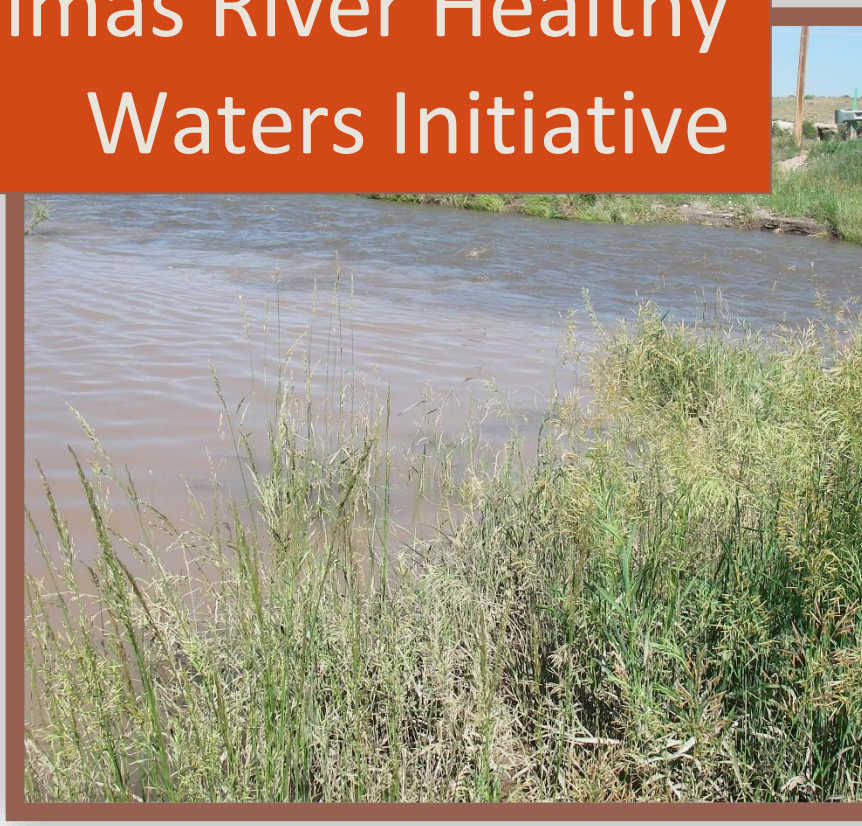
Florida and Animas River Healthy Waters Initiative



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Introduction

The Florida and Animas River Healthy Waters Initiative (originally proposed as the Animas River Education and Healthy Waters Partnership) assessed water quality within the Animas Watershed, with a focus on the Florida River.

The project conducted water quality monitoring on the Florida and Animas Rivers in southwest Colorado in order to 1) identify source areas of E. coli and nutrient contamination in the Florida River.

In 2014 SWCD generously granted $16,923 to support the Upstream Expansion of Microbial Source Tracking and Nutrients Study. That study completed sampling of nutrients and E. coli at three sites within Colorado: one on the Animas near the state-line, one on the Animas just upstream of the mouth of the Florida River, and one on the Florida River just upstream of its mouth. This sampling matched and was coordinated with a similar sampling effort in New Mexico to identify geographic and biological sources of E.coli, and nutrients.

The E.coli samples collected near the mouth of Florida River in 2014 showed that the geometric means of the E. coli levels sampled in the July/August (235cfu/100ml), August/September (331cfu/100ml), and September/October (288 cfu/100ml) two-month periods of that sampling effort each exceeded the Colorado State Standard for that reach, which is 126 cfu/100ml as a 2–month geometric mean (to support primary contact recreation. Similarly, the nutrient samples showed that high levels of nitrogen and phosphorus were entering the Animas River from the Florida River.

These results for one summer at one location near the mouth of the Florida River raised a concern around non-point source pollution and recreational use of the Florida River. The elevated E. coli levels found near the mouth of the Florida River led AWP to seek funding for this follow-up study, Florida and Animas River Healthy Waters Initiative (originally called The Animas River Education and Healthy Waters Partnership), from the Southwestern Water Conservation District (SWCD). With SWCD's generous support, AWP completed this project. This report summarizes AWP's methods and findings from that sampling and also includes an accounting of project expenditures.

Ultimately, the results of this sampling can lead to new partnerships with landowners for implementing practices that can benefit both the landowners and the Florida River as a healthy, productive and fun community resource. Since 2012, AWP has been working together with private landowners on the Florida River to install riparian fencing and improved irrigation systems aimed at these goals. The Southern Ute Tribe and the NRCS also continue to focus funding toward such partnerships with private landowners in the Florida River drainage.

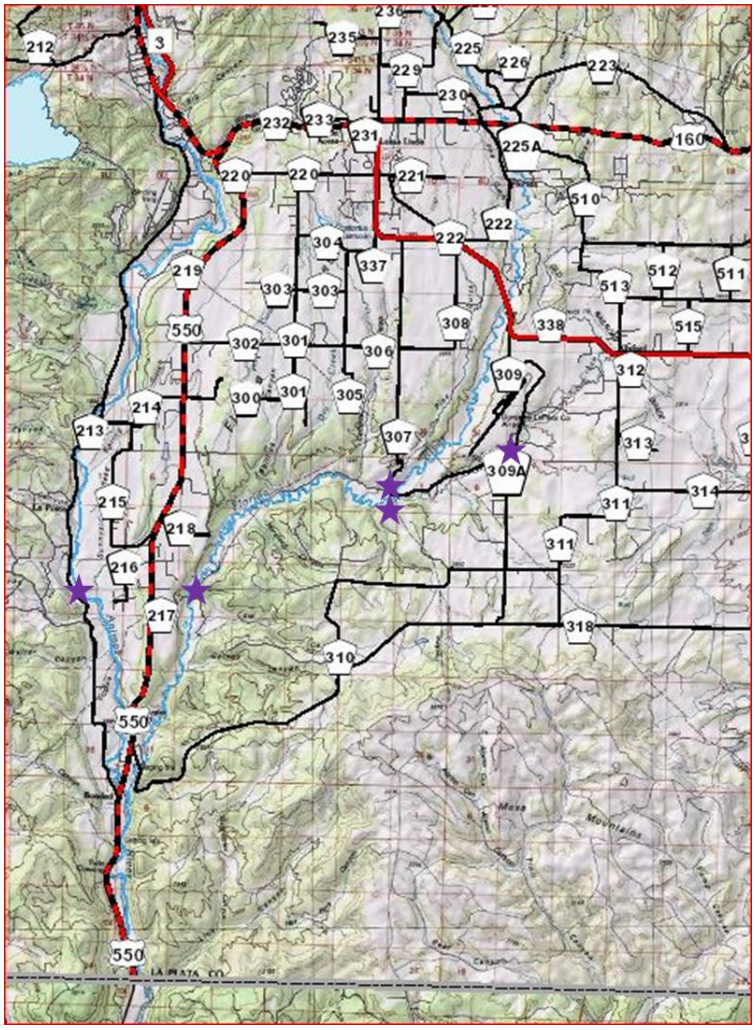
Methods

In 2015 AWP sampled nutrients, E.coli and turbidity, at four locations within the Florida River watershed and one location on the Animas River. Each location was sampled on thirteen days from June 8 to November 24. Sampling was coordinated by AWP's VISTA volunteer, Rachel Hoffman and conducted by AWP staff and volunteers. Each volunteer participated in training at each site prior to conducting sampling on their own.

The five sampling locations are shown on the map in Figure 1. For the purposes of this study they are referred to as:

- Animas-Bondad: about 2 river miles upstream of the mouth of the Florida River
- Florida-Bondad: about 2 river miles upstream of the mouth of the Florida River
- Salt Creek – 309A: on upstream side of County Road 309A bridge
- Salt Creek – 307: right bank, about 30 feet upstream of the mouth of Salt Creek
- Florida River – 307: left bank, about 30 feet upstream of the mouth of Salt Creek.

Figure 1 Map of five 2015 sampling locations (purple stars).



On each sampling day, samples were kept on ice and delivered to the appropriate lab immediately following completion of sampling at all five sites. Nutrient sample bottles were delivered to and analyzed by Green Analytical Laboratories and E.coli sample bottles were delivered to and analyzed by San Juan Basin Health. Turbidity readings were taken in the field with a meter loaned to AWP by the San Juan Watershed Group and readings recorded on data sheets.

Concentrations of E. coli (cfu/100ml), total Kjeldahl nitrogen (milligrams/L), nitrate/nitrite (milligrams/L), total phosphorus (milligrams/L), as well as turbidity, were identified for each sampling location on the following 13 sample dates.

Findings

Figures 2 thru 5 show the data for turbidity, E. coli, total nitrogen, and total phosphorus collected at each sampling location. Figures 3 thru 5 also display the Water Quality Control Commission standards that apply to the segment of the Florida River from the Southern Ute Tribal Boundary downstream to the confluence with the Animas River. We are in the early stages of data analysis. In addition to comparing concentrations across sample sites we are developing flow estimates that will allow us to develop relative load comparisons for E. coli, total nitrogen and total phosphorus. We also plan to map precipitation events onto the calendar day horizontal axis. However, the patterns evident in Figures 2 through 5 do shed light on the following questions.

What drainages are associated with the highest levels of each parameter?

For each constituent, the pattern appears similar across the sample sites. The highest levels of turbidity, E. coli, total nitrogen and total phosphorus were generally sampled on Salt Creek (sometimes at County Road 309A, other times at County Road 307). The next highest levels within the Florida basin sites were fairly consistently sampled on the Florida at Bondad, with the Florida River at County Road 307 most frequently showing the lowest levels of the 4 sites sampled in the Florida basin.

On most occasions, the levels sampled on the Animas River at Bondad are lower than those sampled the same day on the Florida River at Bondad. However, there are a few notable exceptions to this pattern. On August 3, turbidity peaked much higher on the Animas than on the Florida at Bondad. On October 12, total phosphorus concentration in samples from the Animas at Bondad was 0.047, whereas the concentration in samples from the Florida at Bondad was not detectable. And on November 2, total nitrogen concentration measured higher on the Animas at Bondad than it did on the Florida at Bondad.

When are levels highest on the Florida and the Animas at Bondad?

In 2015, E. coli concentrations on the Florida River at Bondad remained between 500 and 1000 cfu/100 ml for the five samples collected from June 8 thru August 3rd. All subsequent samples, from August 10 through November 24 were under 210 cfu/100ml. On the other hand, on the Animas River, all samples remained below 100 cfu/100ml, except for one, taken on August 3, which measured 285.1 cfu/100ml.

In order to generalize reliably beyond this one year's pattern, we will need to look at several other years' data for the same period and sample locations. It may be (and there is some evidence from our field observations) that high levels at these locations are more driven by precipitation events than by season of the year.

Does turbidity indicate high concentrations of E. coli?

On the Animas River at Bondad, the pattern of turbidity level appears to reflect that of E. coli level, with the peak in turbidity on August 3 matching the measured peak in E. coli level on that day. However, the Florida River at Bondad, the pattern of high and low turbidity levels does not match up well with the pattern of high and low E. coli levels. In fact, the lowest turbidity

measured at this location occurred on August 3, which is when the second highest concentration of E. coli was sampled.

A more robust correlation analysis is necessary, and again it will be important to look at turbidity and E.coli levels measured at this location in other years. The apparent lack of correlation in 2015 does not match the findings in 2014.

How do the sampled levels compare to Colorado's Water Quality standards?

The Water Quality Control Commission has established the following use classifications for the segment of the Florida River from the Southern Ute Tribal Boundary to the confluence with the Animas River: Aquatic Life Use is Cold Water 2; Water Supply Use; Recreation E (primary contact), and Agricultural Use.

The Recreation E standard is 126 cfu/100ml as a 60 day geometric mean. On the Animas River at Bondad only one sample exceeded 126 cfu/100ml (August 3). However, on the Florida River at Bondad all samples except one on (November 2) exceeded 126 cfu/100ml. Similarly, all samples except one (November 2 at County Road 309A) collected at the two Salt Creek locations exceeded 126 cfu/100ml. Exceedances were fewer on the Florida River at County Road 307 (located upstream of the mouth of Salt Creek), with only 3/11 samples higher than 126 cfu/100ml on June 8, July 6 and August 3.

The WQCC has adopted interim nutrient standards for total phosphorus and total nitrogen. For cold water streams the interim total nitrogen standard is 1.25 mg/L, effective May 31, 2017; the interim total phosphorus standard is 0.11 mg/L, applicable as of May 31, 2022. Both of these interim standards are as annual median concentrations, with allowable exceedance frequencies of 1-in-5 years. Only one sample collected at one location surpassed the 1.25mg/L concentration of the interim total nitrogen standard: this was on Salt Creek at County Road 307 on August 3.

However, at least one sample at all locations surpassed the 0.11 mg/L concentration of the interim total phosphorus standard. These were: Animas at Bondad (June 22), Florida at Bondad (June 8, 22 and August 3, 10), Florida at County Road 307 (June 8, 22), and both Salt Creek sites (June 8, 22; July 6 and August 3, 10).

Figure 2 Turbidity by sampling location.

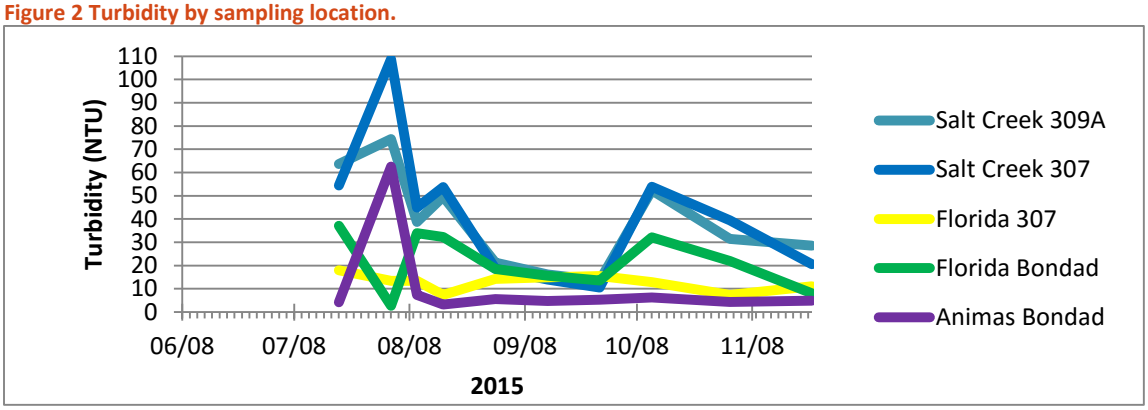


Figure 3 E. coli concentration by sampling location, with WQCC criteria.

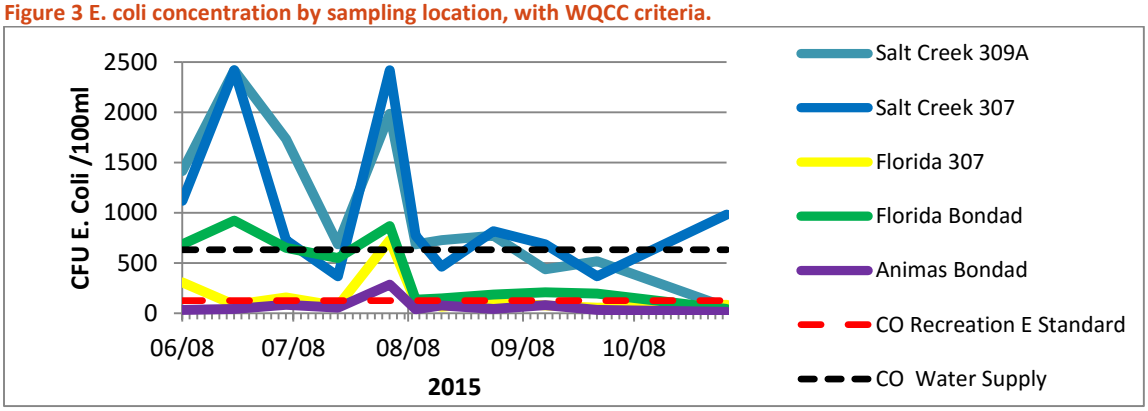


Figure 4 Total phosphorus concentration by sample location, and WQCC interim standard (applicable May 31 2022).

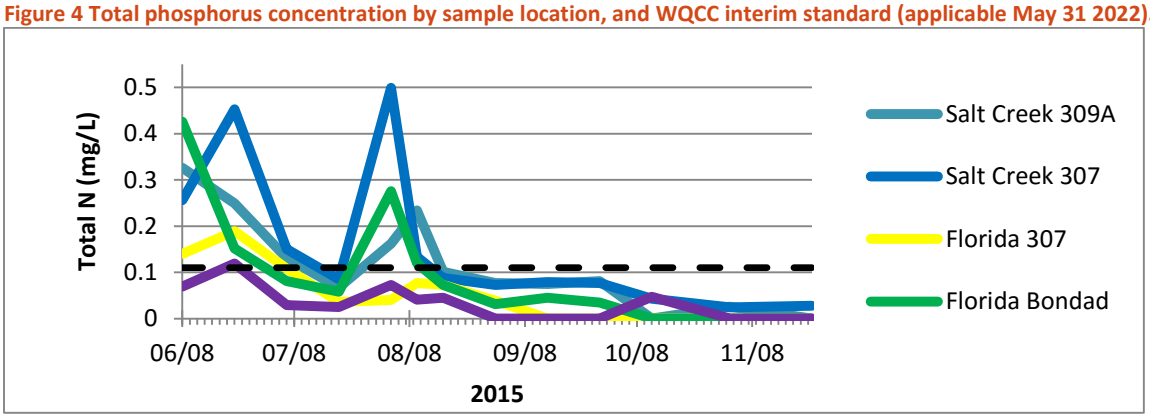
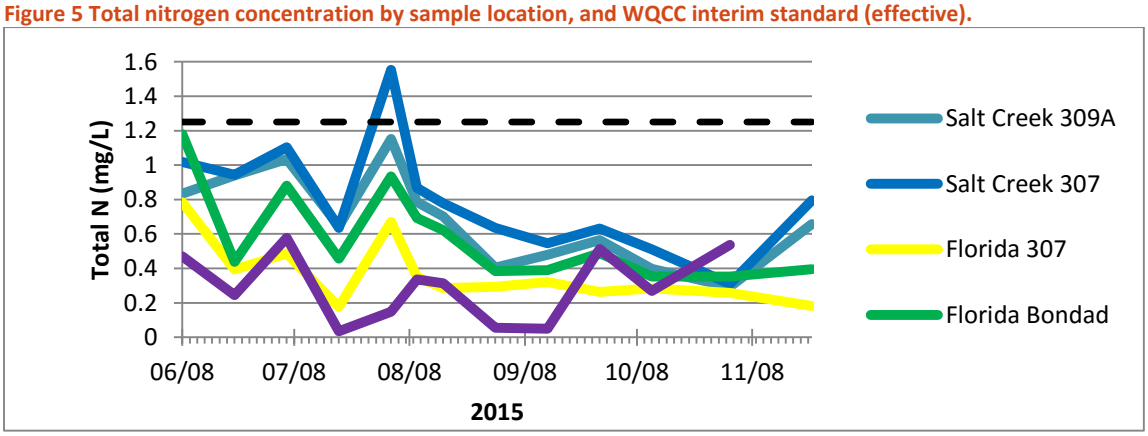


Figure 5 Total nitrogen concentration by sample location, and WQCC interim standard (effective).



Project Budget Expenditures

Project Expense	unit cost	units	Quantity	Project Costs	Grant Request SWCD Funds	Expenditures SWCD Funds Spent	Expenditures Pending	Match BOR (Cash)	Match SJSWCD (In-kind)	Match AWP (In-kind)
Labor- AWP Project Management	$ 70.00	hours	32	$ 2,240	$ -	$ -	$ -	$ 2,240	$ -	
Labor -AWP project management	$ 70.00	hours	28	$ 1,960	$ -	$ -	$ -	$ 1,960	$ -	
Labor-VISTA Volunteer Coordinator	$ 22.00	hours	28	$ 616	$ -	$ -	$ -	$ -	$ -	$ 1,100
Labor-Volunteers	$ 22.00	hours	75	$ 1,650	$ -	$ -	$ -	$ -	$ -	$ 1,584
Sampling equipment	200	sampling pole	1	$ 200	$ -	$ -	$ -	$ -	$ 400	$ -
Sampling equipment	2500	Turner handheld flourometer/ turbidimeter	1	$ 2,500	$ -	$ -	$ 1,472	$ -	$ 2,500	$ -
Sampling Supplies	800	bottles and cuvettes	1	$ 800	$ -	$ 540	$ -	$ -	$ -	$ -
Sample Analysis	$ 40.00	E. coli sample	100	$ 4,000	$ 4,000	$ 1,260	$ 540	$ -	$ -	$ -
Sample Analysis	$ 75.00	Nutrients sample	100	$ 7,500	$ 7,500	$ 3,338		$ -	$ -	$ -
Sampling Mileage	$ 0.55	60 miles/sampling trip	1200	$ 660	$ 660	$ -		$ 660	$ -	$ 300
Total Project Costs				**$22,126**	**$ 12,160**	**$ 5,137**	**$ 2,012**	**$4,860**	**$2,900**	**$2,984**
Grant Admin. 7%					$ 851	$ 560	$ 291			
Total Request					**$ 13,011**	**$ 5,697**	**$ 2,303**			