

Historical Water Quality Data Analysis

There are three TCEQ SWQM sites on the Lower Nueces River, Segment 2102 (Figure 1). The most upstream station, 12965, is located on SH 359 just below Lake Corpus Christi. The United State Geological Survey conducted monthly monitoring from October 1959 through August 1980, then quarterly through July 2007. The City of Corpus Christi also conducted monthly monitoring from October 1977 through December 1992. The Nueces River Authority (NRA) began quarterly monitoring in January 1998 under the Clean Rivers Program (CRP).

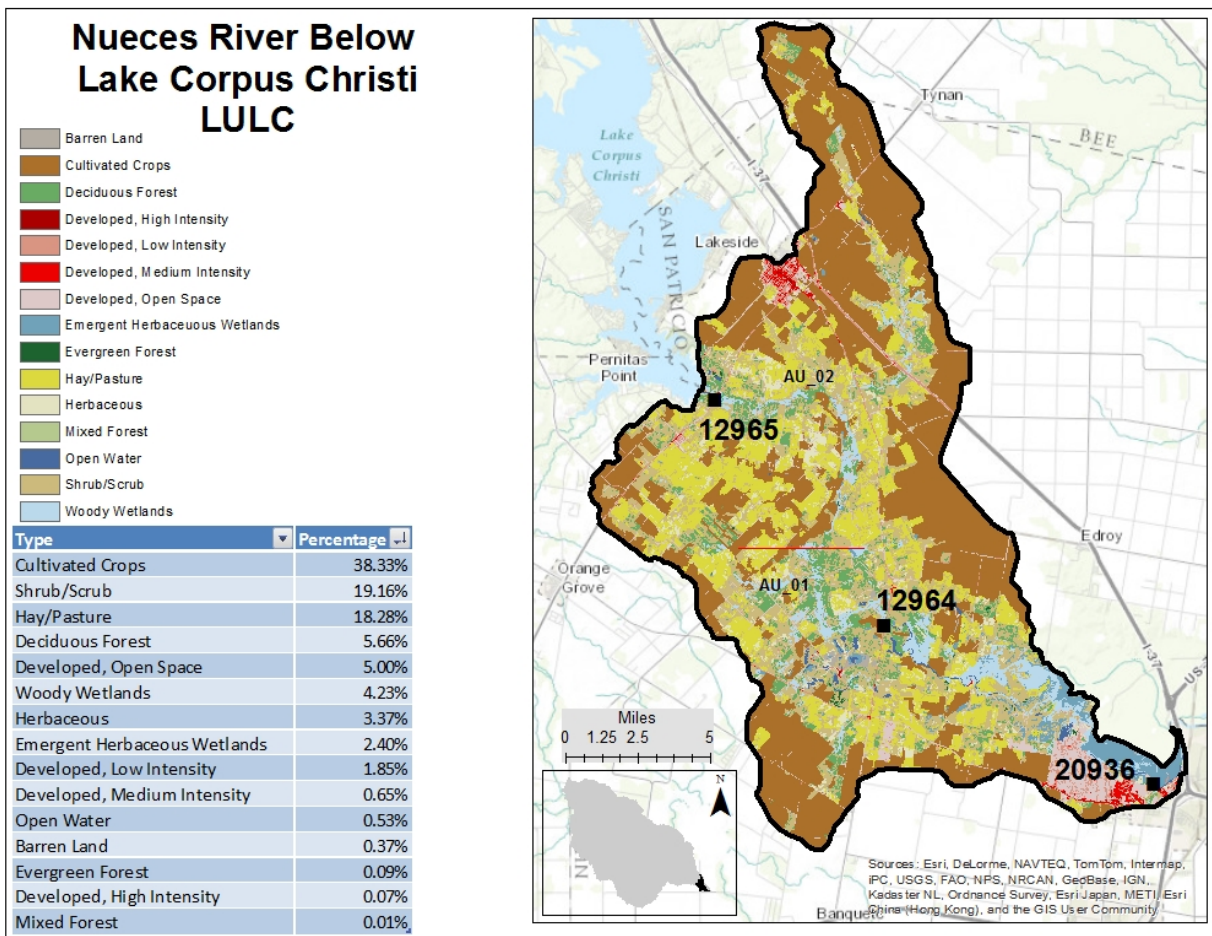


Figure 1 Water Quality Monitoring Stations

Station 12964 is located on FM 666 near the middle of the segment. The City of Corpus Christi conducted monthly monitoring from October 1977 through December 1992. NRA began quarterly monitoring in January 1998 under CRP. USGS conducts occasional measurements associated with sediment transport during primarily high flow events.

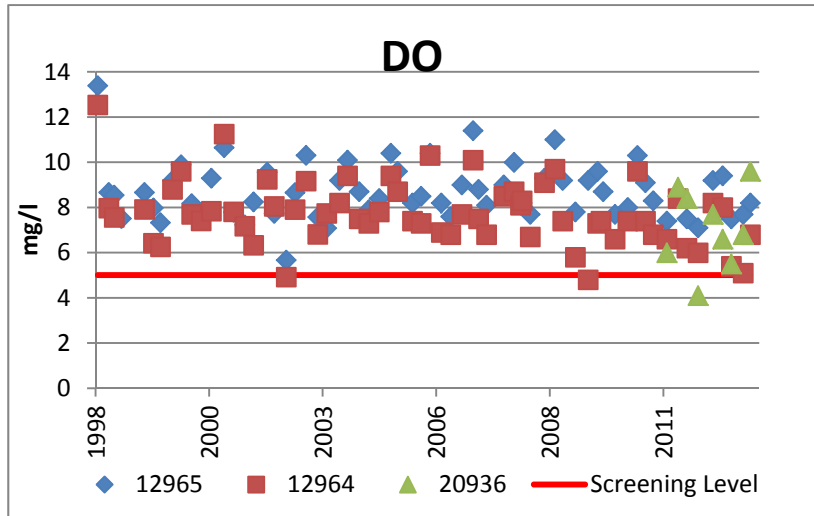
Station 20936 is located at the boat ramp in Hazel Bazemore County Park, Nueces County, near the downstream end of the segment. NRA began quarterly monitoring at this site in October 2011 under CRP.

Because of the data gap between 1992 and 1998 and more a consistent parameter suite being collected under the routine quarterly monitoring, analysis was conducted on data collected January 1998 – November 2013.

The data analysis consisted of noting the minimum and maximum values; calculating the median, average, or geometric mean depending on the specific parameter; and conducting trend analysis. Trend analysis was not conducted on data from Station 20936 since a longer time period is needed for this type of analysis.

Dissolved Oxygen (DO) and Dissolved Oxygen Deficit (DOD)

DO is the amount of gaseous oxygen dissolved in the water. DOD is the difference between the actual amount of DO in the water and the saturation concentration at the water temperature when sampled. Because water temperature is taken into account, trend analysis is conducted on DOD to reduce seasonal variation.



Overall, DO values tend to decrease downstream. The minimum, maximum, and median values are:

- 12965: 5.7 / 13.4 / 8.5
- 12964: 4.8 / 12.5 / 7.6
- 20936: 4.1 / 9.6 / 6.8

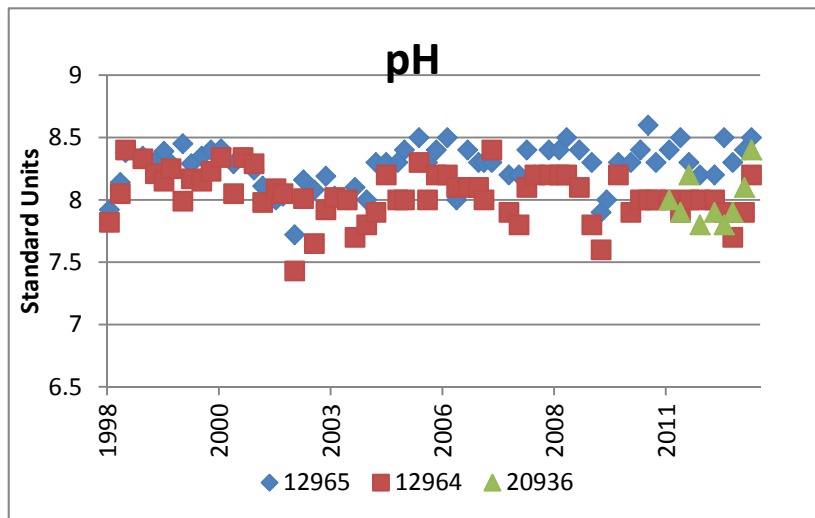
There is an increasing DOD trend at station 12964.

pH

pH is the measure of the acidity (< 7) or basicity (> 7) of water. Pure water has a pH very close to 7. With respect to water quality standards, the optimum range is between 6.5 and 9. The maximum and median values decrease downstream. The minimum, maximum, and median values are:

- 12965: 7.7 / 8.6 / 8.3
- 12964: 7.4 / 8.4 / 8.0
- 20936: 7.8 / 8.4 / 7.9

There is a decreasing pH trend at station 12964.

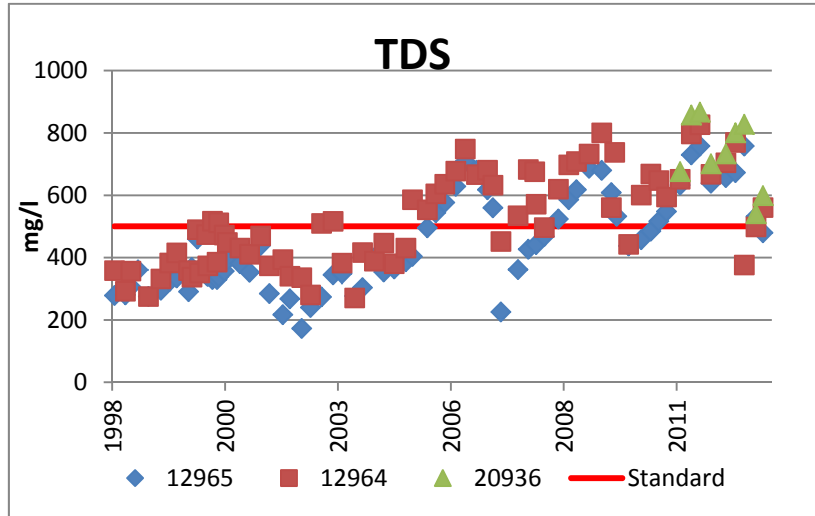


Total Dissolved Solids (TDS)

TDS is a measure of the combined content of all inorganic and organic substances suspended in the water that are too small to be filtered out. The TDS values increase downstream. The minimum, maximum, and average values are:

- 12965: 173 / 758 / 443
- 12964: 271 / 827 / 518
- 20936: 541 / 867 / 734

Trend analysis indicates that the TDS values are also increasing over time at stations 12965 and 12964. As a result of this increase, this segment of the river is on the State of Texas 303(d) List of Impaired Water Bodies for a TDS impairment.

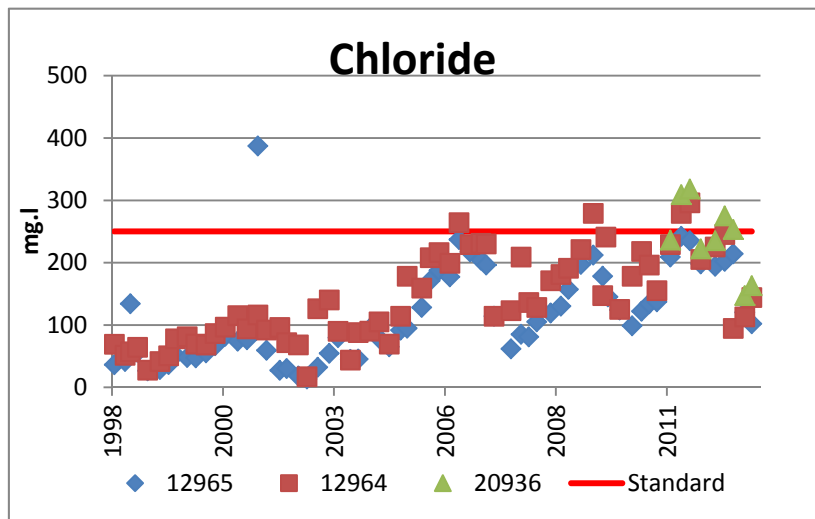


Chloride

Chlorides are present in sediments, natural water, salt air, human and animal excretions, and wastewater. Chloride values increase downstream. The minimum, maximum, and average values are:

- 12965: 13 / 387 / 115
- 12964: 17 / 296 / 141
- 20936: 147 / 318 / 240

The chloride values are also increasing over time at stations 12965 and 12964. If these trends continue, chlorides may also be listed as an impairment in the future.

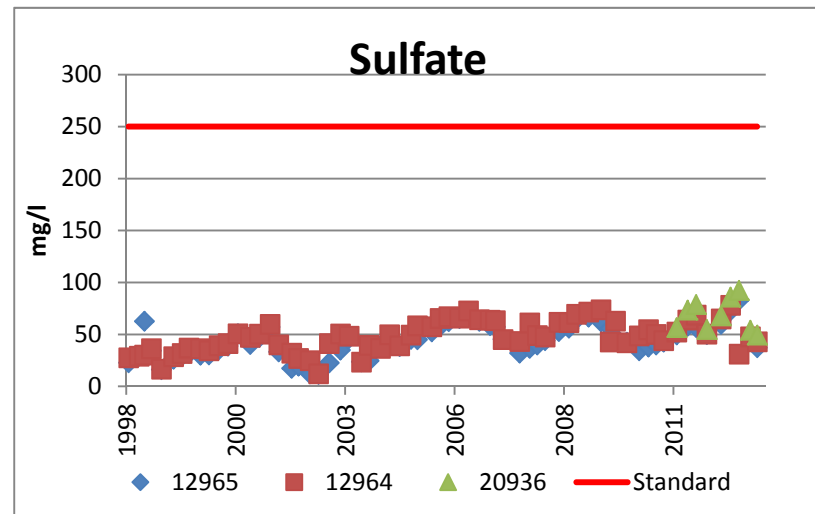


Sulfate

Sulfates refer to sulphur salts which are commonly found in soils, natural water, and wastewater. Sulfate values also increase downstream. The minimum, maximum, and average values are:

- 12965: 12 / 83 / 43
- 12964: 12 / 78 / 48
- 20936: 49 / 92 / 68

The sulfate values are also increasing over time at stations 12965 and 12964. However, the values are well below the standard.

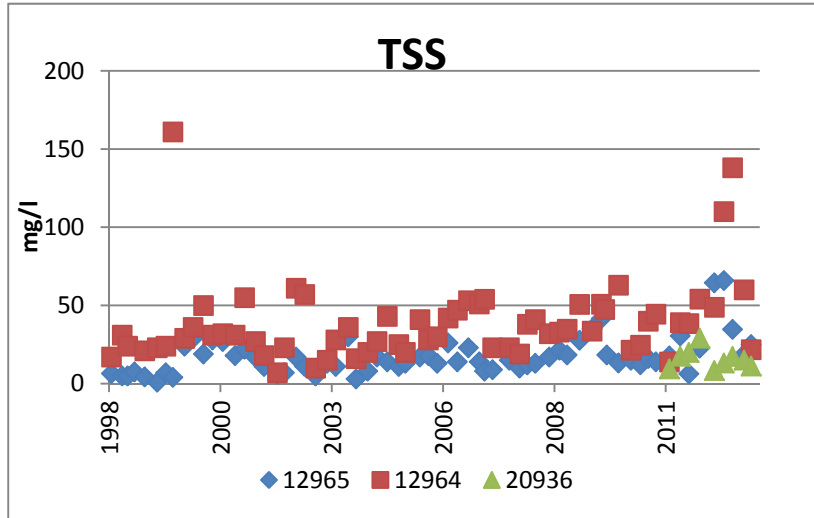


Total Suspended Solids (TSS)

TSS is the measure of the combined content of all inorganic and organic substances suspended in the water that are large enough to be filtered out. The minimum, maximum, and median values are:

- 12965: 1 / 66 / 15
- 12964: 7 / 161 / 32
- 20936: 8 / 29 / 15

Although the lowest values were recorded at station 12965, there is an increasing trend in TSS values at this site.

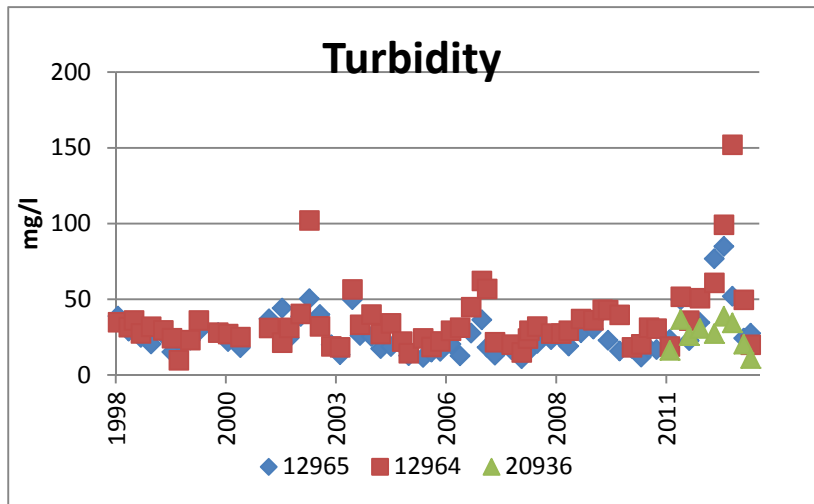


Turbidity

Turbidity is the measure of the cloudiness of the water caused by total suspended or dissolved solids. The minimum, maximum, and median values are:

- 12965: 10.7 / 84.9 / 23.2
- 12964: 9.7 / 152 / 31
- 20936: 10.8 / 28.7 / 27.3

The highest values were recorded at station 12964 and there is an increasing trend in turbidity values at this site.

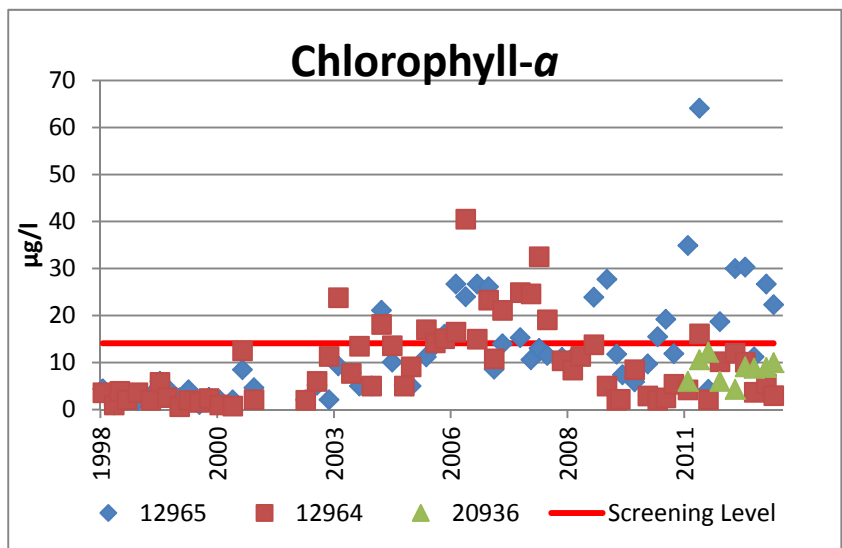


Chlorophyll-a

Chlorophyll-a is the measure of the green pigment of plants and photosynthetic algae and bacteria that traps the energy of sunlight for photosynthesis. High levels of chlorophyll-a in the water may indicate excessive plant growth that could deplete DO levels. The minimum, maximum, and median values are:

- 12965: 1 / 64.1 / 10.4
- 12964: 0.6 / 40.5 / 6
- 20936: 4.3 / 12.2 / 9

Chlorophyll-a has been listed as a concern on the State's Water Quality Inventory since 2008 for the portion of the river assessed with 12964 data and since 2012 for the portion of the river assessed with 12965 data. More recently, the measured values at 12964 have been meeting the standard, but there is an increasing trend in chlorophyll-a values at 12965.

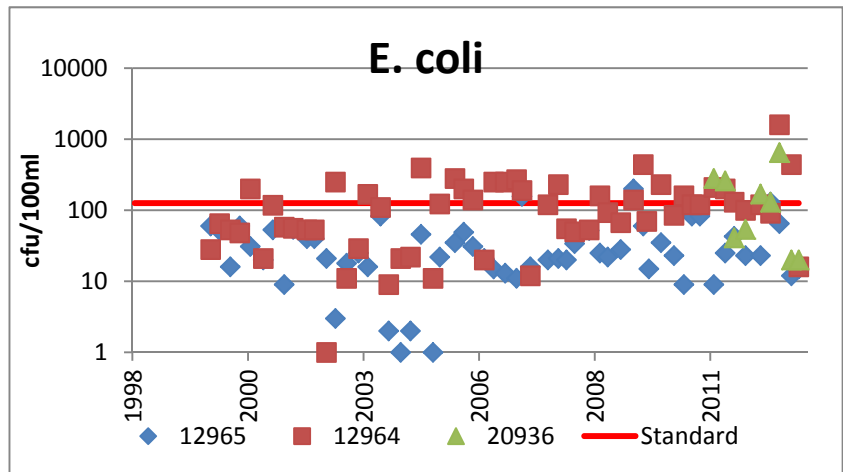


E. coli

E. coli are bacteria found in the environment, foods, and intestines of people and animals. The presence of *E. coli* may indicate the presence of additional pathogens. *E. coli* is the indicator bacteria for assessing the water quality of fresh water streams and lakes. The minimum, maximum, and geometric mean values are:

- 12965: 1 / 200 / 23.4
- 12964: 1 / 1600 / 82.8
- 20936: 20 / 650 / 99.2

Based on the geometric mean, bacteria levels increase downstream. There is an increasing trend in *E. coli* values at 12964.

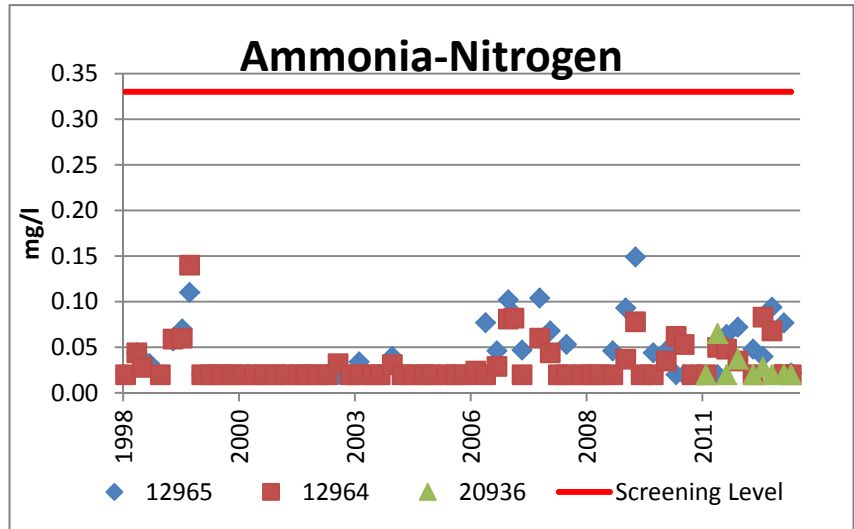


Ammonia-Nitrogen

Ammonia-nitrogen is an inorganic, dissolved form of nitrogen and is the preferred form for algae and plant growth. High ammonia concentrations can stimulate excessive aquatic production and indicate pollution. High ammonia levels can be toxic to aquatic life. The minimum, maximum, and median values are:

- 12965: 0.02 / 0.15 / 0.02
- 12964: 0.02 / 0.14 / 0.02
- 20936: 0.02 / 0.06 / 0.02

There is an increasing trend in ammonia-nitrogen values at station 12965. However, all measured values at all three sites are well below the screening level.

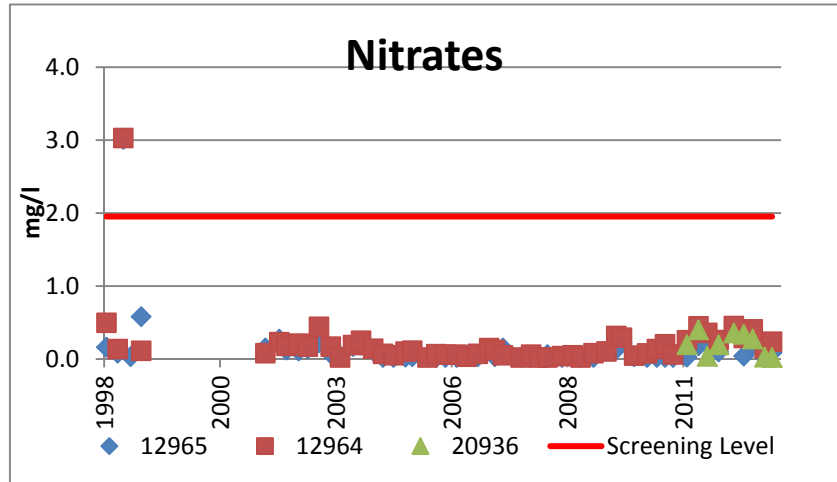


Nitrates

Nitrates are naturally present in soil, water, and food. Human activities have increased environmental nitrate concentrations, with agriculture being the major source. Nitrate compounds are very soluble in water and quite mobile in the environment. High levels and long-term exposure to lower levels can be toxic to humans. The minimum, maximum, and median values are:

- 12965: 0.02 / 3 / 0.04
- 12964: 0.02 / 3 / 0.12
- 20936: 0.02 / 0.4 / 0.2

Except for one occurrence in June 1998, all measured values have been well below the screening level. There is a decreasing trend in nitrate values at station 12965.



Total Phosphorus

Phosphorus is one of the key elements necessary for growth of plants and animals. An excess of phosphorus can cause algae and aquatic plants to grow wildly, choke up the waterway, and use up large amounts of oxygen – a condition is known as eutrophication. The minimum, maximum, and median values are:

- 12965: 0.04 / 0.53 / 0.16
- 12964: 0.04 / 0.38 / 0.18
- 20936: 0.09 / 0.21 / 0.18

There is a decreasing trend in nitrate values at station 12965.

