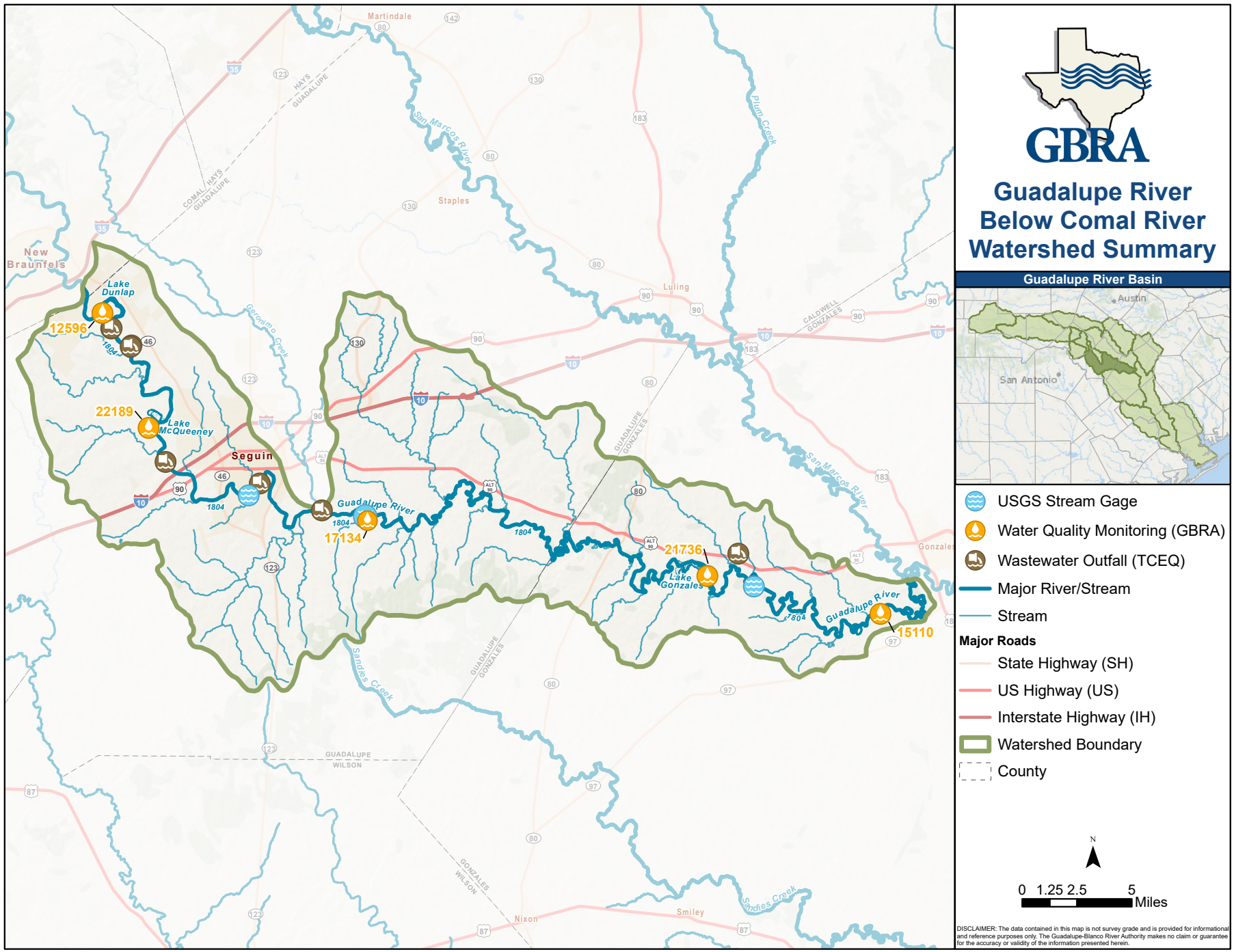
GUADALUPE RIVER BELOW COMAL RIVER



Segments

Segment 1804 - Guadalupe River Below Comal River

Segment Summary

Guadalupe River at H5 Dam

Guadalupe River below Comal River is a 101-mile-long segment that runs from the confluence of the Comal River in New Braunfels to the confluence with the San Marcos River near Gonzales. Due to the significant hydrological and geological changes that happen in this watershed, this segment is one of the most ecologically diverse in the basin. Segment 1804 flows through the Edwards Plateau, Texas Blackland Prairie, and Post Oak Savannah ecoregions, and lies over the Edwards Balcones Fault Zone and Carrizo Wilcox aquifers. Stream flow in this segment comes from several sources: Canyon Reservoir, spring flows from the Comal River, and several tributaries including Geronimo Creek (1804A). Wastewater discharges between New Braunfels and Seguin also contribute to the total flow. The upper reaches of this segment are urban with a rapidly growing population; as the segment moves south the land use becomes more rural, and agriculture is prevalent. Several different substrate types are found throughout this watershed, including limestone, calcareous clay, sandy loam, clay-loam, dark red sandstone, and tan to gray sandstone.

This segment experiences a 300-foot drop in elevation as it flows south. This elevation change created an ideal location for the construction of six hydroelectric dams to provide power to the surrounding area. The dams were constructed in the 1920s to 1930s and GBRA took ownership in 1963. Unlike Canyon Dam, which is a flood control structure, these are pass-through dams that do not control flood waters. Because of the relatively high velocity of the water flowing through these impoundments (referred to collectively as the Guadalupe Valley Lakes), water quality is significantly different than in larger reservoirs. Stratification, which occurs in Canyon Reservoir, does not occur in these impoundments. Recreation including boating, fishing, and water skiing are extremely popular on the Guadalupe Valley Lakes. The land surrounding Lake Dunlap, Lake McQueeney, and Lake Placid is urban and located in the rapidly expanding I-35 corridor. The watershed surrounding the lower three lakes is more rural. Over time as the dam structures have aged, they have exceeded their useful life expectancy period and are no longer structurally sound. In recent years, several of the structures have failed despite regular maintenance, and replacement of several of the dams is taking place.

GBRA monitors this segment at five stations:

Station ID	Dissolved Oxygen	Biologicals	Bacteria	Temperature	Nutrients	Chlorophyll a
12596	M	M	M	M	M	M
15110	M	M	M	M	M	M
17134	M	M	M	M	M	M
21736	M	M	M	M	M	M
22189	M	M	M	M	M	M

M - Meets water quality criteria

Table 11: Summary of the 2022 Texas Integrated Report / Segment 1804

At station 17134, increasing trends were found for chloride and sulfate. These trends do not have a strong correlation with flow and it is unknown why these trends are increasing. Nonpoint source runoff could be a contributing factor to the observed increases in chloride and sulfate.

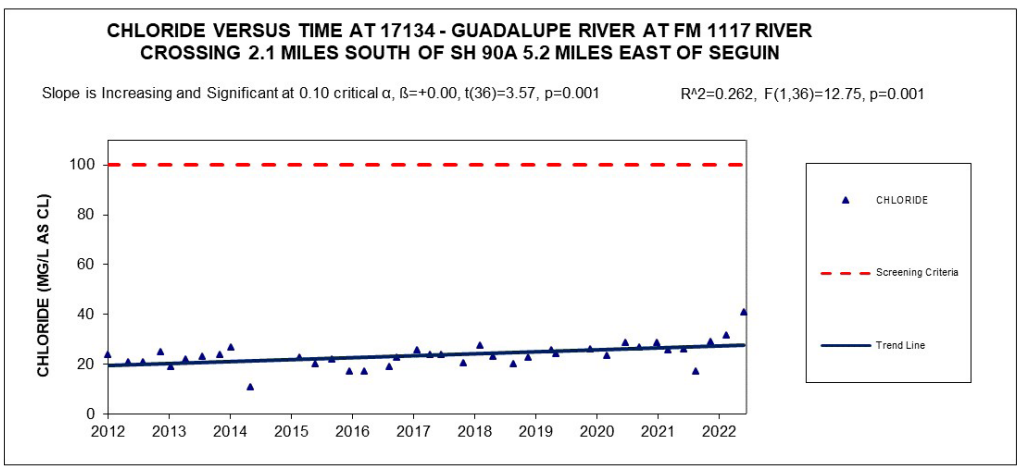


Figure 21: Chloride trend at Station 17134

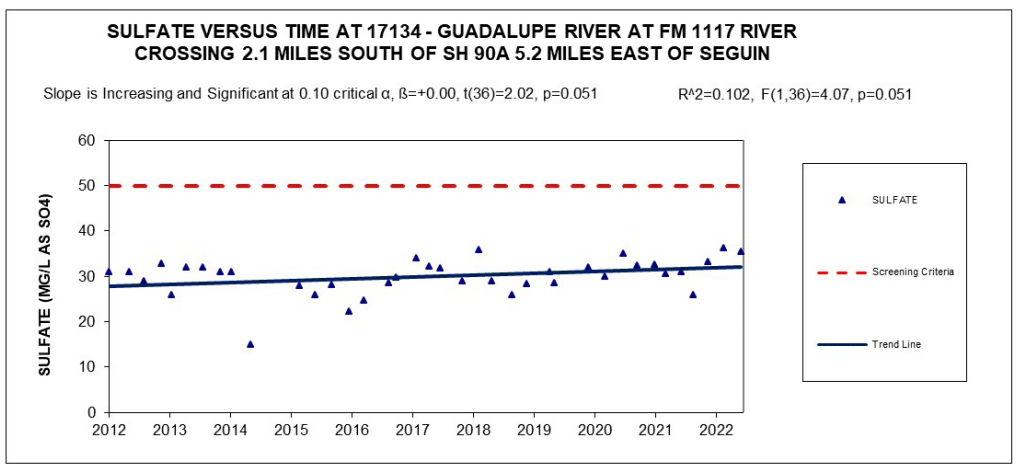


Figure 22: Sulfate trend at Station 17134

A decreasing trend for dissolved oxygen was also found at station 17134. This decrease is not significantly correlated with stream flow. This segment of river is infested with several different species of invasive species which may be contributing to this trend.

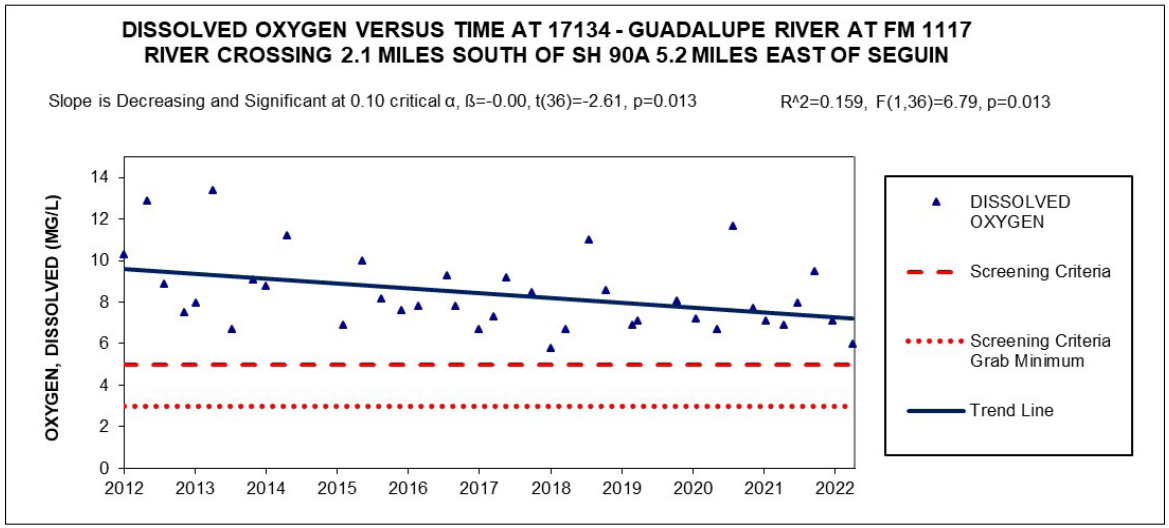


Figure 23: Dissolved oxygen trend at Station 17134

An increasing trend in nitrate was identified at station 12596. This station is located on Lake Dunlap, a heavily urbanized area. Fertilizer runoff from lawns that cover a large area of the land directly around the lake could be contributing to this increase. Wastewater effluent could also be contributing to the increase. Education to local homeowners on proper use of fertilizers, and more efficient wastewater treatment could help mitigate this increase.

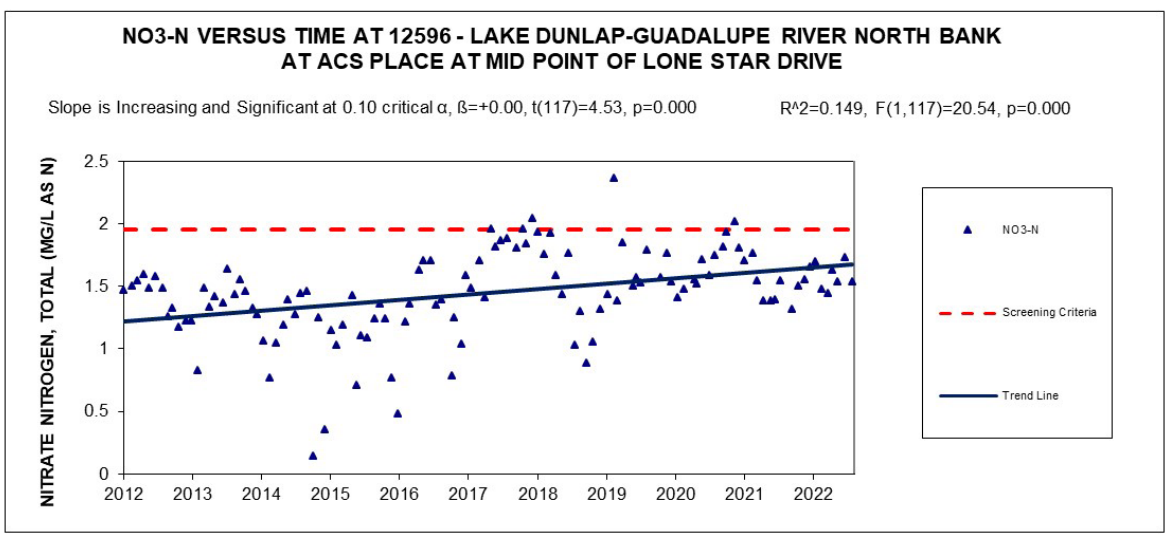


Figure 24: Nitrate trend at Station 12596

Data analysis also showed an increasing trend in *E. coli* at station 12596. Changes in rainfall patterns could be a contributing factor, as *E. coli* loading can be higher after a heavy rainfall event that follows a period of drought.

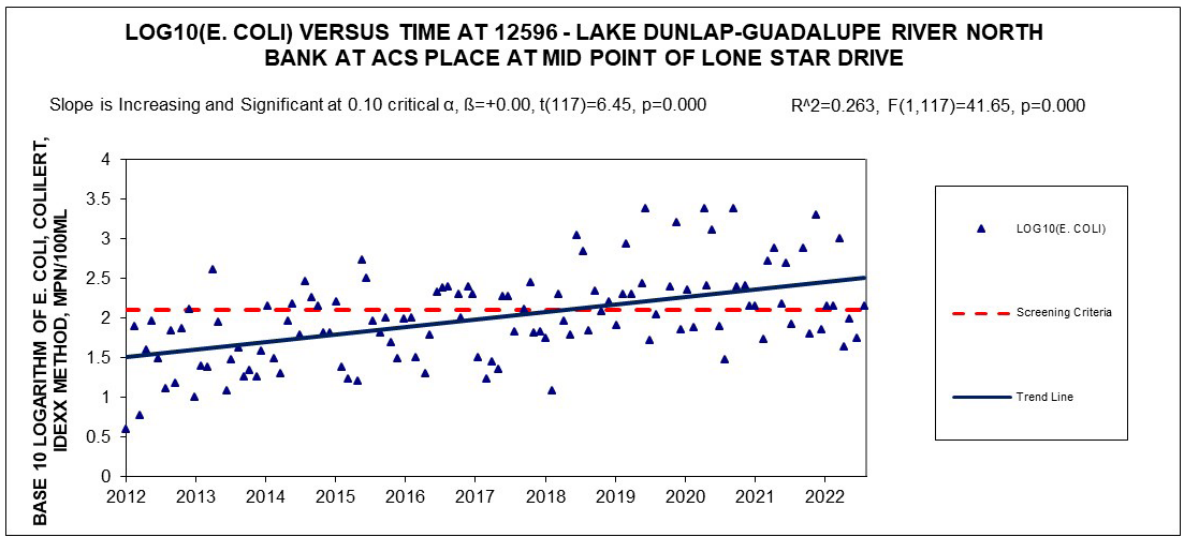


Figure 25: Log10 E.coli trend at Station 12596

A decreasing trend in chloride was seen at station 15110, which is located in the lower portion of the segment. This trend is inversely correlated with flow.

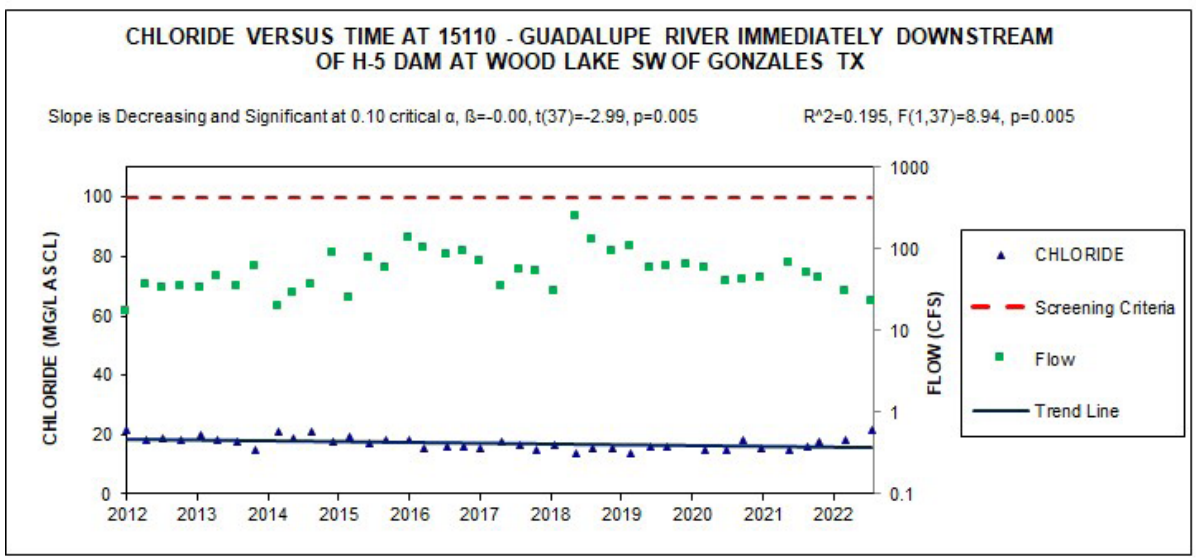


Figure 26: Chloride trend at Station 15110