines. The Rio Paguate, highlighted on Map 1, runs directly through the mine and eventually into the Rio San Jose.

MAP 3: Paguate-Jackpile Mine Location



The majority of Pueblo lands are used for livestock, hunting and firewood collection. The Pueblo authorizes seven livestock associations that are permitted to graze approximately 1,800 cattle and 70 horses. There are approximately 800 feral and trespass livestock including horses, burros, and cattle. During an aerial survey conducted in February 2016 218 elk, 42 mule deer and 123 pronghorn were identified. These animals are not restricted from accessing

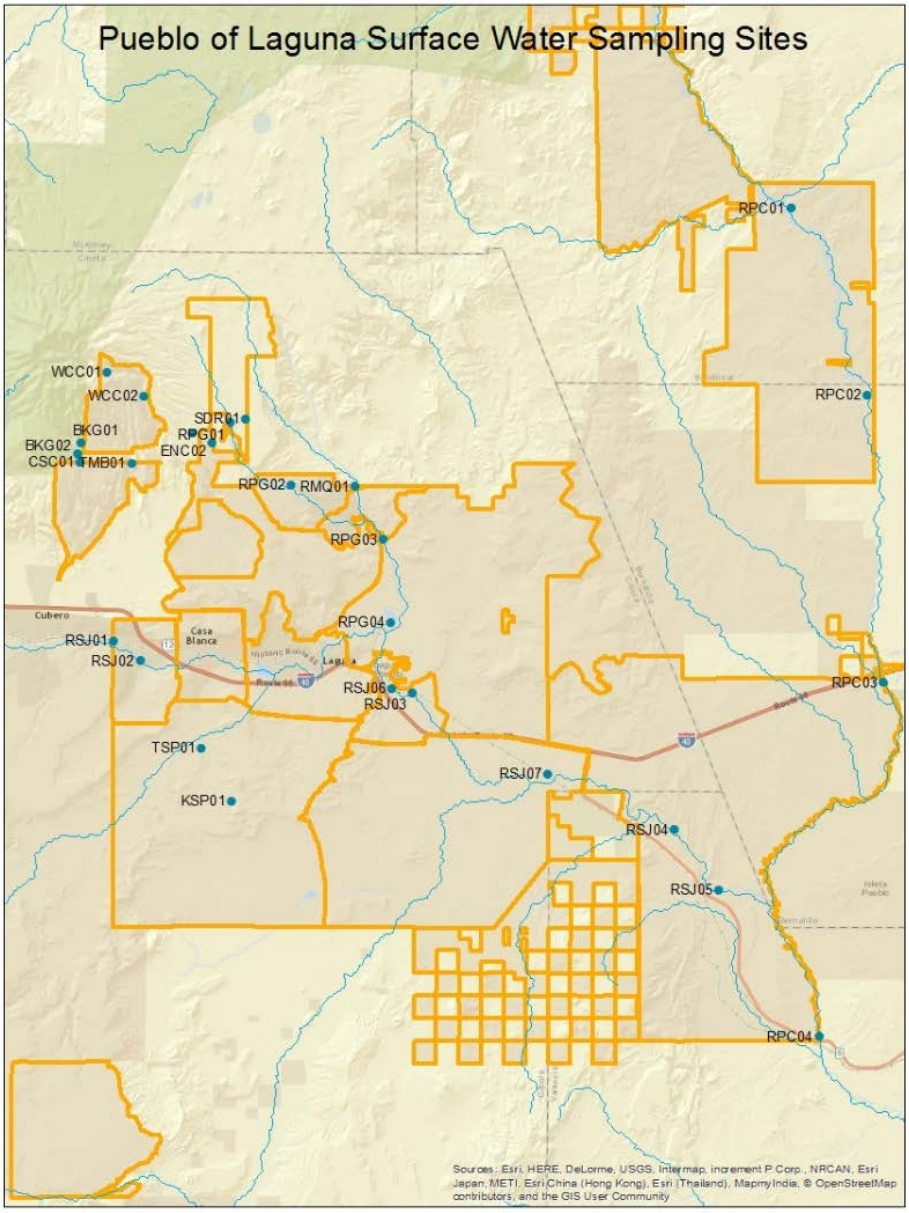
surface waters in most locations. Small paddocks are also present in many of the villages, temporarily or permanently housing livestock, which are not well documented by the Pueblo. These livestock and wildlife have the potential to cause fecal coliform contamination, ammonia contamination as well as potential sedimentation of rivers and streams due to overgrazing.

Hunting occurs across the Pueblo in 12 hunting units. Besides the contamination that wildlife may contribute, hunters also add to potential contamination. Roads have been created so that hunters can gain access to the more remote hunting areas. These roads and the vehicles on them, often contribute to contaminated run off, down cutting of existing river and stream systems, as well as increased sedimentation in these systems.

The many land uses on the Pueblo create a very unique possibility of non-point source pollution and the rapid transport of this pollution. It is important to be able to properly assess the possible sources of contamination and regulate these sources as much as possible while simultaneously protecting our waters.

5.0 SURFACE AND GROUND WATER QUALITY

MAP 4: Pueblo of Laguna Surface Water Sampling Sites

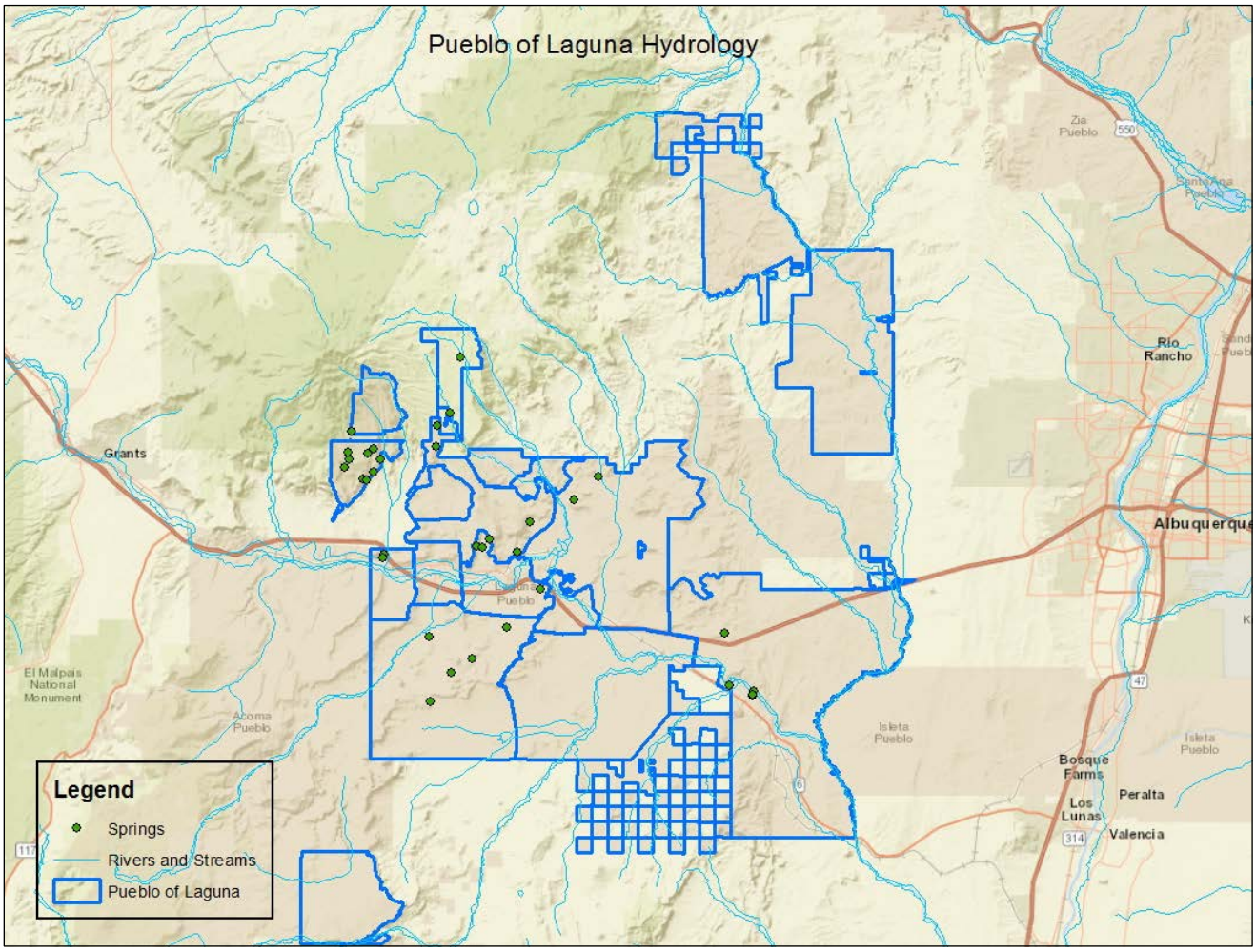


Surface water is monitored at 27 sites around the Pueblo. These sites are monitored under the Pueblo's CWA § 106 grant (Map 4).

Current sampling sites include six springs, five stream, and 16 river sites. The § 106 grant covers strictly surface water testing so, at this time, no ground water testing is being done. Surface water quality is evaluated at all sites quarterly presuming that water is present at the site. The data gathered is then compiled into an in-house database and the AWQMS database which automatically uploads to EPA WQX network. The data is then analyzed against the Pueblo's WQS into an Annual Report submitted to the EPA, and the Pueblo.

In addition to the sites covered in the CWA § 106 Grant, the Pueblo has at least 29 springs and several streams and creeks that have not been sampled or analyzed for chemical components (Map 5).

MAP 5: Spring and streams not yet sampled

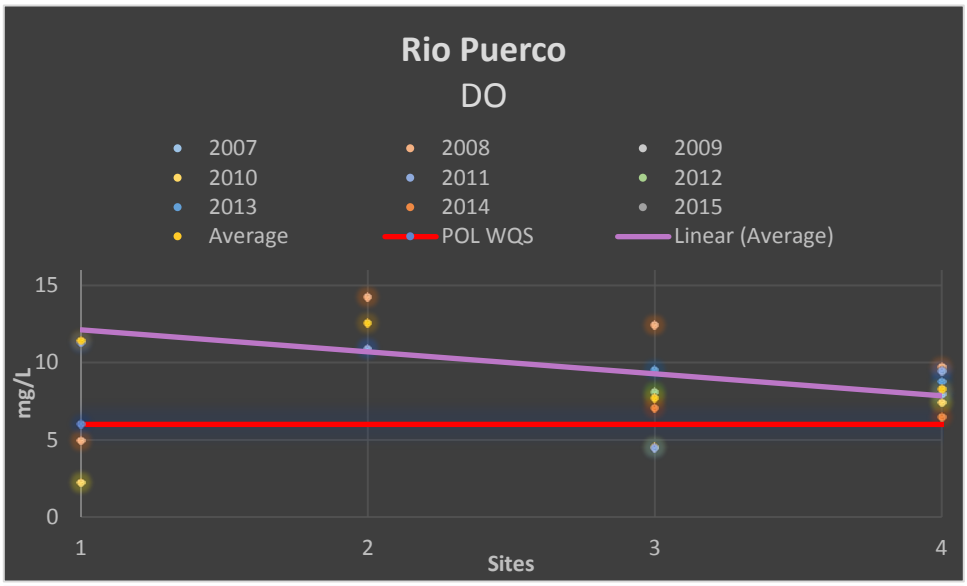


6.0 RESULTS

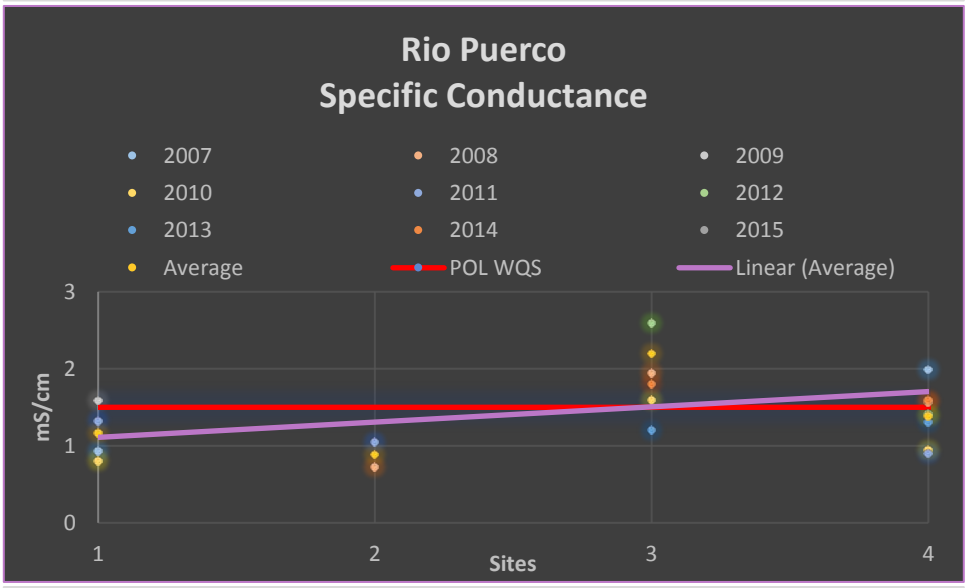
The results for the major river systems are highlighted in this report. These include the Rio Puerco, the Rio San Jose and the Rio Paguate. Alongside the major rivers, the springs and streams included for analysis in the CWA § 106 grant were analyzed to demonstrate the effects of NPS pollution on remote areas relative to more visited, well-traveled areas. Rivers that run through or are adjacent to Paguate-Jackpile mine were analyzed for Uranium, while unrelated springs and streams were not, and were assumed to be at background levels.

The following graphs represent data from upstream to downstream along the respective river reaches, during the spring sampling round under the CWA § 106 grant. Spring sampling events were highlighted due to the most complete and accurate data. The red line on each graph is the Pueblo's Water Quality Standard (WQS) while the purple line is the linear averaged trend line. This is to indicate how the parameters change, on average, along each river system. As seen in the graphs below, sedimentation is a huge contributing factor to the poor water quality on the Pueblo. The sedimentation contributes to high Specific Conductance, low Dissolved oxygen, and high turbidity readings.

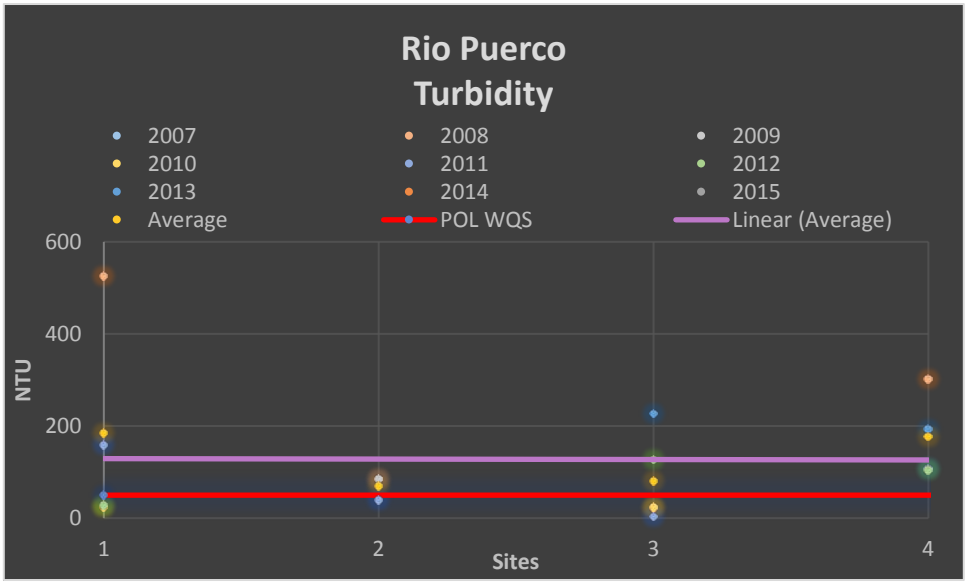
Rio Puerco – RPC01, RPC02, RPC03, RPC04



Dissolved Oxygen levels decrease from upstream to downstream but is consistently above the Pueblo's WQS of 6 mg/L.

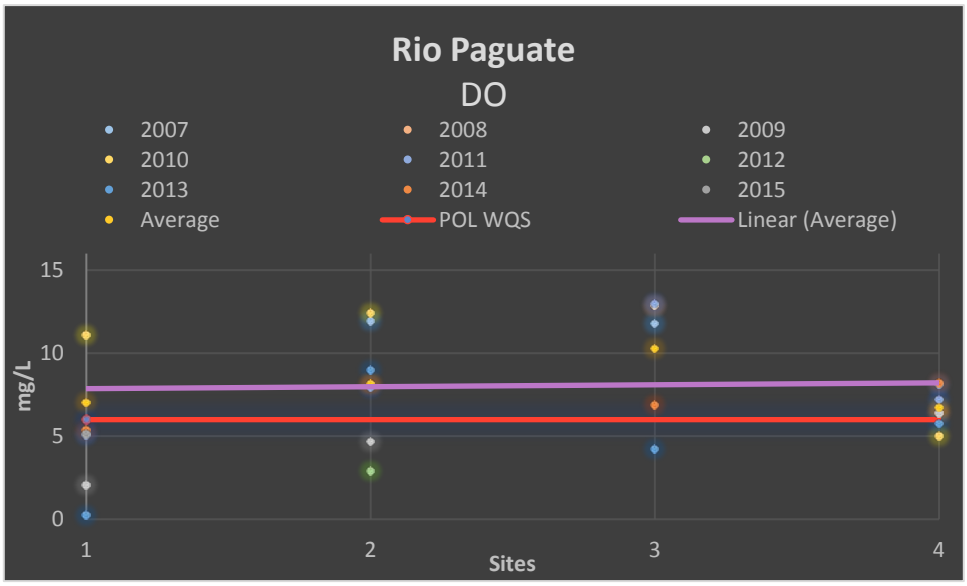


Specific Conductance (SC) increases from upstream to downstream. In general the SC remains under the WQS of 1.5 mS/cm until site #3. This may be related to the location of site #3 (See Map 4) is near I-40, Route 66 Casino/Hotel and travel center. Paved surfaces contributes to a high amount of run off, raising the conductivity. The Pueblo also has several salt springs and very saline aquifers.

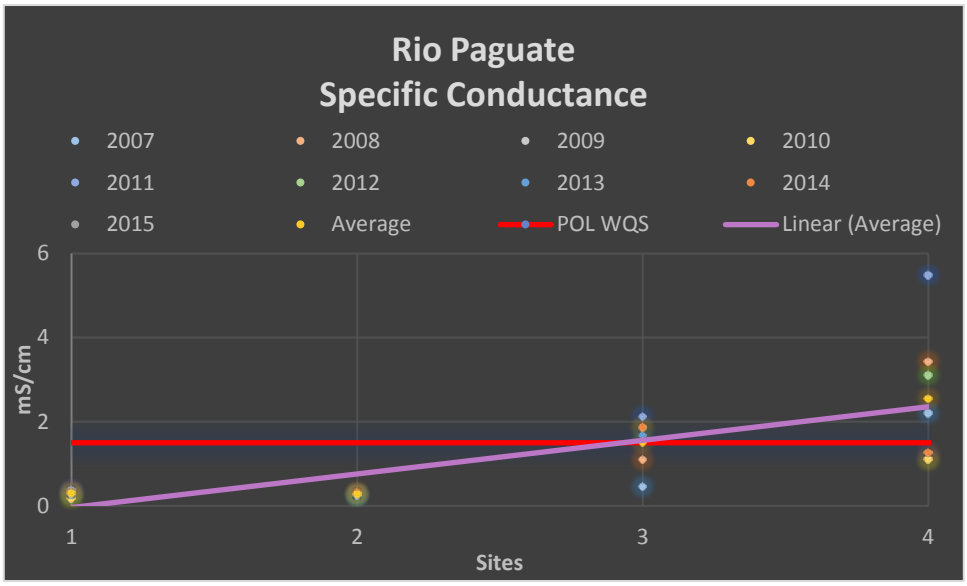


Although turbidity stays largely consistent throughout the extent of the river it is always over the 50 NTU WQS. It is important to note that all numbers recorded over 800 NTU were removed from the data set in order to show a more consistent representation of this and the other rivers.

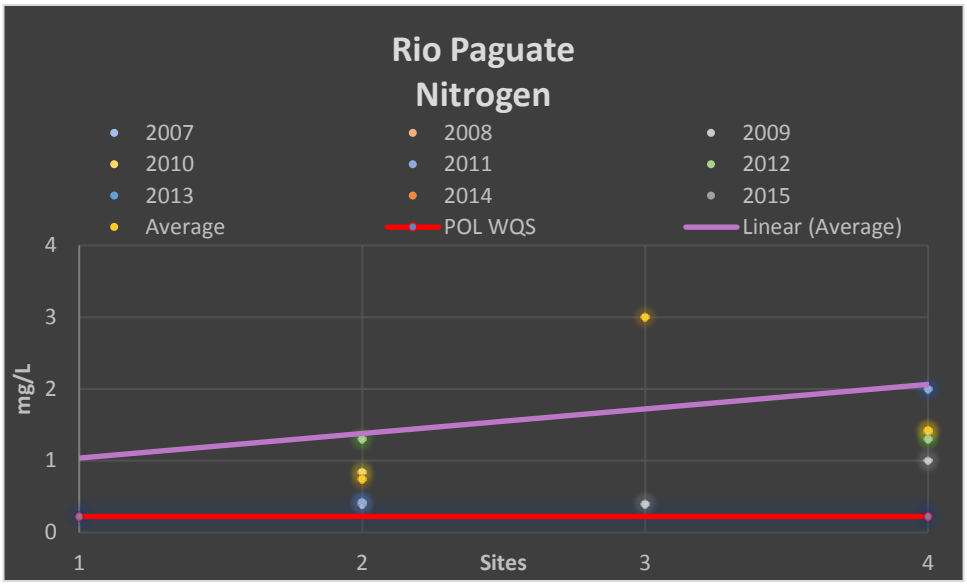
Rio Paguate – RPG01, RPG02, RPG03, RPG04



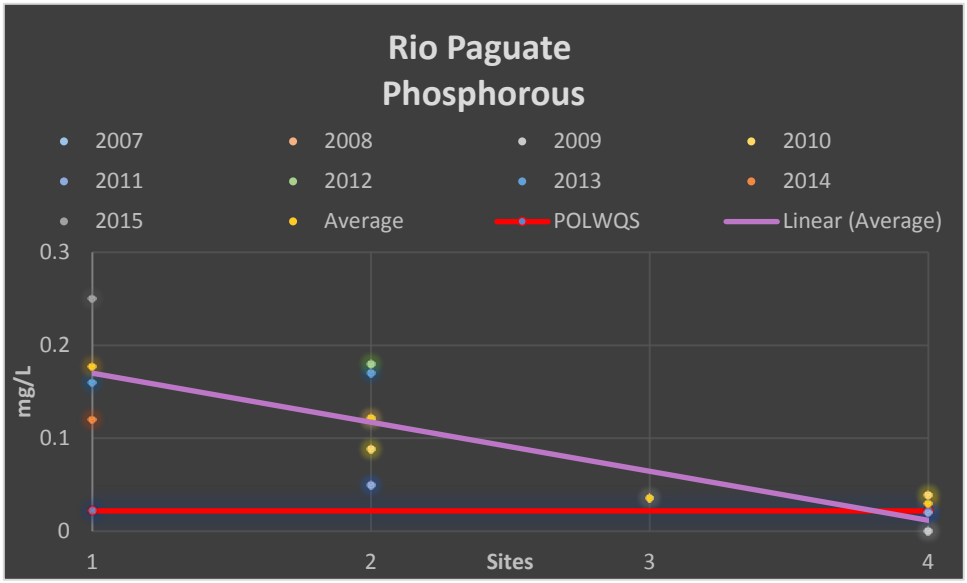
Along the Rio Paguate, Dissolved Oxygen remains largely constant from upstream to downstream and is consistently above the WQS of 6 mg/L, signifying a healthy amount of dissolved oxygen content.



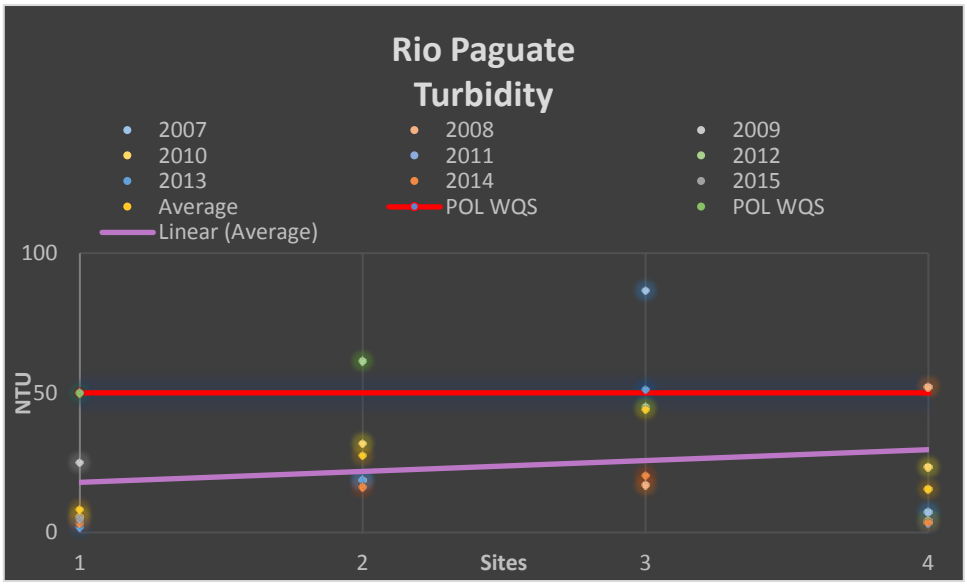
Specific conductance is below the 1.5 mS/cm WQS until site #3 (RPG03 on the Map 5). RPG03 is where the Rio Paguate is tested at the entrance to Paguate-Jackpile mine.



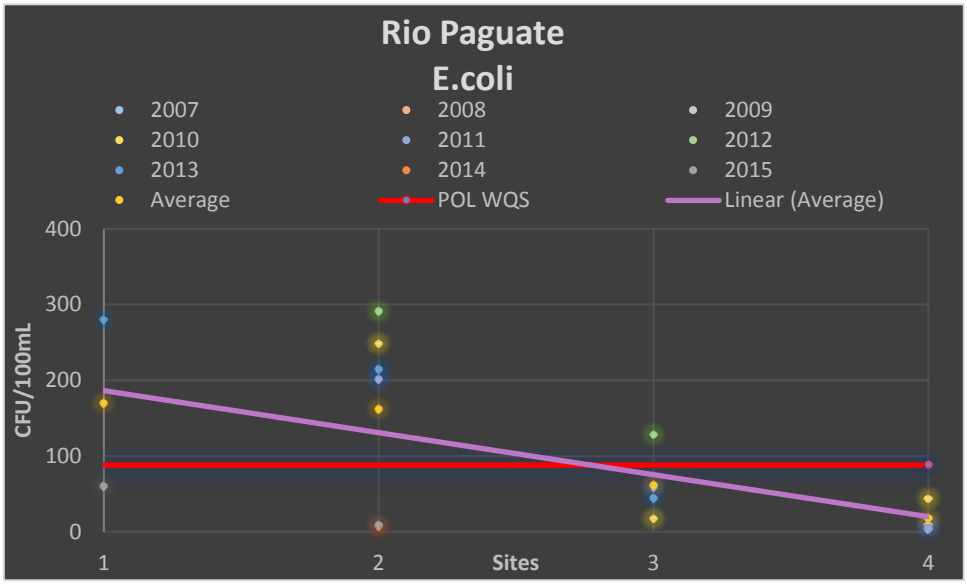
Total Nitrogen increases upstream to downstream and is consistently over the Pueblo's WQS of 0.223 mg/l as a calculated total.



Phosphorous decreases from upstream to downstream on average and is above the Pueblo's WQS of 0.02881 mg/l until the 4th site, farthest down the Rio Paguate which is a manmade wetland area create after addition of a dam approximately 80 years ago.

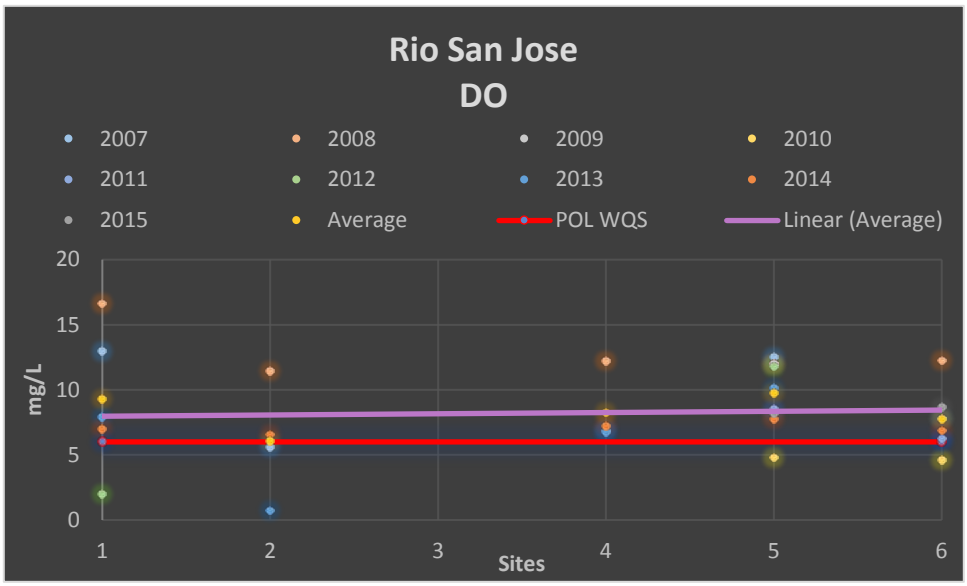


Turbidity increases slightly from the upstream sites to the downstream sites but remains under the WQS of 50 NTU. This is likely due to the slow flow in the Rio Paguate which allows for much of the sediment to settle out, clearing the upper water column where samples are generally taken.

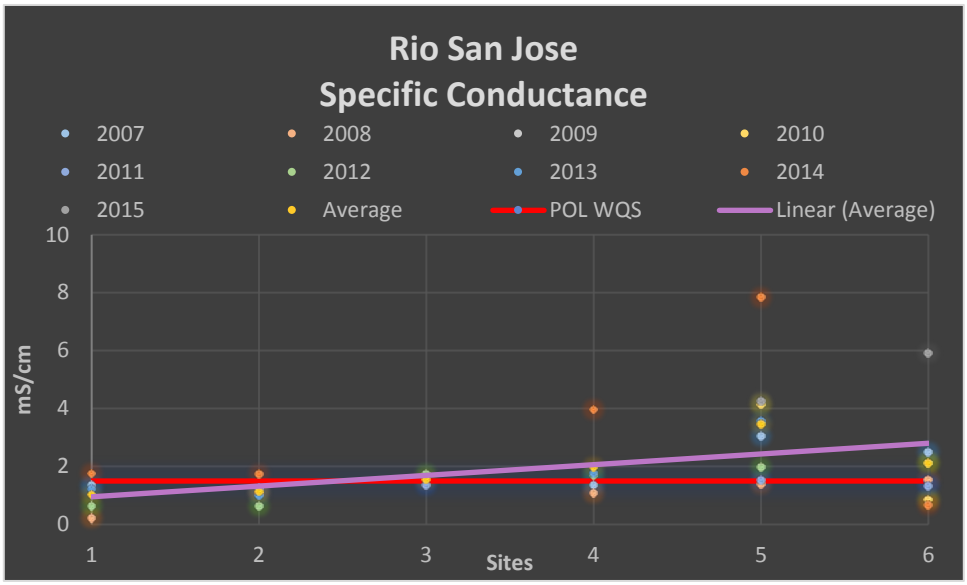


E.coli decrease from upstream to downstream. *E.coli* starts out above the WQS of 88 cfu/ 100mL for surface water but quickly declines flowing downstream.

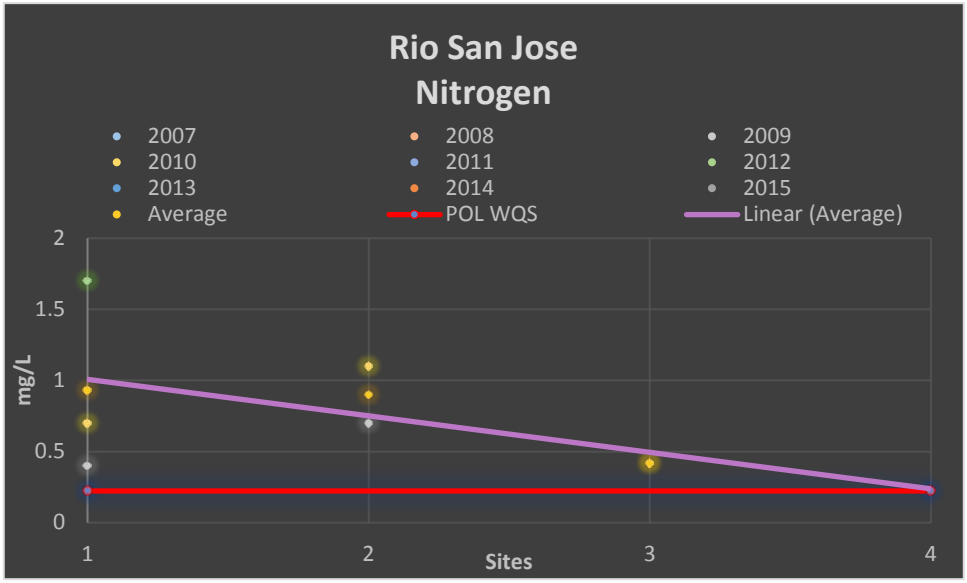
Rio San Jose – RSJ01, RSJ02, RSJ03, RSJ04, RSJ05, RSJ06



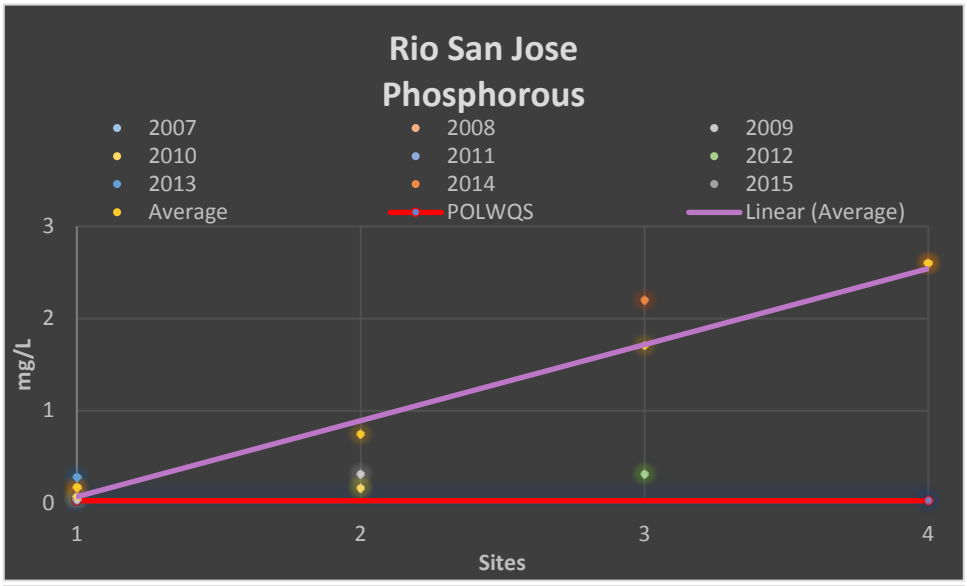
Dissolved oxygen does not vary much along the reach of the river and is consistently above the WQS designated by the Pueblo.



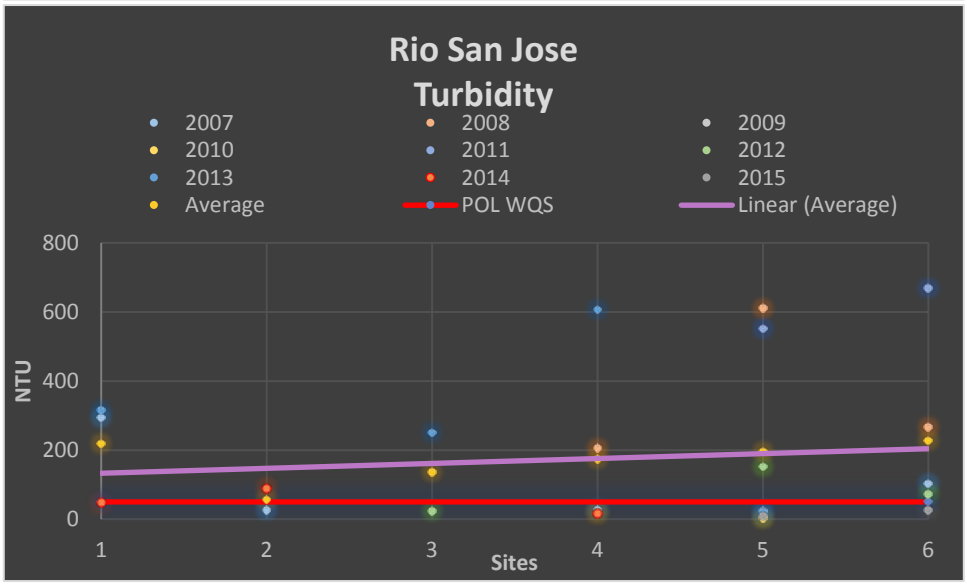
Along the Rio San Jose, specific conductance increases from upstream to downstream. Specific conductance meets the water quality standard only at the first two sites that are tested (RSJ01 and RSJ02 on the Map 5). The lower 4 sites however, slightly surpass the WQS. This occurs after the confluence with the Rio Paguate.



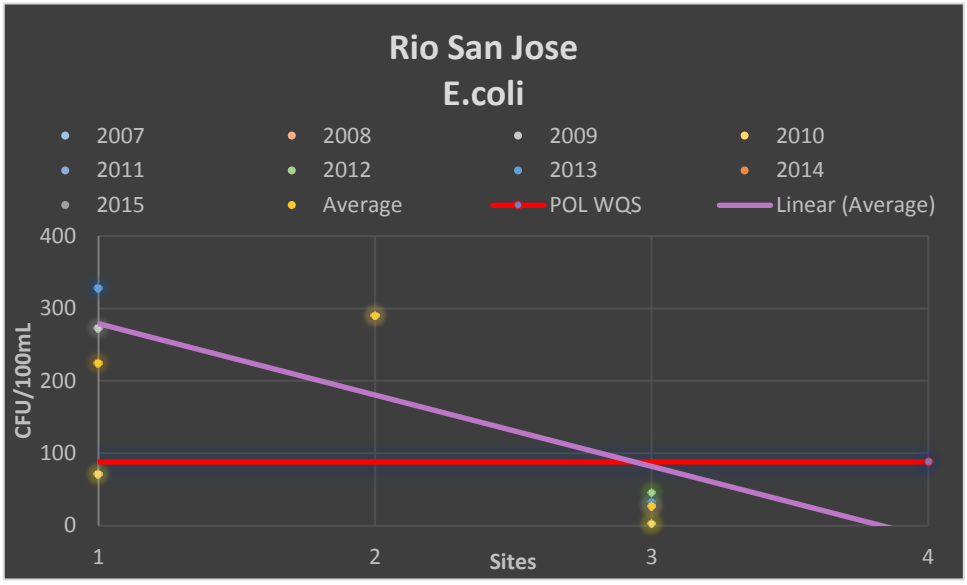
Nitrogen decreases going downstream along the Rio San Jose and is consistently above the WQS (RSJ01, RSJ04, RSJ05, RSJ06).



Phosphorous increases going downstream along the Rio San Jose and is consistently above the WQS (RSJ01, RSJ04, RSJ05, RSJ06).



Turbidity increases slightly traveling downstream and is consistently over the WQS, especially in past years. Data indicates that current turbidity is lower than in past years.



E.coli decrease from upstream to downstream. *E.coli* starts out above the WQS of 88 cfu/ 100mL for surface water but declines flowing downstream (RSJ01, RSJ04, RSJ05, RSJ06).

7.0 DISCUSSION

The previous graphs illustrate potential patterns and correlations between parameters but does very little to outline the potential extent of NPS pollution problems on Pueblo lands. The current patterns and correlations over several years are incomplete. The Pueblo is situated in a desert with very unique characteristics. There is often no flow in large stretches of river due to drought. When samples are collected it is often closely following torrential rain events causing the output data to be skewed. CWA § 319 funding would enable the tribe to better evaluate the data that is available, fill data gaps with further sampling, determine the most effective riparian restoration methods, and potentially develop a watershed based plan.

8.0 SELECTION OF BMPs

8.1 Core participants

Participant	Role
Pueblo of Laguna Council	Lead participant, sets strategic policies, provides legal authorization, and final approval on large scale projects.
Pueblo of Laguna Villages (6)	Grant approval and supply assistance for projects within village jurisdiction.
Pueblo of Laguna Environmental & Natural Resources Department (ENRD)	Provides operational lead to surface water monitoring and pollution control activities. Conducts and oversees funding, implementation, and evaluation of monitoring programs and BMPs. Conducts and oversees educational/community outreach programs for pollution reduction.
Pueblo of Laguna Public Works Dept.	Provides operational lead for road construction, repair, and maintenance
Pueblo of Laguna Range Management Program	Provides operational lead for potential exclusion fencing around water resources.
Rio Puerco Management Committee	Interagency coordination and technical assistance.
USEPA Region 6 Project Officer	Provide funding and technical resources.
United States Army Corps of Engineers	Potential funding source and technical assistance
U.S. Department of Agricultural	Potential funding source and technical assistance
Bureau of Indian Affairs	Potential funding source and technical assistance
Bureau of Reclamation	Potential funding source and technical assistance
Bureau of Land Management	Potential funding source and technical assistance
U.S. Fish and Wildlife	Potential funding source and technical assistance

8.2 Public participation and governmental coordination

The Pueblo's decision making process regarding selection of the most suitable BMP to address each category and subcategory of nonpoint source pollution is as follows:

1. Identify appropriate BMPs to each NPS pollution through research and consultation.
2. Determine which BMPs are suitable in terms of cost, scales, environment, and infrastructure.
3. Consult with relevant agencies listed above and jurisdictions to determine which BMPs may be best used in coordination for joint efforts. Identify multiple funding options where possible.
4. Large scale proposals will undergo public a public comment period of tribal officials, tribal members, and surrounding communities.
5. Small scale proposals, such as low impact, inexpensive, site specific projects will undergo internal review within the Environmental & Natural Resources Department.
6. Following implementation, regular updates on BMP status will be provided to all stakeholders.

8.3 Existing BMPs

BMPs can include, but are not limited to the following list:

NPS Category	Nonpoint source	NRCS conservation practice standards		Partners	Potential Funding
Uranium mine drainage	Operation of the Paguate-Jackpile mine from 1952-1982. Original reclamation was insufficient. Surface water exceeds 0.03 mg/L tribal WQS.	322	Channel vegetation	ENRD/NRCS/USEPA	CERCLA
		327	Conservation cover	ENRD/NRCS/USEPA	CERCLA
		332	Contour buffer strips	ENRD/NRCS/USEPA	CERCLA
		342	Critical planting area	ENRD/NRCS/USEPA	CERCLA
Agriculture	Grazing related streambank erosion	322	Channel vegetation	ENRD/NRCS/USEPA	319, NCRS, BIA, Tribal
		327	Conservation cover	ENRD/NRCS/USEPA	319, NCRS, BIA, Tribal
		342	Critical planting area	ENRD/NRCS/USEPA	319, NCRS, BIA, Tribal
		390	Riparian herbaceous cover	ENRD/NRCS/USEPA	319, NCRS, BIA, Tribal
		391	Riparian forest buffer	ENRD/NRCS/USEPA	319, NCRS, BIA, Tribal
		395	Stream habitat improvement and management	ENRD/NRCS/USEPA	319, NCRS, BIA, Tribal
		584	Channel bed stabilization	ENRD/NRCS/USEPA	319, NCRS, BIA, Tribal
		382	Fence	ENRD/NRCS/USEPA	319, NCRS, BIA, Tribal
Forestry	Streambank erosion	228	Prescribed burning	ENRD/NRCS/USEPA	319, BIA, Tribal
		315	Herbaceous weed control	ENRD/NRCS/USEPA	319, BIA, Tribal
		342	Critical area planting	ENRD/NRCS/USEPA	319, BIA, Tribal
		390	Riparian forest buffer	ENRD/NRCS/USEPA	319, BIA, Tribal
		391	Riparian herbaceous cover	ENRD/NRCS/USEPA	319, BIA, Tribal
		395	Stream habitat improvement and management	ENRD/NRCS/USEPA	319, BIA, Tribal
		410	Grade stabilization structure	ENRD/NRCS/USEPA	319, BIA, Tribal
		472	Access control	ENRD/NRCS/USEPA	319, BIA, Tribal
		584	Channel bed stabilization	ENRD/NRCS/USEPA	319, BIA, Tribal
Habitat Alteration	Channelization, vegetation buffer degradation	390	Riparian forest buffer	ENRD/NRCS/USEPA	319, Tribal
		391	Riparian herbaceous cover	ENRD/NRCS/USEPA	USACE, 319, Tribal
		395	Stream habitat improvement and management	ENRD/NRCS/USEPA	USACE, 319, Tribal
		584	Channel bed stabilization	ENRD/NRCS/USEPA	USACE, 319, Tribal
Roads, Highways, and Bridges	Contaminated runoff	570	Stormwater runoff control	ENRD/Laguna Public Works/NRCS/USEPA	NMDOT, BIA, 319, Tribal
Urban	Storm water	570	Stormwater runoff control	ENRD/Laguna Public Works/NRCS/USEPA	319, Tribal
Other	Illegal dumping			ENRD, Law Enforcement, Tribal members	GAP

8.4 Pollution reduction

The Pueblo of Laguna does not have a nonpoint source control program. The development of this NPS Assessment Report and NPS Management Plan are the first steps toward implementing nonpoint source prevention and controls.

9.0 NPS CONTROL PROGRAMS

The Pueblo of Laguna does not currently have any NPS control programs in place nor has it in the past. The CWA § 319 grant would be a great opportunity for the Pueblo to begin assessing and controlling its non-point source pollution problem areas.

10.0 CONCLUSION

The Pueblo is in a challenging position to assess NPS pollution. Drought, flooding, livestock, wildlife, and riparian degradation are all contributing factors. Currently, the main need is to gather more data that is specific to non-point source pollution. While we recognize that we have several factors that may contribute to or exacerbate non-point source pollution around the Pueblo, these sources have not been tested for chemical components that would outline the extent of contamination. While many of the rivers and streams on the Pueblo suffer from severe sedimentation, high nutrient loads and loss of riparian vegetation, the extent of these has not been fully examined. As seen in the graphs, most of the Pueblo's WQS are rarely met. This is of high concern.

Upstream users along the Rio San Jose contribute to the lack of water and increase contamination loads, the extent of which is unknown. The designated use of the Rio San Jose was downgraded cold water fishery due primarily to the lack of consistent flow throughout the system. This lack of dependable water is one reason why the Pueblo's data is not consistent. Climate change is another issue that we are all facing. With later monsoon seasons creating unpredictable flow we suffer from either drought conditions or flood conditions. Snowmelt runoff is occurring earlier and in more voluminous pulses for shorter periods of time. While high flow would be beneficial to calculate the effect of NPS pollution, it has proven difficult to gather accurate surface water and flow data for constituents such as phosphorous and nitrogen. Drought conditions are also beneficial when attempting to do bank reconstruction or riparian planting. Being able to do the necessary work with 319 funding while there is little or no flow will allow us to better assess the benefits and progress made when there is flow.

Although the challenge is great we are optimistic. With § 319 funding we can begin to assess what our major NPS pollution concerns are, where they are present, and where they originate. We can then begin to implement containment and mitigation measures to ensure that the contamination is not spread during times of flood or high flow while simultaneously protecting the areas that have consistent higher quality water such as our springs and mountain streams. The Pueblo is dedicated to monitoring and restoring our natural systems so that future generations can live healthy lives free of contamination.

11.0 REFERENCES

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12.0 ACRONYMS and ABBREVIATIONS LIST

BIA – Bureau of Indian Affairs
BMP – Best Management Practices
CAA – Clean Air Act
CERCLA – Comprehensive Environmental Response, Compensation and Liability Act - Superfund
CWA – Clean Water Act
ENRD – Environmental & Natural Resources Department
EPA – Environmental Protection Agency
GAP – General Assistance Program
NALEMP – Native American Land Environmental Mitigation Program
NRCS – Natural Resources Conservation Service
NMDOT – New Mexico Department of Transportation
NPS – Non-Point Source
Pueblo – Pueblo of Laguna
USACE – United State Army Corp of Engineers
WQS – Water Quality Standards