

WATERSHED ASSESSMENT IN THE TSAILE, WHEATFIELDS AND WHISKEY CREEK WATERSHEDS

2018

Prepared by:

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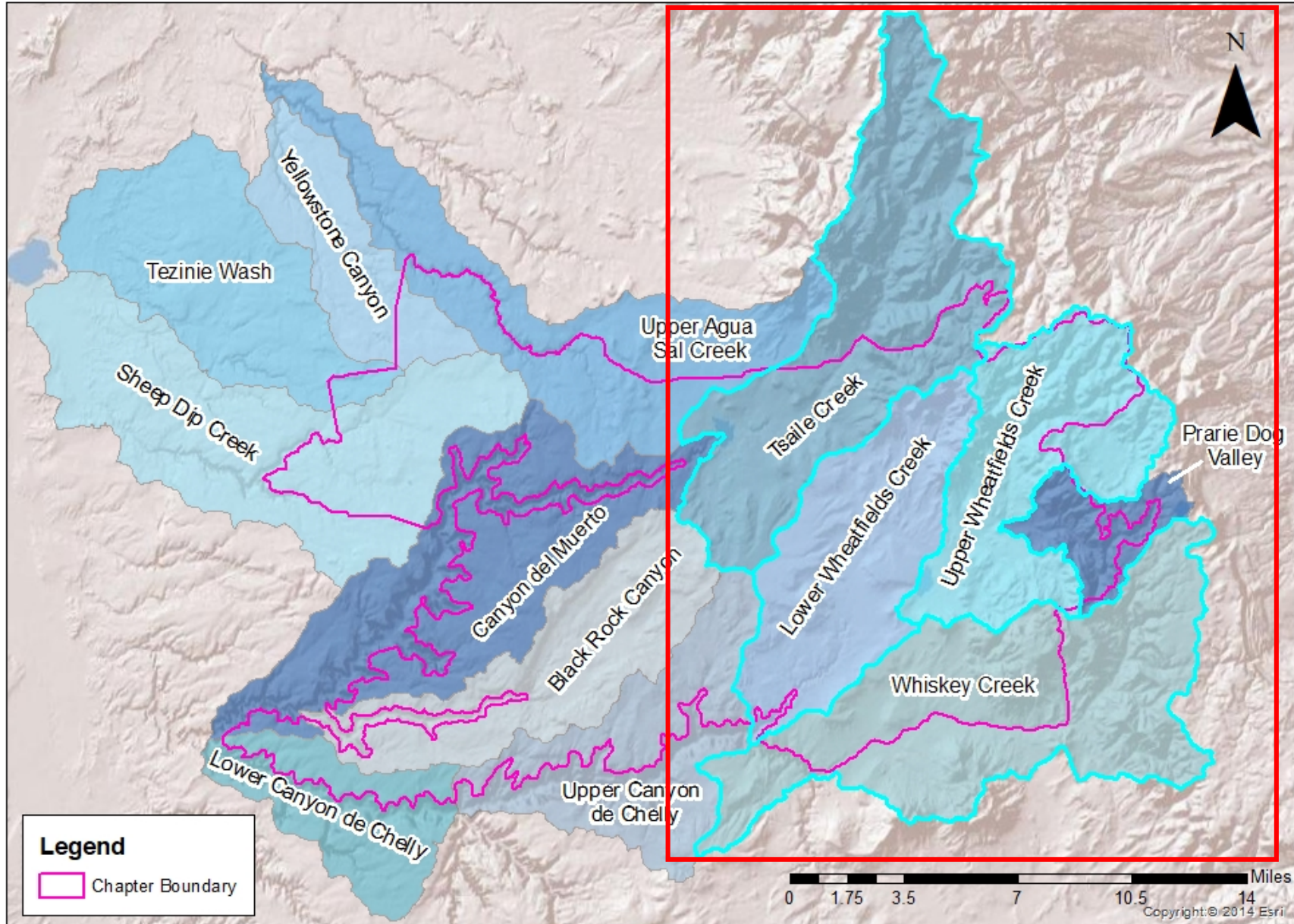
Tyler Begay- Diné College, Biology



Introduction

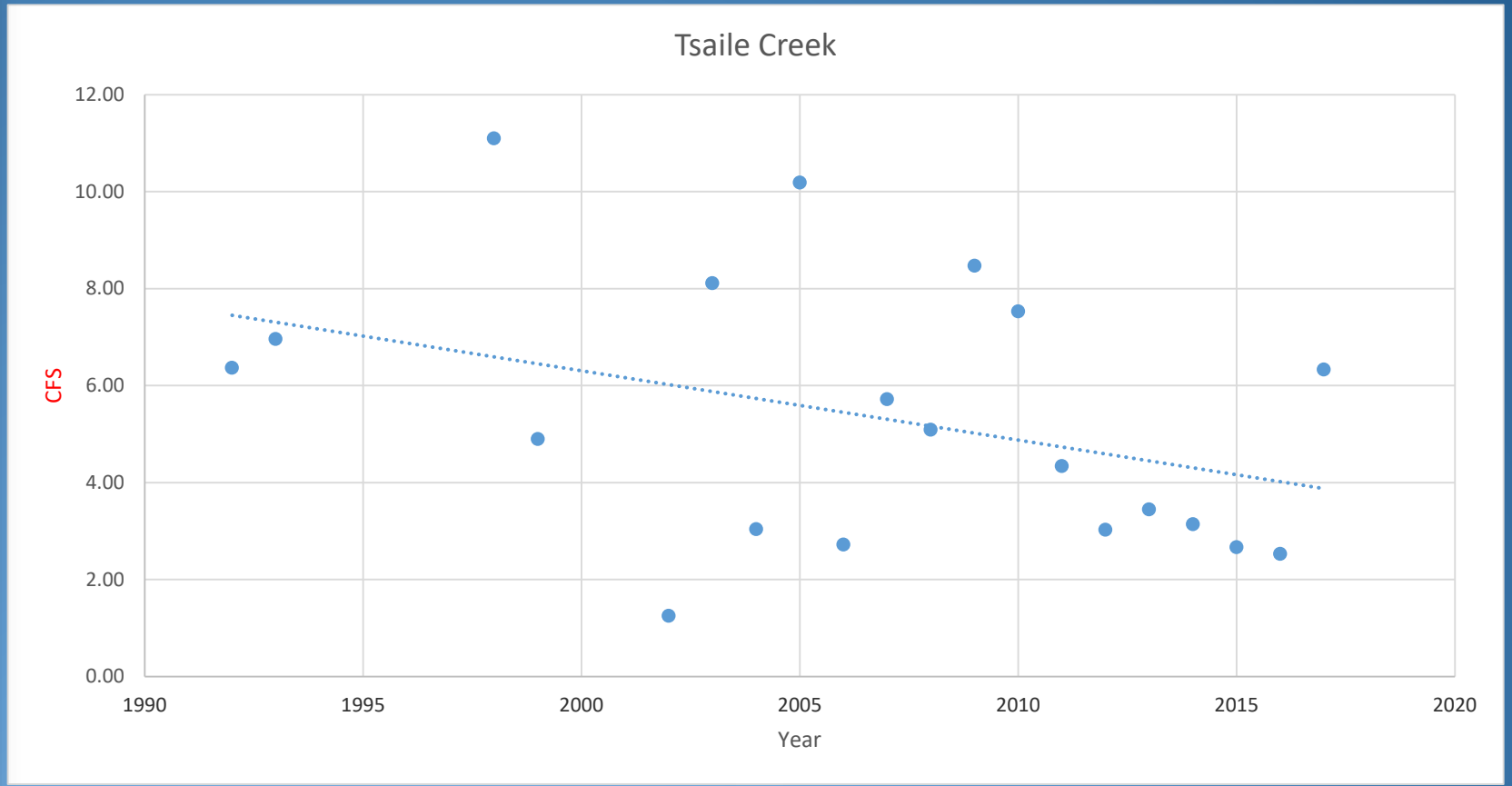
- Purpose:
 - Develop a general watershed profile for the Tsaile, Wheatfields and Whiskey Creek watersheds which will aid in developing a long-term watershed plan for the Tsaile/Wheatfields/Blackrock community.
- Main objectives:
 - ✓ Conduct water quality assessment
 - ✓ Apply watershed best management practices (BMPs)
 - ✓ Build-capacity with community and stakeholders

Study Area of Tsaile, Wheatfields, and Whiskey Creek Watersheds

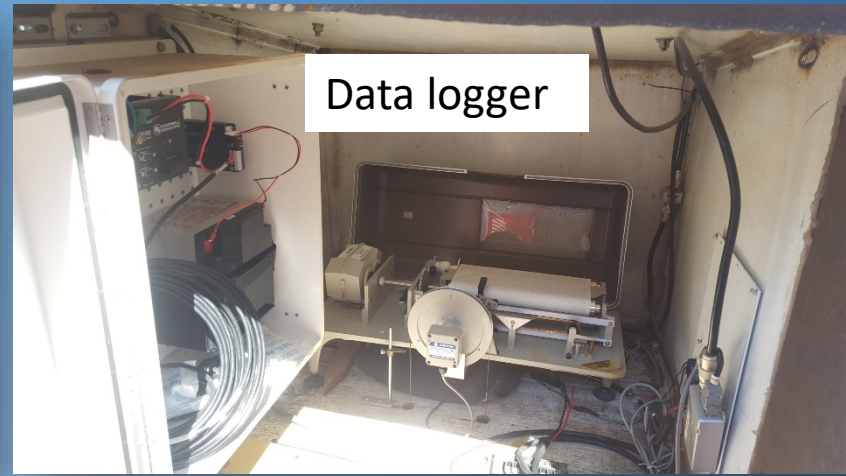




Tsaile Creek Stream Gage



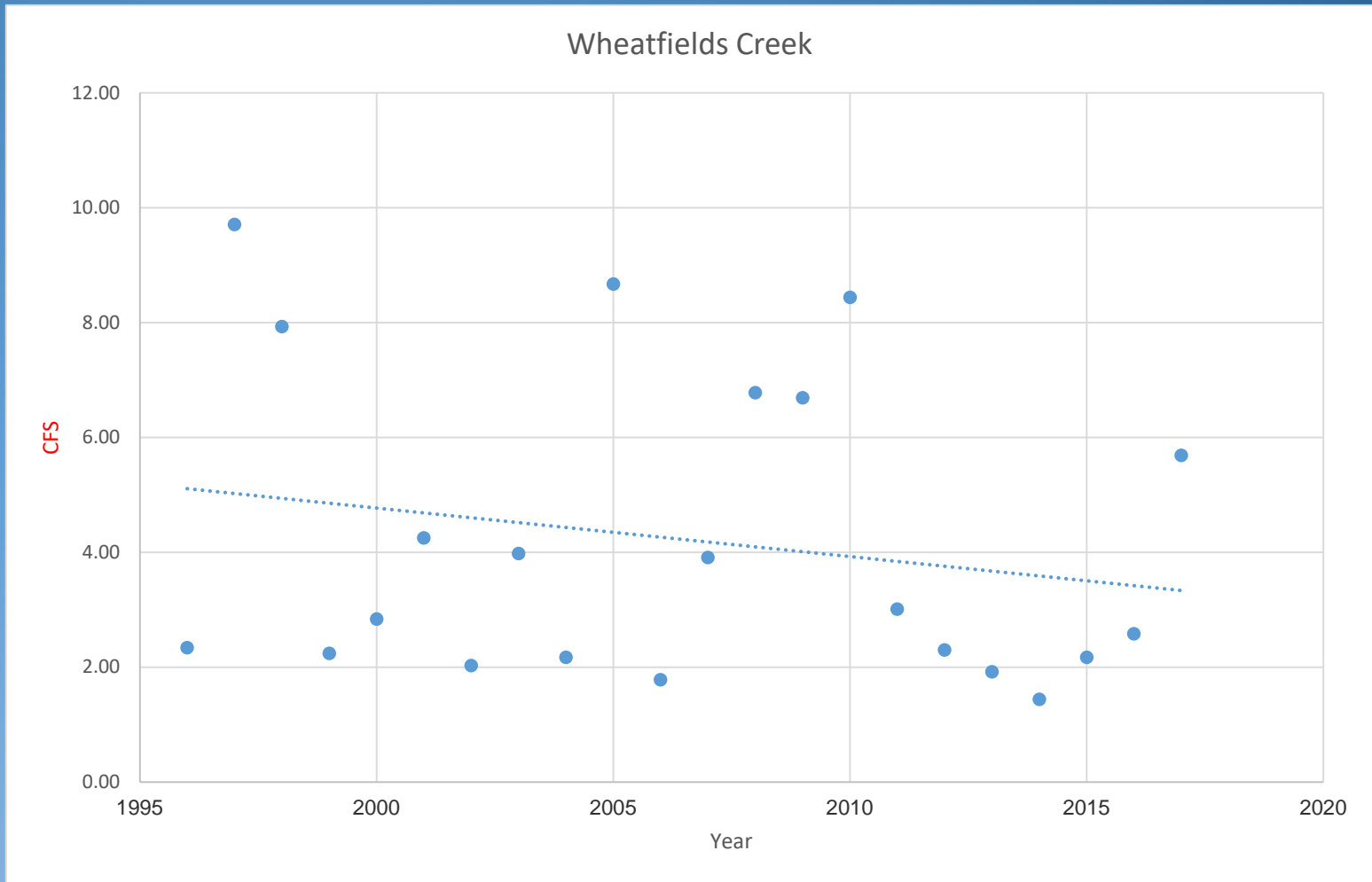
Flow meter



Data logger

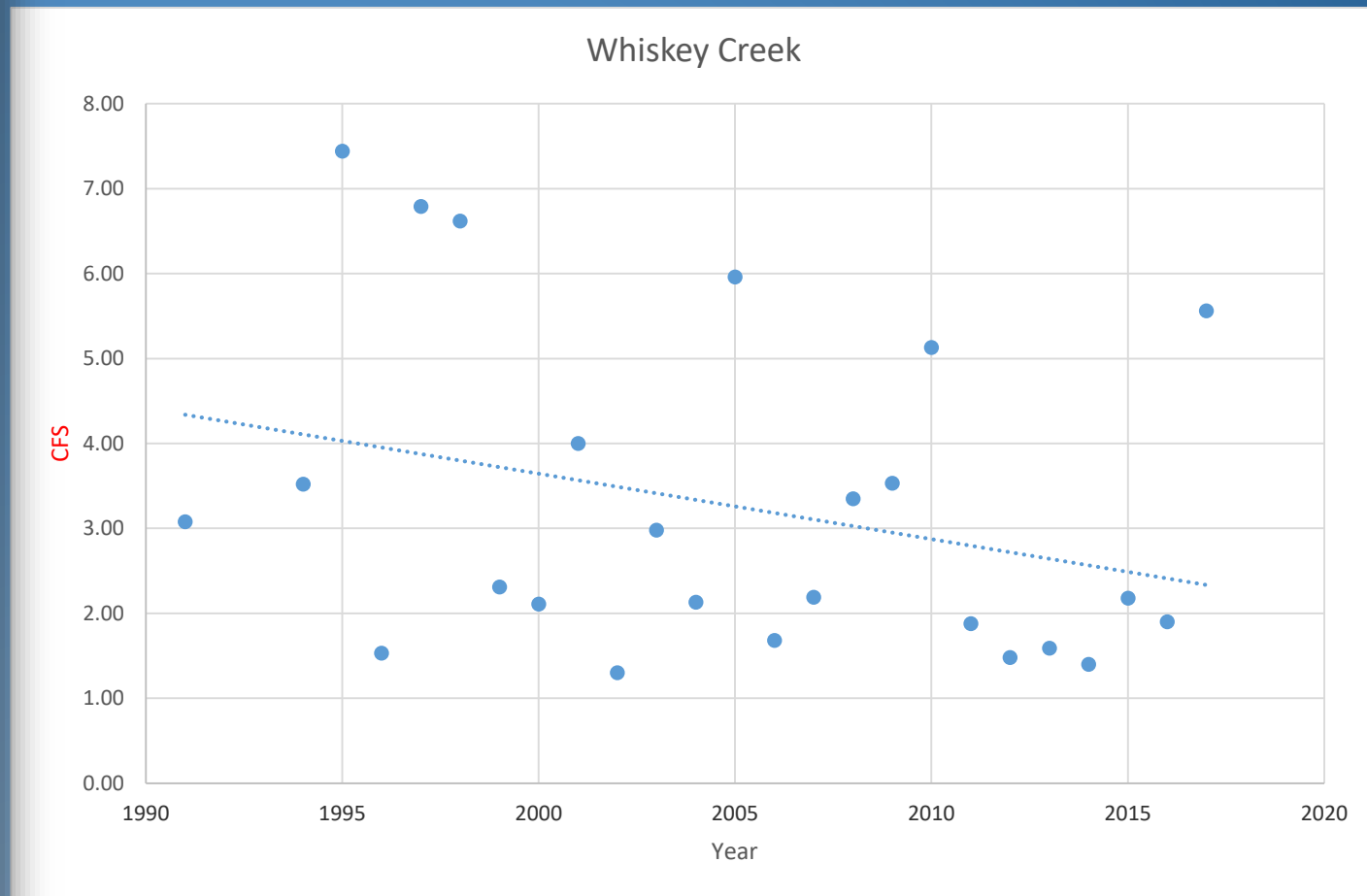


Wheatfields Creek Stream Gage





Whiskey Creek Stream Gage



Methods

1. Conduct Water Quality Test (ArcMap 10.4, GPS)

a. Parameters

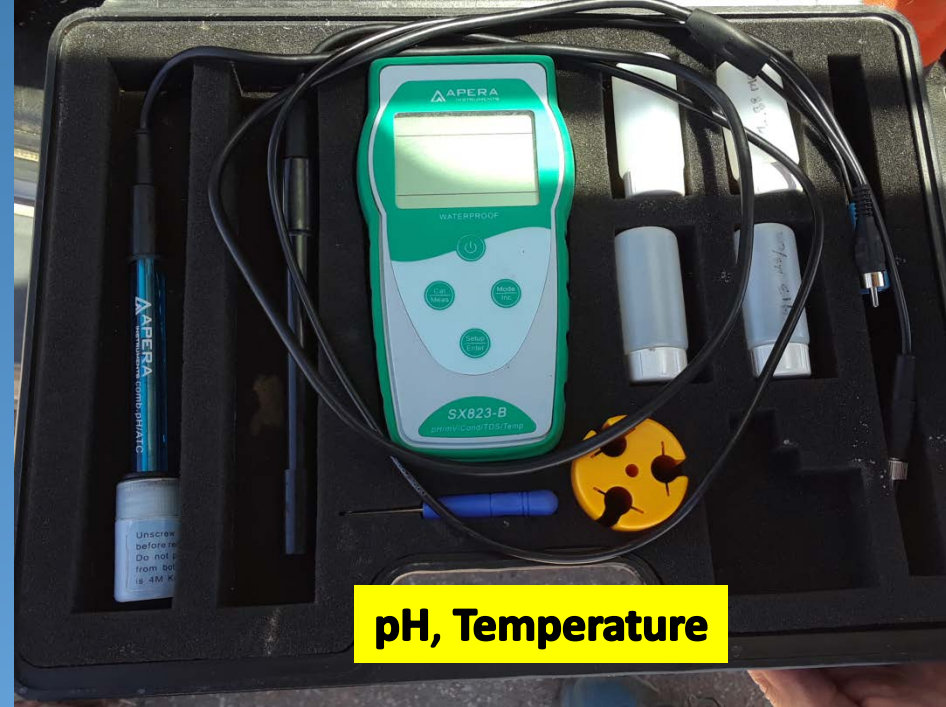
- ✓ Salinity
- ✓ Dissolved Oxygen
- ✓ Temperature
- ✓ pH
- ✓ Conductivity
- ✓ Total Dissolved Solids
- ✓ Nitrate, Phosphate, Ammonia
- ✓ E. coli
- ✓ Heavy metals
- ✓ Benthic Invertebrates



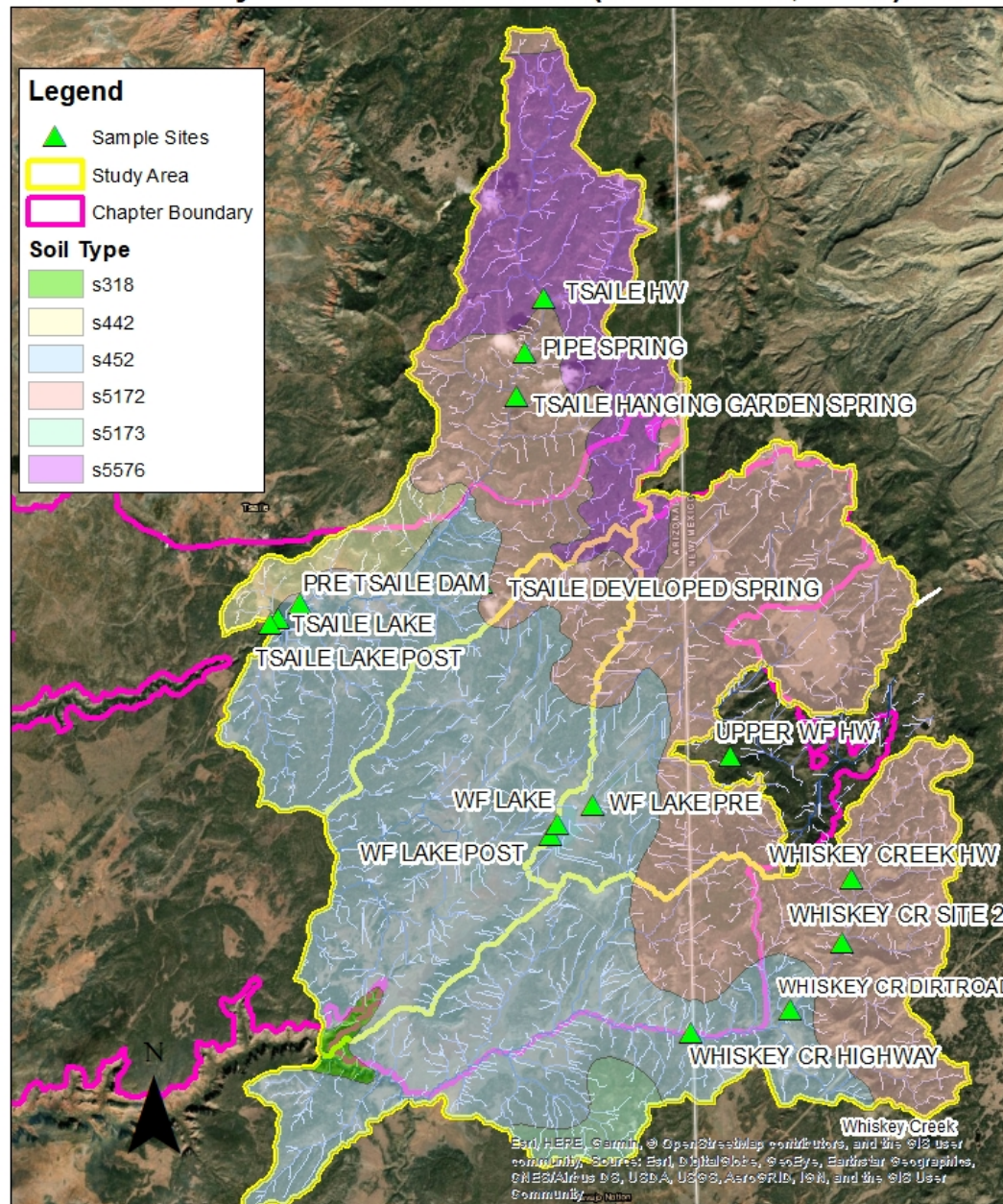
Site Reports

(Photos, Coordinates, Attributes)

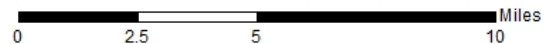
b. *Identify risks to water quality*

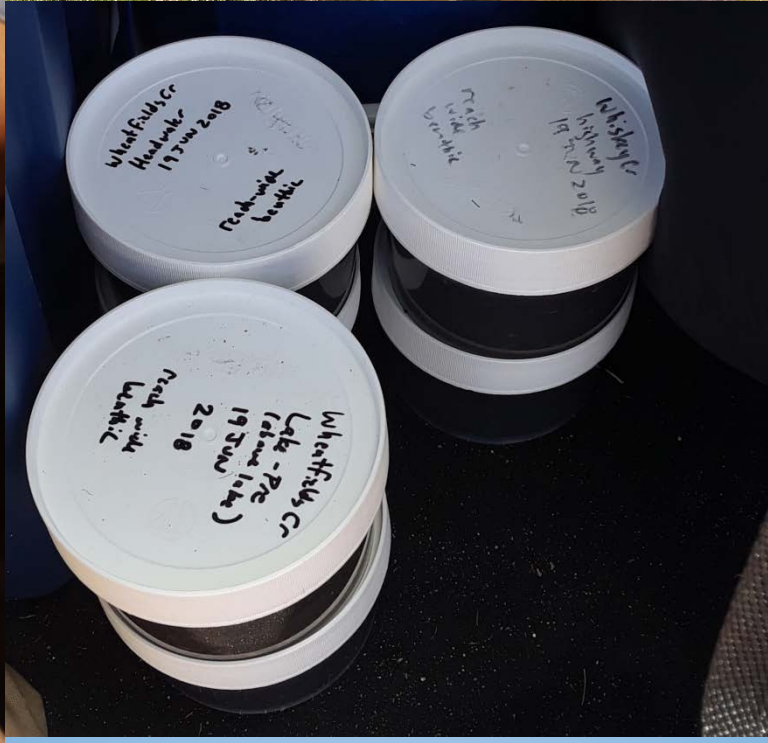


Water Quality Testing Site Map for Tsaile, Wheatfields, and Whiskey Creek Watersheds (June 18-19, 2018)



Marquel Begay, Tyler Begay, 06/20/18







Tsaile Headwaters



Pipe Spring



Hanging Garden Spring



Developed Spring
(Water Hauling Site)



Pre Tsaile Lake



Post Tsaile Lake



Upper Wheatfields



Pre Wheatfields Lake



Post Wheatfields Lake

Whiskey Creek



Headwaters



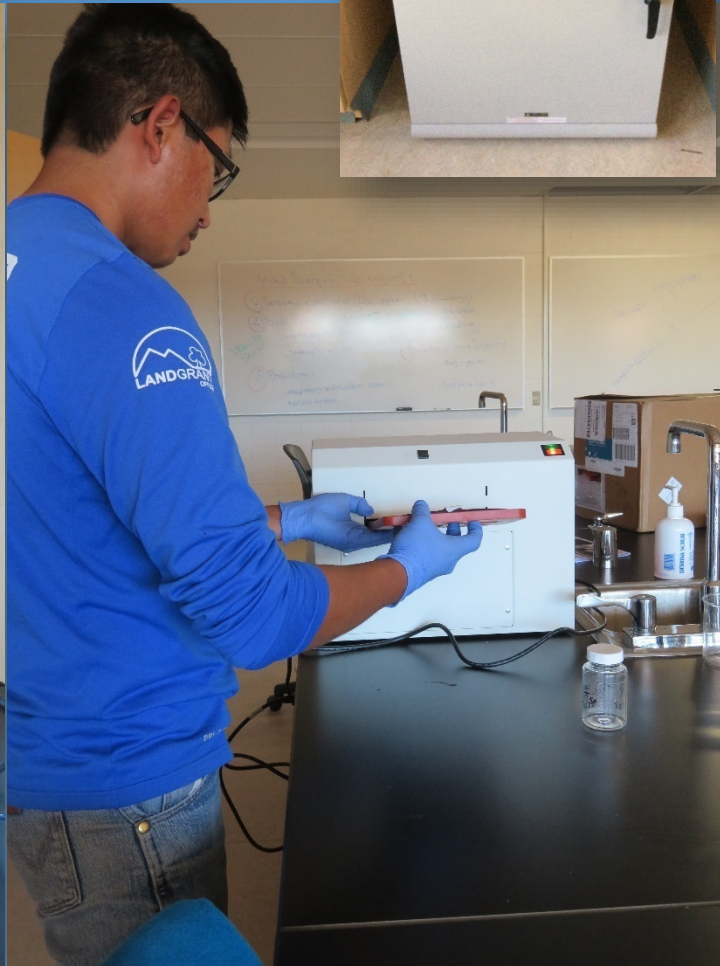
Midstream



Downstream

Lab: E.coli

Field collection: September 22-23, 2018
Status: analysis in process



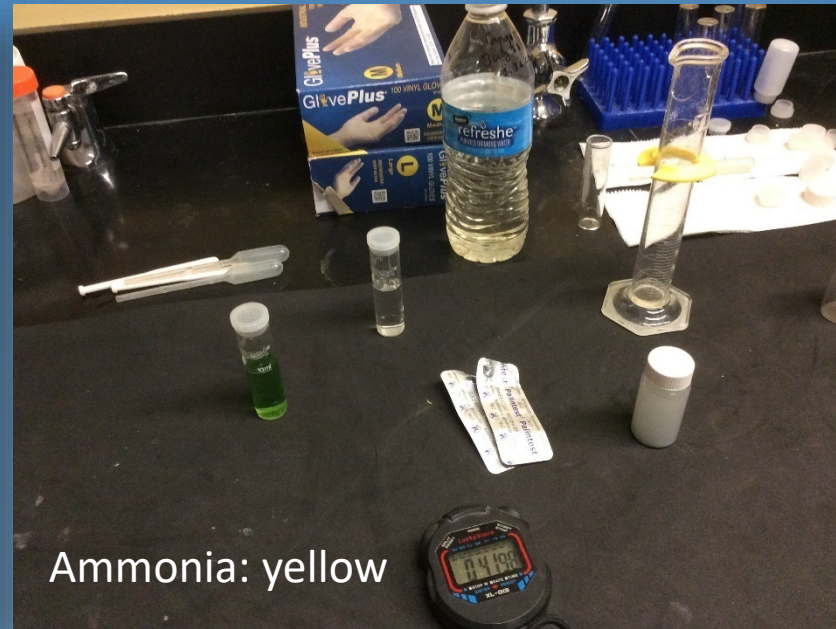
Tyler Begay, Dine College Biology Student sealing e. coli trays

Valerisa Joe, UA PhD Candidate counting coliforms

Lab: Nitrate, Phosphate & Ammonia



Phosphate: blue



Ammonia: yellow



Nitrate: purple



Lab: Heavy Metals



Acidifying samples

Field collection: September 22-23, 2018
Lab: samples in process

Methods

2. Apply best watershed management practices (BMPs)

a. Stream buffers

- ✓ Presented at grazing committee meeting
- ✓ Developed 4 plots total (~36 ft x 15 ft)
- ✓ 4 plots before Wheatfields Lake
 - 2 horizontal plots
 - 2 meandering plots

Site Reports
(Photos, Coordinates,
Attributes)





Install Teaposts



Box fence



Wooden stakes (6 transects)



Vegetation Composition

Methods

2. Apply best watershed management practices (BMPs) continued...

a. Pervious Check Dams

✓ Lead rock dam building to treat different types of erosion

- Overgrazing
- Roads
- Gully erosion



Methods

3. Build capacity with community and stakeholders

a. Organize Teach-In

- a. Community education outreach
- b. Identify community priority concerns and recommendations

b. Meet with Navajo Nation Departments

- a. Water Resources
- b. Agriculture
- c. Forestry
- d. Fish & Wildlife
- e. Navajo Environmental Protection Agency
- f. Historic Preservation

- Identify roles and responsibilities for developing integrated watershed plan

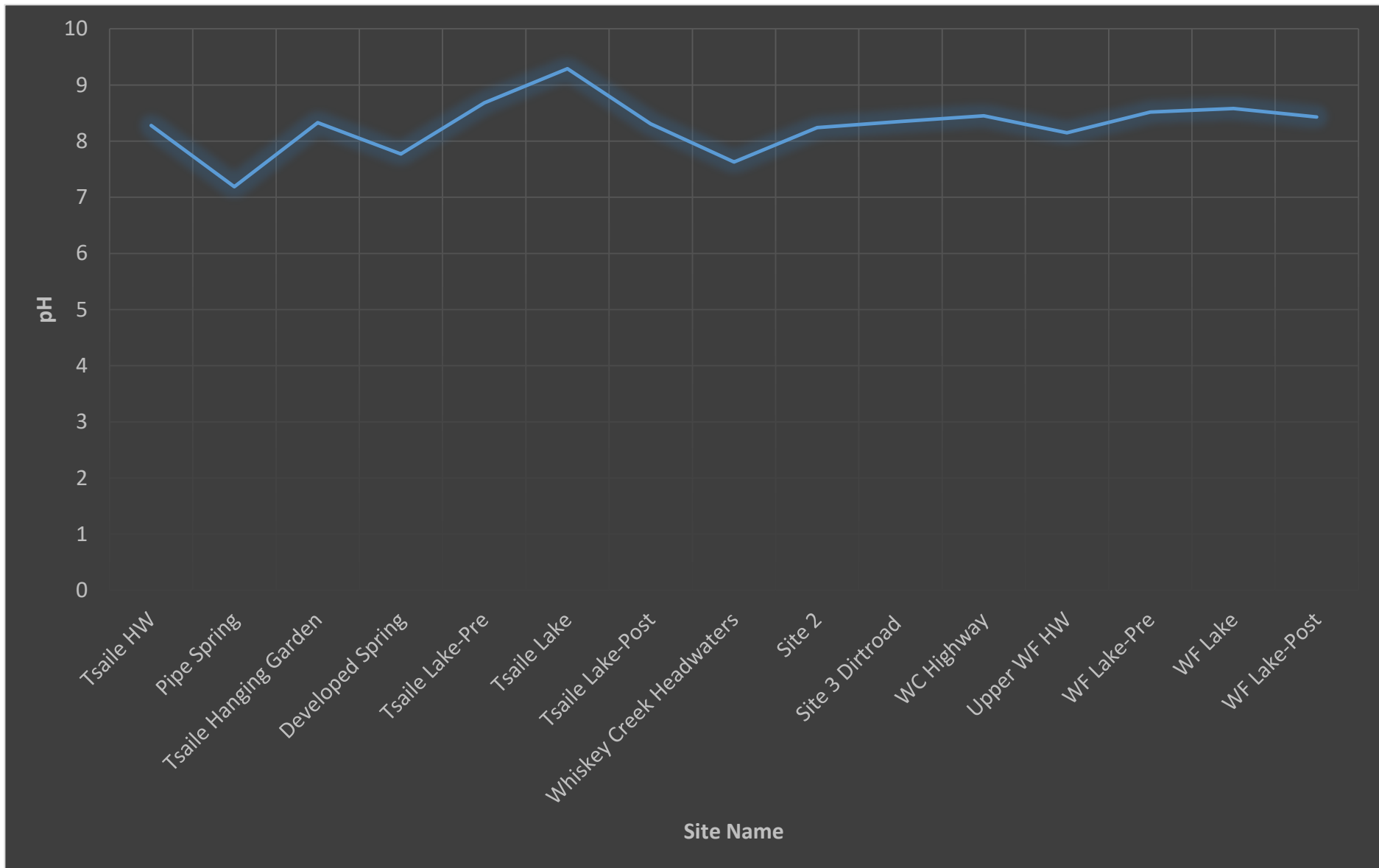


Water Quality Results

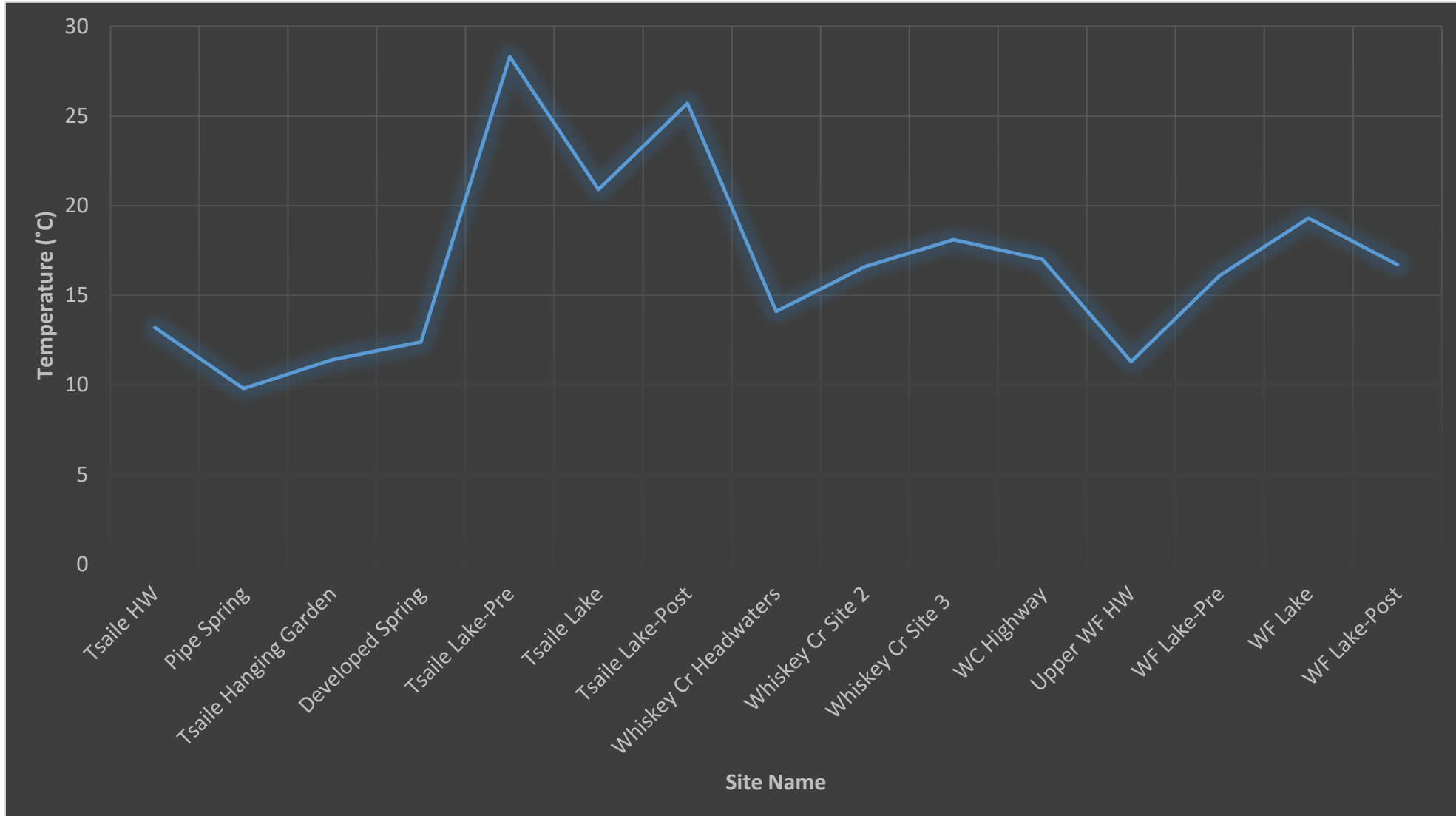
Table 204.1 Numeric Targets for Lakes and Reservoirs

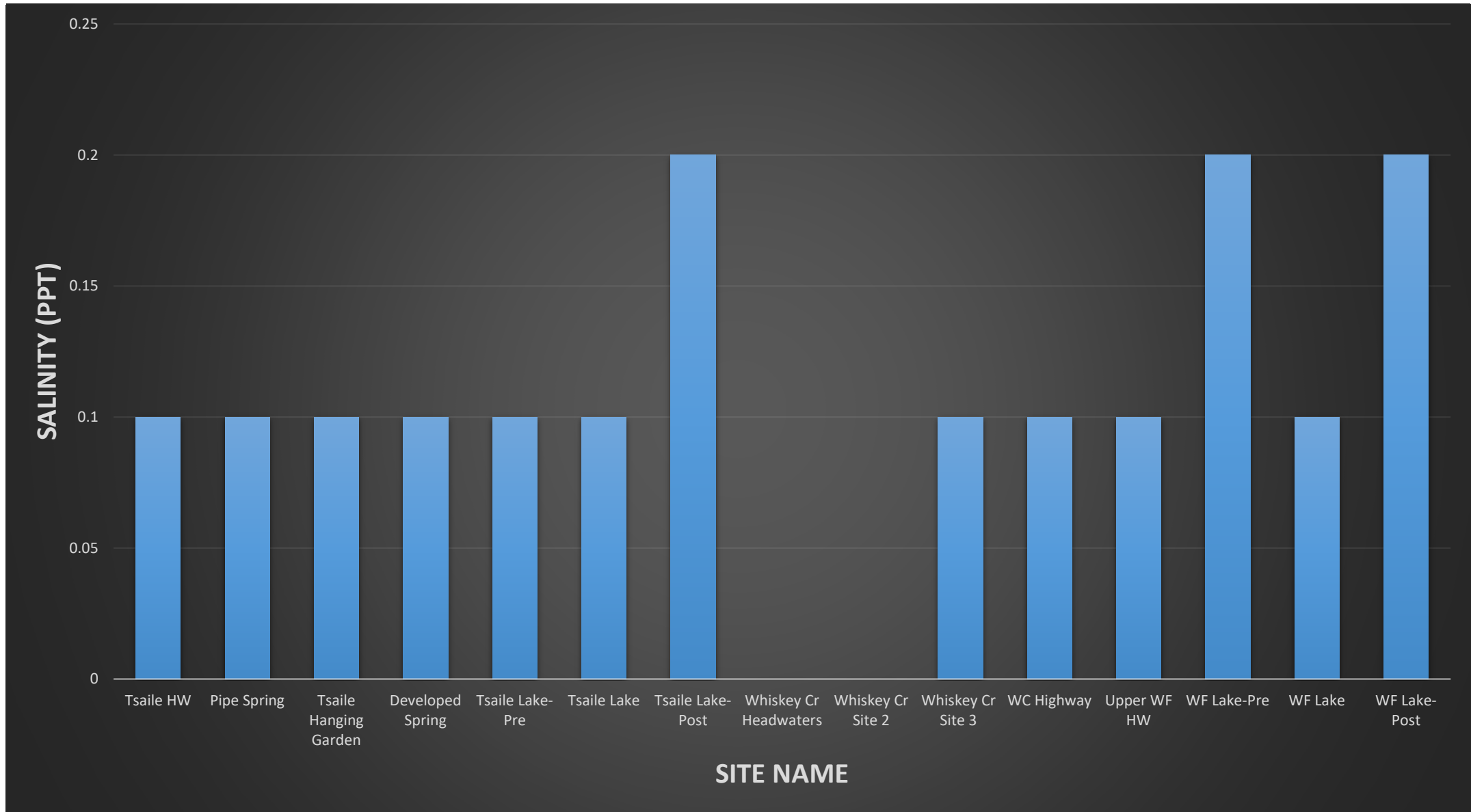
Designated Use	Lake Category	Chl-a (ug/L)	Secchi Depth (m)	Total Phosphorus (ug/L)	Total Nitrogen (mg/L)	Total Kjeldahl Nitrogen (TKN)	Blue-Green Algae (per ml)	Blue-Green Algae (% of total)	Dissolved Oxygen (mg/L)	pH
PrHC	Deep	10-15	1.5-2.5	70-90	1.2-1.4	1.0-1.1	20,000			6.5-9.0
	Shallow	10-15	1.5-2.5	70-90	1.2-1.4	1.0-1.1				
	Igneous	20-30	0.5-1.0	100-125	1.5-1.7	1.2-1.4				
	Sedimentary	20-30	1.5-2.0	100-125	1.2-1.4	1.2-1.4				
A&WHbt (cold water)	All	5-15	1.5-2.0	50-90	1.0-1.4	0.7-1.1	<50		6.5-9.0	
A&WHbt (warm water)	All	25-40	0.8-1.0	115-140	1.6-1.8	1.3-1.6				
Dom	All	10-20	0.5-1.5	70-100	1.2-1.5	1.0-1.2	20,000			5.0-9.0

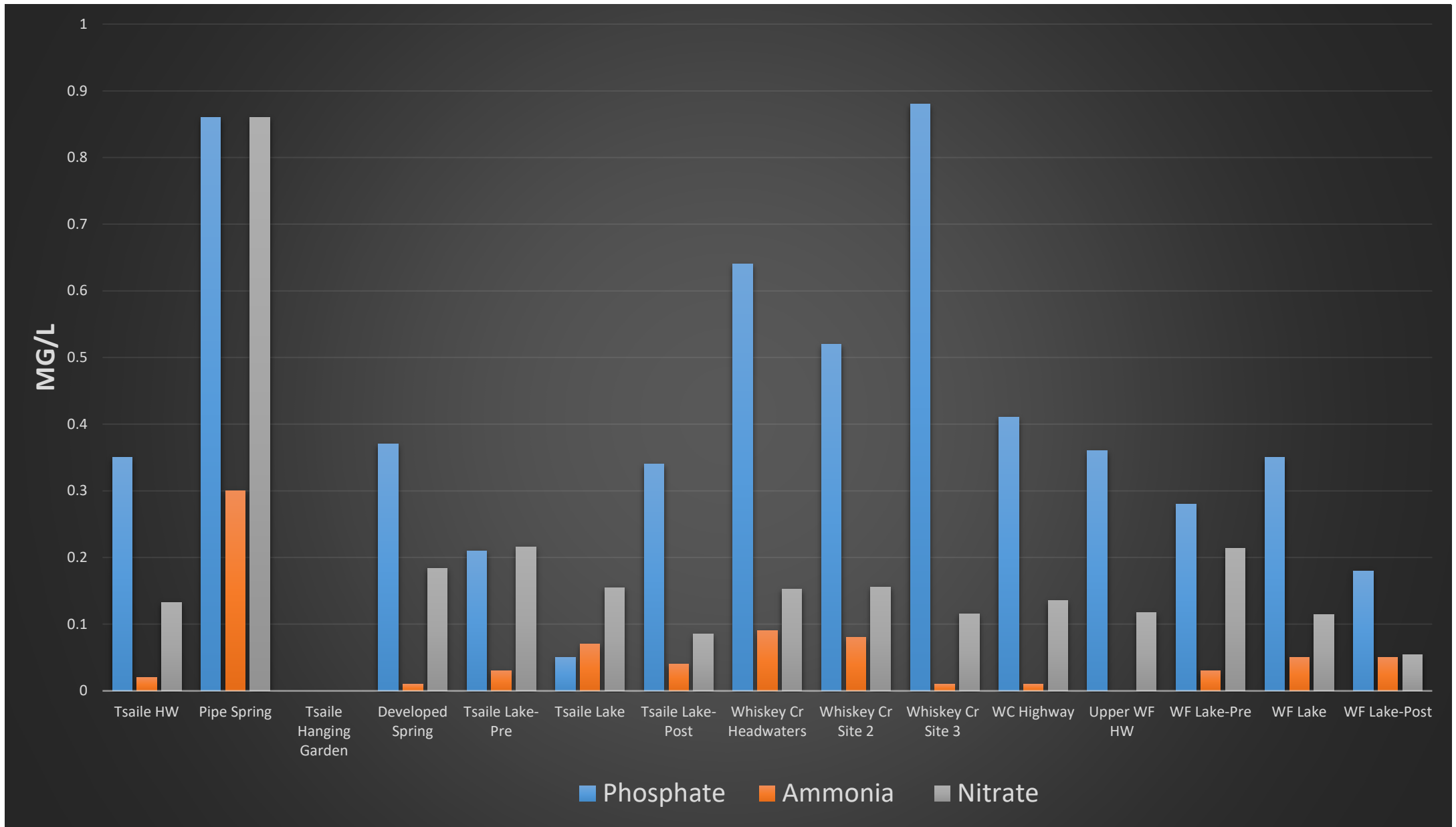
Source: Navajo Nation EPA Water Quality Program Guidelines



Tsaile high due to
(time)







Risks to Water Quality

Headcut Erosion - upstream



Sediment transport degrades water quality



Gully erosion

Large amounts of sediment deposition into lakes

Southeast of Wheatfields Lake

Livestock



Cause E. Coli & stream bank erosion

Illegal dump sites

Heavy metals depositing into soil

Northwest of Tsaile Irrigation Project



Recreation



Humans throwing trash near streams & lakes



Dirt roads crossing streams



Upper Wheatfields



Pollutants such as vehicle exhaust, oil, and dirt, and deicing chemicals, are deposited to streams

Invasive Species



Russian Olives



Lower Wheatfields

Russian Olives and Tamarisk lower water table, reduce agriculture potential, diminish grazing, pose fire threat, destroy archaeological sites, outcompete native species (Environmental Assessment, 2005)

Best Management Practices Results



Apache County Road 270

risk

gully

Gully

Outlet 2

[Click to see historical imagery from 1997.](#)

Google E

Plot #1



Plot #2



Stream buffers



Wednesday, July 11, 2018



September, 22, 2018

Plot #4



Wednesday, July 11th, 2018



June 23, 2018



September 22, 2018





Monday, July 16th, 2018

Recommendations: Next Steps

PROJECT	CONTACT	DEADLINE
Meet with Stakeholders	<ol style="list-style-type: none"> 1. Navajo Nation Departments 2. Native Nations Institute (UA) 	December 2018
Climate Change Adaptation Planning Workshop with community	<ol style="list-style-type: none"> 1. Institute of Tribal Environmental Professionals (NAU) 	December 2018
Complete Water Portfolio	<ol style="list-style-type: none"> 1. University of Arizona (Marquel) 	April 2019
Conservation Projects <ul style="list-style-type: none"> • Clean-up dump sites • Watershed restoration workshop • Stream buffers • Invasive species removal 	<ol style="list-style-type: none"> 1. Tsaile/Wheatfields Chapter House 2. Dine College Land Grant Office 3. Tsaile Wheatfields Dineh Water User Association 	May to August 2019

Conclusion

- **Water Quality**

- pH measurements meet Navajo Nation Water Quality Standards (5-9), however Tsaile Lake was found to be a little over the standard limit at 9.29
- Heavy Metals & Macroinvertebrates will be assessed in the Fall at UA Lab

- **Risks**

- illegal dumping, e. coli from livestock & wildlife, erosion, dirt roads

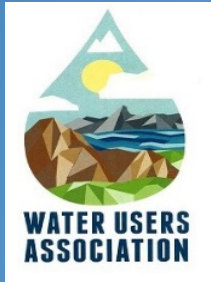
- **BMPs**

- Stream buffers improve water quality
- Rock dams reduce erosion and watershed health

- **Challenges:**

- Getting in contact with Safety of Dams for tour of Tsaile & WF Lakes
- Stream buffer limited
- Time & expert availability low in the summer
- GIS data for range and land use units – not allowed to access

'Ahéhee'!



Navajo Nation Department of Water Resources



LABORATORY OF TREE-RING RESEARCH THE UNIVERSITY OF ARIZONA

