

Tonto Creek Total Nitrogen TMDL Effectiveness Monitoring Report Recommendation for Delisting

Executive Summary

Tonto Creek was placed on Arizona's Water Quality Impaired Waters List 303(d) for Total Nitrogen initially in 1996 due to exceeding the aquatic and wildlife cold water (A&Wc) and warm water (A&Ww) designated uses. Total Nitrogen on Tonto Creek has an annual mean standard of 0.5 milligrams per liter (mg/L) and a single sample maximum (SSM) standard of 2.0 mg/L. Two reaches of Tonto Creek were listed as impaired due to exceedances of the annual mean nitrogen standard, Reach 013A is the headwaters to confluence with unnamed tributary at N 34° 18' 10"/W 111° 04' 14" and Reach 013B is Tonto Creek from unnamed tributary at N 34° 18' 10"/W 111° 04' 14" to Haigler Creek. The Total Nitrogen Total Maximum Daily Load (TMDL) was completed in June 2005. The TMDL identified several nonpoint sources as contributors to Total Nitrogen concentrations in Tonto Creek including recreational uses and unincorporated communities/summer home clusters (ADEQ 2005). There is also a permitted point source in the watershed, Arizona Game and Fish Department's (AGFD) Tonto Creek Fish Hatchery.

The 2005 Tonto Creek TMDL recommended implementation projects and appropriate best management practices (BMPs) to decrease the Total Nitrogen levels in Tonto Creek. Through Arizona Department of Environmental Quality (ADEQ) Water Quality Improvement Grant (WQIG) funding and other projects, septic system upgrades were made throughout the impaired watershed. AGFD also made several upgrades to the facility. These projects working in concert with each other were effective in reducing Total Nitrogen loads in Tonto Creek.

The TMDL recommended future sampling to monitor Total Nitrogen and the effectiveness of implementation projects. Arizona Statute 49-234.J requires ADEQ to review the status of water quality at least once every five years, upon completion of a TMDL, to determine if compliance with applicable surface water quality standards has been achieved, in this case, to meet Total Nitrogen standards. According to data collected throughout the monitoring period in Tonto Creek, Total Nitrogen has decreased since 2005 and water quality has improved.

ADEQ recommends that Reaches 013A and 013B be delisted for Total Nitrogen. U.S. Environmental Protection Agency (EPA) must concur with any final delisting decisions. This request for delisting is supported by effectiveness monitoring data that show two consecutive years with no annual mean Total Nitrogen exceedances in either reach.

Background Information

Tonto Creek is in the Salt River watershed in Gila County and flows 73 miles before draining into Theodore Roosevelt Lake. The elevation on Tonto Creek is greatest at the Tonto Creek spring, about 6,900 feet, and is about 5,000 feet at the lowest effectiveness monitoring sampling point near the Bear Flat Campground. Major tributaries to Tonto Creek include Christopher Creek, Horton Creek, Haigler Creek, and Dick Williams Creek.

The upper Tonto Creek basin is almost entirely within the Tonto National Forest, with some privately-owned properties within the basin. Recreation is the primary land use in the watershed. The vegetation of the basin is primarily Ponderosa Pine forest, although there are areas of recent fires that are dominated by grasses, scrub, snags, and scattered groves of pines.

Total Nitrogen

Total Nitrogen is the sum of Nitrate-Nitrite and Total Kjeldahl Nitrogen (ammonia, organic, and reduced nitrogen). Nitrogen is an essential nutrient for plant and animals but if in excess, high levels of nitrogen can result in low levels of dissolved oxygen. The primary reason for the Total Nitrogen standard in Tonto Creek is to prevent eutrophication in Theodore Roosevelt Lake.

Sample Sites

There were eight to nine sample sites along the impaired portion of Tonto Creek that were sampled periodically from 2006-2014 after the 2005 TMDL report was written. Due to data quality issues with data collected for Total Nitrogen in 2006 through 2011, only data collected in 2013 and 2014 were used for effectiveness monitoring data analysis. Arizona Game and Fish Department (AGFD) collected data monthly to meet permit requirements; that data was also included in the analysis.

Pollutant Sources

There is one AZPDES permitted facility in the watershed, the AGFD's Tonto Creek Fish Hatchery. The remaining sources are all non-point in nature, such as recreation, grazing, natural background, and failing septic systems.

TMDL Summary

The critical condition for Total Nitrogen in Tonto Creek is the late spring to early fall recreation season. Samples collected for the TMDL were in flows less than 100 cubic

Table 1. Total Nitrogen Annual Mean TMDL

Based on Annual Mean Standard of 0.5 mg/l.

Natural background load = 72 kg/year and is the nitrogen measured at the natural background site and applied to all other sites.

Segment	Discharge (cfs)	Concentration (mg/L)	Existing Load (kg/year)	TMDL (kg/year)	WLA (kg/year)	LA (kg/year)	MOS (kg/year)	Natural Background (kg/year)	Load Reduction (kg/year)	Reduction (%)
Natural Background	0.67	0.12	72	299	--	197	30	72	0	--
Fish Hatchery	1.98	0.528	934	884	583	--	88	212	50	5
Baptist Camp	1.36	0.411	499	607	--	401	61	146	0	--
Below Horton Creek	1.14	0.304	309	509	--	336	51	122	0	--
Kohl's Ranch and Camp Tontozona	1.68	0.3	450	750	--	495	75	180	0	--
Christopher Creek mouth	1.63	0.338	492	728	--	480	73	175	0	--
Below Christopher Creek	3.59	0.649	2081	1603	--	1058	160	385	478	23
Bear Flats	3.99	0.546	1945	1781	--	1176	178	428	164	8

feet per second (cfs). The TMDL was separated into seven segments within both reaches of Tonto Creek. Two of the segments required reductions of 50 - 478 kilograms per year (kg/year) in order to meet the annual mean standard, according to the TMDL (Table 1).

Effectiveness Monitoring Summary

ADEQ collected data from the effectiveness monitoring period 2006-2014 on a varying basis. However, only data collected in 2013 and 2014 was used for analysis due to quality control issues in the earlier effectiveness monitoring data. Monthly data collected by AGFD were included in the analysis. ADEQ wrote an effectiveness monitoring report summarizing all data collected to pre-TMDL data (ADEQ 2015).

In the 2013 and 2014 data, only one segment below the AGFD Tonto Creek Fish Hatchery exceeded the annual mean of 0.5 mg/L, whereas the TMDL showed the annual mean was exceeded in three segments. In order to be able to remove the not attaining status of the two reaches of Tonto Creek for Total Nitrogen, the data must show two consecutive years where the annual mean does not exceed the water quality standard. The data must include a minimum of three monthly means within a calendar year. After analyzing the 2013 and 2014 data for both reaches, there is evidence to support removing 013A and 013B reaches of Tonto Creek as not attaining for Total Nitrogen (Tables 2 and 3).

Table 2. 2013 data to support removal of Tonto Creek from not attaining portion of 303(d) list for Total Nitrogen.

2013 Total Nitrogen Means						
Reach	May	June	July	August	September	Annual
013A	0.392	0.472	0.495	0.530	0.595	0.499
013B	0.443	0.330	0.392	0.354	0.509	0.406

Table 3. 2014 data to support removal of Tonto Creek from not attaining portion of 303(d) list for Total Nitrogen.

2014 Total Nitrogen Means				
Reach	July	August	September	Annual
013A	0.433	0.377	0.364	0.405
013B	0.365	0.305	0.254	0.308

Implementation

ADEQ has provided funding in the form of three 319(h) grants for water quality improvement projects in the Tonto Creek watershed. All of the projects involved upgrades to septic systems or on-site sewer projects.

The first grant funded a two-phase project by Gila County Division of Health and Human Services in 2007. In the first phase, seven septic systems were upgraded or replaced. These included one cesspool replaced 20 feet from Tonto Creek, one cesspool system replaced 200 feet from Tonto Creek, and four systems replaced due to failing septic systems discharging into Thompson Draw, a tributary of Tonto Creek.

The second phase of the Gila County septic system upgrade project was completed two years after the first phase. Phase two included upgrading or replacing five septic systems. Three systems replaced cesspool systems with overflow leach lines that were zero feet from Tonto Creek. One system replaced a cesspool with overflow leach lines 30 yards from Tonto Creek. The final upgrade replaced a failing septic system discharging partially treated effluent directly to the surface and eventually into Tonto Creek.

The most recent project in the watershed was the Tonto Rim Christian Camp Water Quality Improvement Project on Tonto Creek in 2010. The entire septic system was replaced and upgraded, including all of the piping. Additionally, the deep trench leach process was converted to a drip irrigation technique, reducing saturated pollutants to the creek.

AGFD has been making gradual upgrades to the Tonto Creek Fish Hatchery outfall to reduce nutrient loading into Tonto Creek. Some of the upgrades included improving wetlands and adding centrifuges. These upgrades were not completed using ADEQ 319(h) grant funds since they are related to meeting AZPDES permit conditions. There is more work to do, but the hatchery discharge is not leading to a Total Nitrogen impairment.

Conclusion

Effectiveness monitoring determines the success of the actions taken to improve impaired conditions. The actions taken in Tonto Creek have resulted in reductions of Total Nitrogen in the creek. ADEQ recommends that Tonto Creek be removed from the 303(d) list as not attaining for Total Nitrogen as a result of the effectiveness monitoring data. ADEQ intends to continue monitoring Tonto Creek and reevaluate the water quality in the future.