

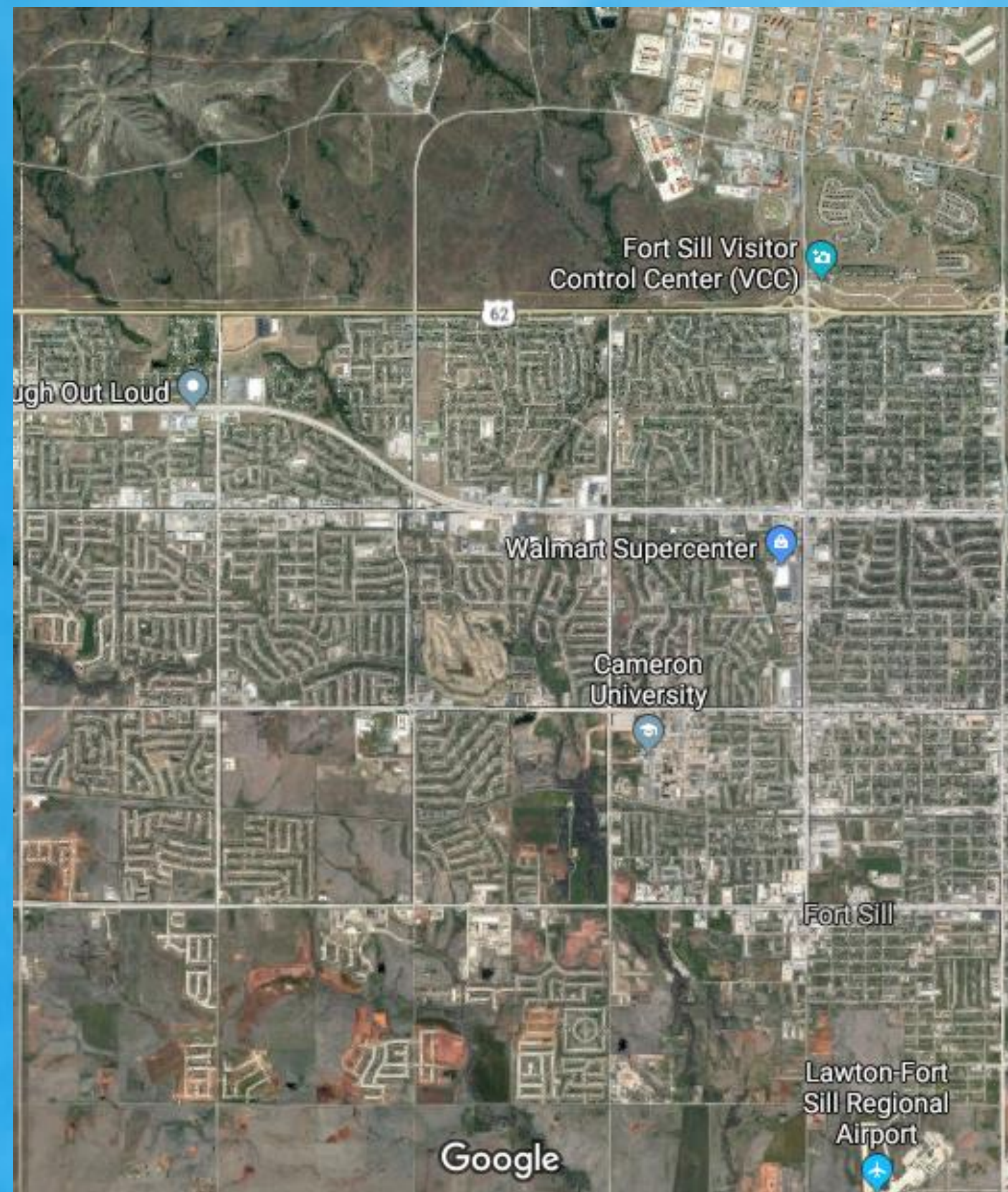
CHEMICAL AND PHYSICAL CHARACTERIZATION OF WATER QUALITY IN WOLF CREEK AS AFFECTED BY THE LAWTON, OKLAHOMA COMMUNITY

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ABSTRACT

Monthly analysis of Wolf Creek in Lawton, Oklahoma has been collected over the course of three years, where the vitality of the creek is diagnosed through chemical and biological monitoring in collaboration with The Blue Thumb Program of the Oklahoma Conservation Commission. Bioassay illustrated that diversity in Wolf Creek was very low at Gore Blvd. and significantly higher in Lee Blvd. The purpose of this research is to determine if point pollution is affecting aquatic life at Gore Blvd.

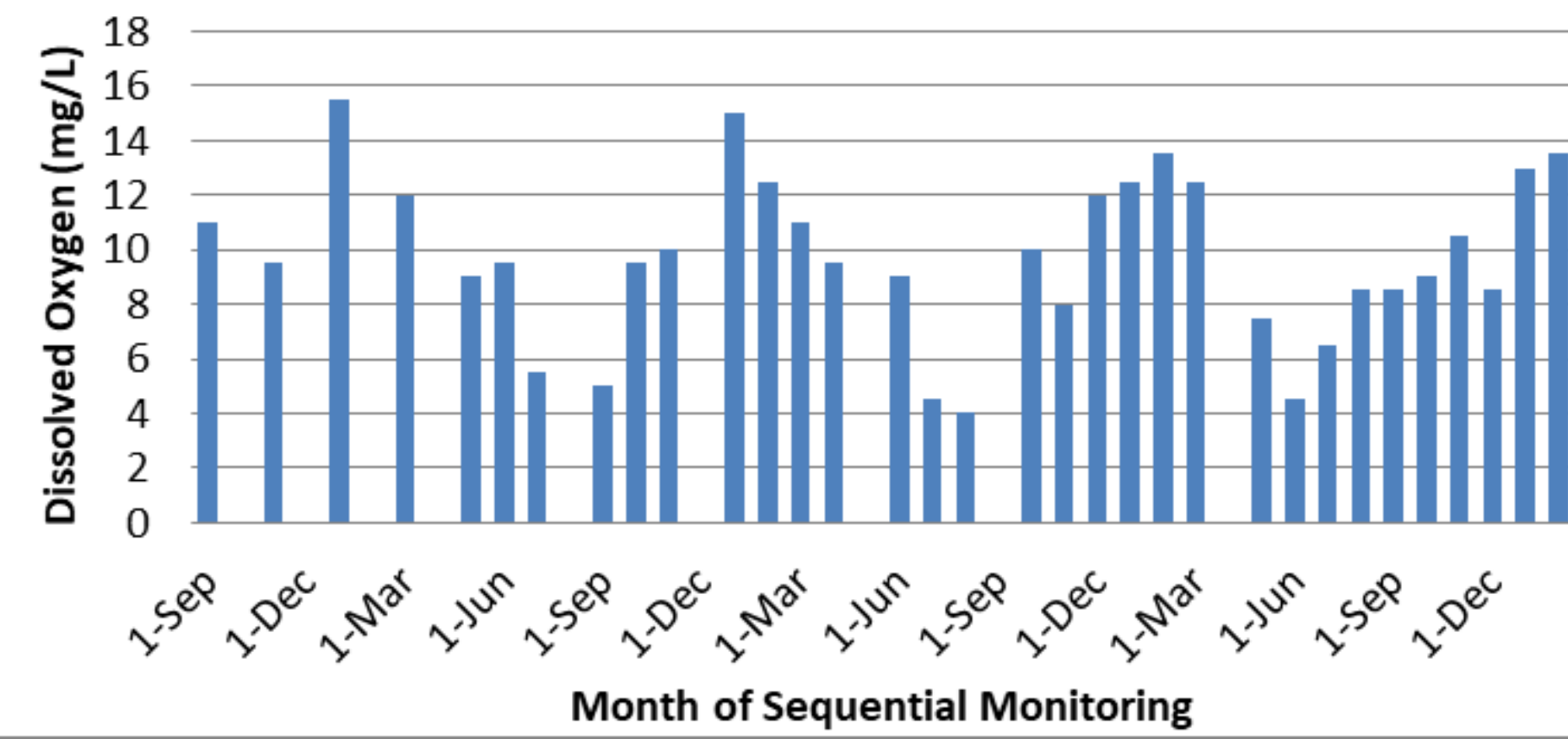


INTRODUCTION

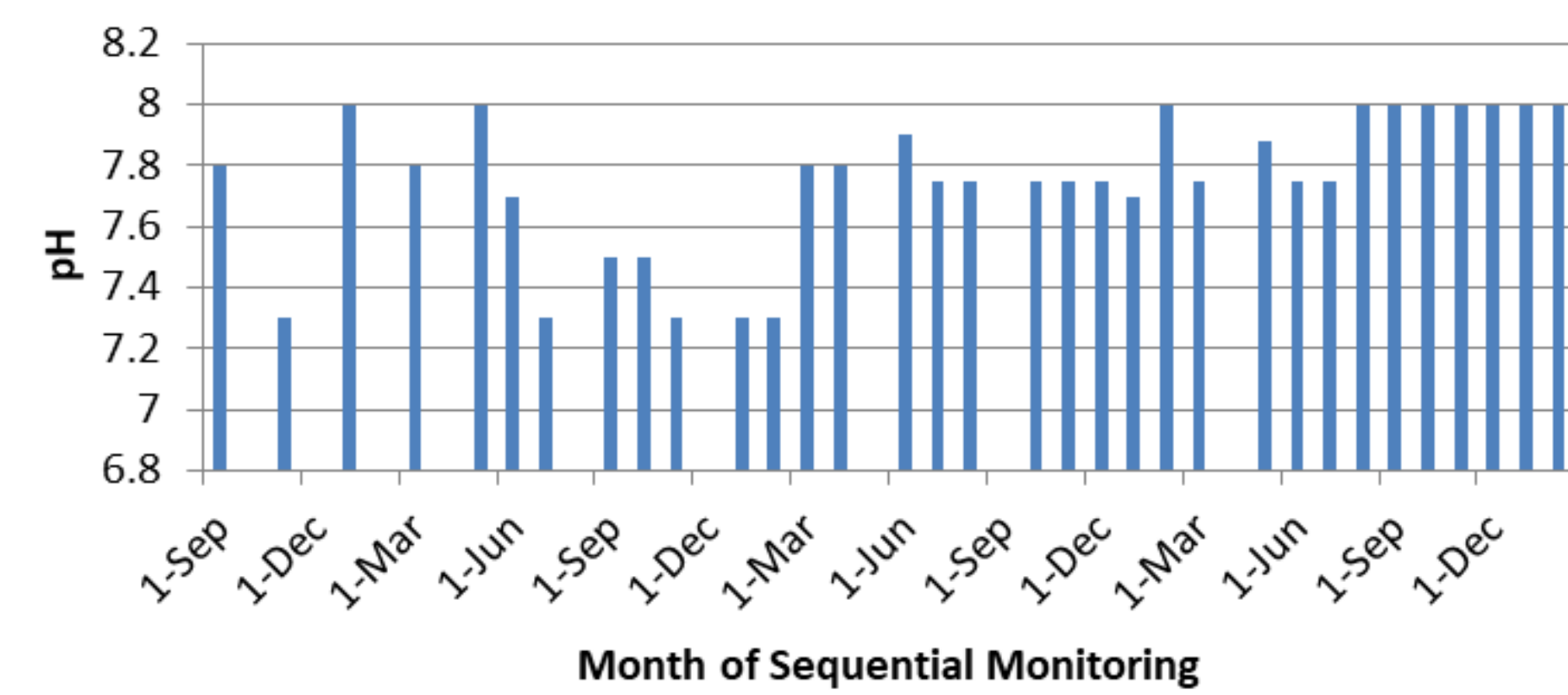
In southwest Oklahoma, Wolf Creek flows from headwaters on Fort Sill through Lawton before merging with West Cache Creek and, ultimately, with the Red River that borders with north Texas.

- 1985 – Pipe observed releasing a substance smelling like gasoline and looking like diesel
- 1986 – Oklahoma Water Resources Board starts an investigation
- 1990 – Several thousand gallons of gasoline accidentally released by public works crew when digging to investigate disintegrating asphalt parking lot
- 1990 – Oklahoma chapter of National Toxics Campaign submits 1000 signatures and 400 letters to Oklahoma Department of Environmental Quality
- 1990 – ODEQ decides that investigation is too expensive when there is no evidence of injury to humans or of threat to an endangered species
- 2014 – Oklahoma Conservation Commission offers a Blue Thumb volunteer water quality monitoring mini-academy to the Chemistry of Water and Wastewater class of Cameron University at the site where Wolf Creek enters the campus at Gore Blvd.
- 2014 – Water Quality Monitoring of Wolf Creek at Gore Blvd begins
- 2015 – Gas Station about one-tenth mile and uphill of Wolf Creek replaced by liquor store with removal of all gasoline works
- 2015 – EPT = 1% macroinvertebrates collected were pollution-sensitive
 - EPT expressed as a percentage of the sensitive orders to the total taxa found.
 - E= Ephemeroptera, P= Plecoptera, T= Tricoptera

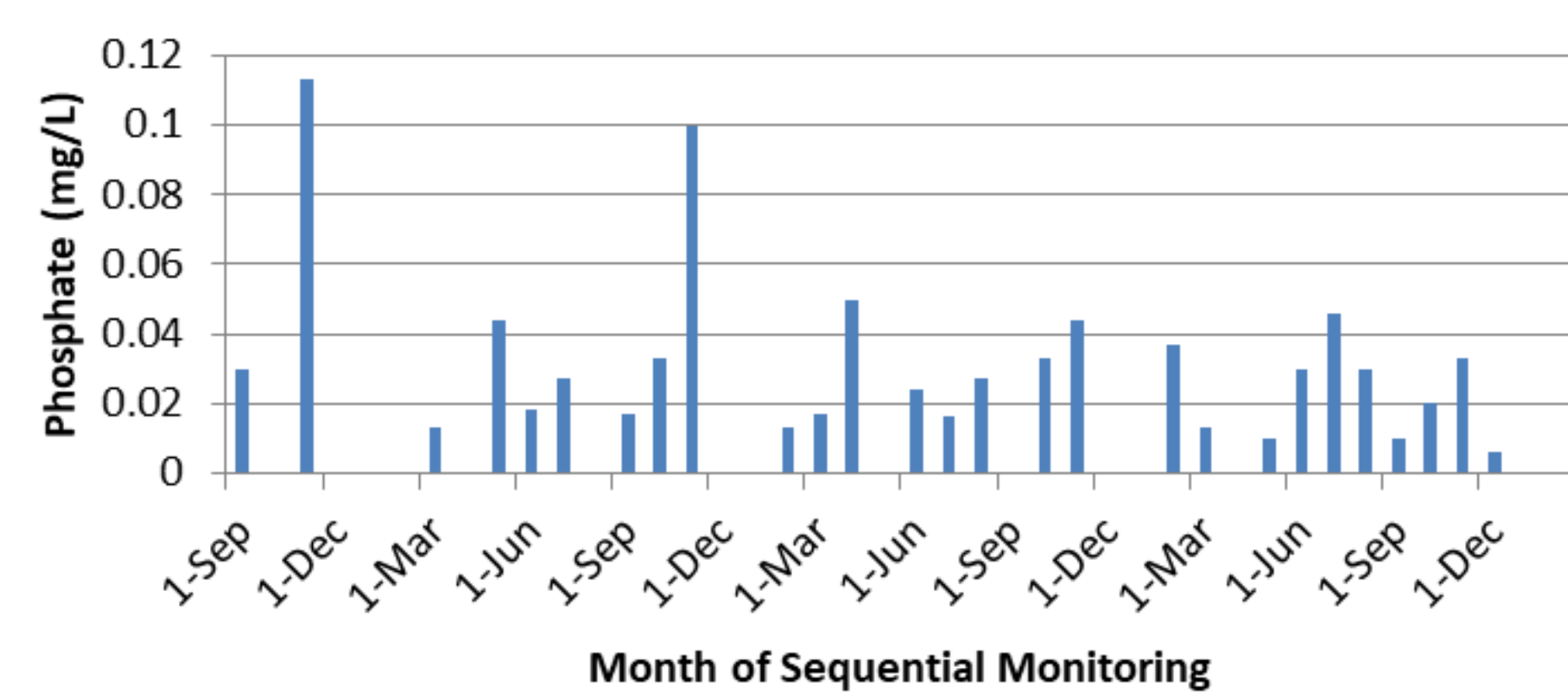
Wolf Creek Dissolved Oxygen
09/14-02/18



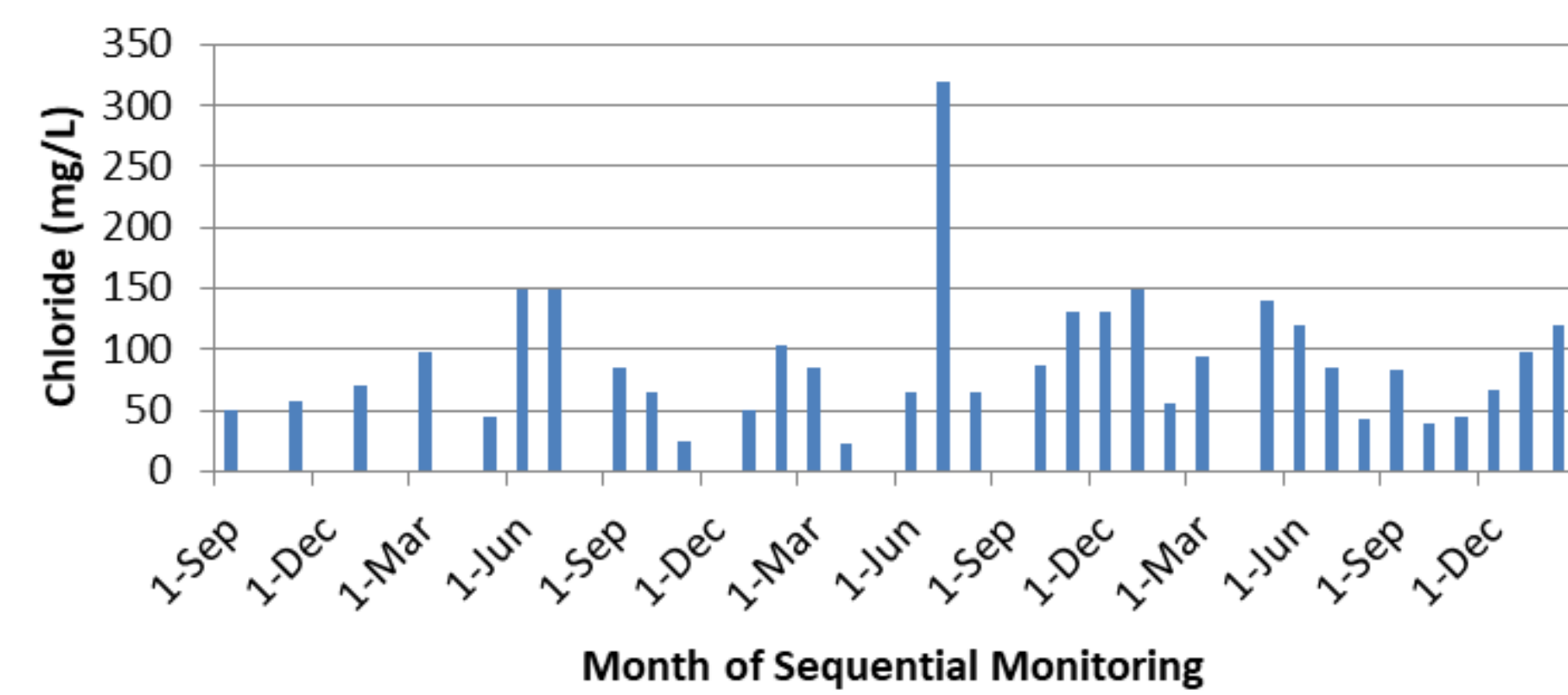
Wolf Creek pH
09/14-02/18



Wolf Creek Phosphate
09/14-02/18



Wolf Creek Chloride
09/14-02/18



DATE (Month -Year)	Nitrate (mg/L)	Nitrite (mg/L)	Ammonia (mg/L)
14-Sep	0	0	0.05
14-Oct			
14-Nov	0	0	0.2
14-Dec			
15-Jan	0	0	0
15-Feb			
15-Mar	0	0	0
15-Apr			
15-May	0	0	0.15
15-Jun	0	0	0
15-Jul	0	0	0
15-Aug			
15-Sep	0	0	0
15-Oct	0	0	0
15-Nov	0	0	0
15-Dec			
16-Jan	0	0	0
16-Feb	0	0	0
16-Mar	0	0	0
16-Apr	0	0	0
16-May			
16-Jun	1	0	0
16-Jul	1	0.3	0.1
16-Aug	0	0	0
16-Sep			
16-Oct	0	0	0
16-Nov	0	0	0
16-Dec	0	0	0
17-Jan	0	0	0
17-Feb	0	0	0
17-Mar	0	0	0
17-Apr			
17-May	0	0	0
17-Jun	0	0	0
17-Jul	1	0	0
17-Aug	0	0	0
17-Sep	0	0	0
17-Oct	0	0	0
17-Nov	0	0	0
17-Dec	0	0	0
18-Jan	0	0	0
18-Feb	1	0	0

Date	Taxa Richness (Species)	EPT Richness (Species)	EPT Abundance (Population %)
Summer 2015	5	1	1
Winter 2016	5	1	1
Summer 2016	13	5	49
Winter 2017	10	2	17

Metal Contamination

Atomic Absorption Spectrometry was employed to probe for heavy metal contamination at Gore Blvd where Wolf Creek enters the CU campus and at Lee Blvd. where it leaves the campus. Copper, Lead, and Zinc were found to be within experimental error of zero ppm at both sites. Potassium was found at 4.05(0.16) ppm and 4.05(0.19) ppm at the two sites, respectively.

Chemical Oxygen Demand on Wolf Creek Up- and Down-Stream of the Suspect Gas Station

Sample Site	mg/L O ₂	Standard Deviation
Site 1 (Roger's Ln.)	11.43	1.90
Site 2 (Cache Rd.)	10.56	1.73
Site 3 (Gore Blvd.)	7.66	5.11
Site 4 (Lee Rd.)	8.57	1.35

Discussion

- Dissolved oxygen, phosphate, chloride, nitrate, nitrite, and ammonia concentrations are probably not the cause of low biodiversity of Wolf Creek as they have not changed significantly during the study period
- Metals contamination by Cu, Pb, Zn, and K are probably not the cause of poor biodiversity
- Chemical oxygen demand during the summer 2016 suggested the lack of organic pollution in the creek following removal of the gas station
- The biodiversity improved dramatically following the 2015-2016 academic year following the removal of the gas station
- Heavy rains in April 2015 ended a lengthy, hard drought period for southwest Oklahoma in which municipal reservoirs reached as low as ten percent capacity.

Conclusion

The low biodiversity observed during the 2015-2016 academic year was concluded to be the result of low water levels resulting from drought and exacerbated by the contamination of the creek water by designed drainage from a gas station now removed.

ACKNOWLEDGEMENTS

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