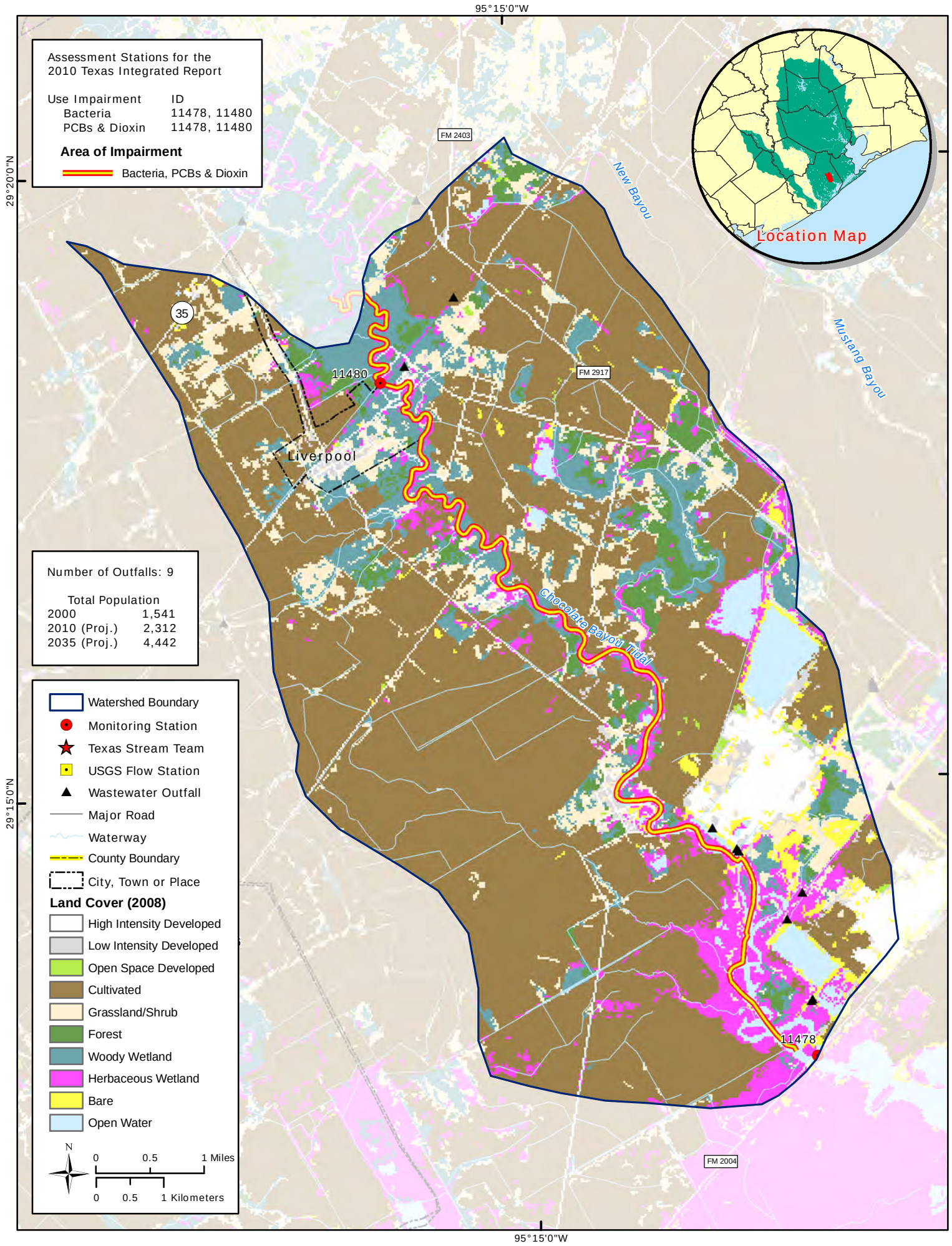
CHOCOLATE BAYOU TIDAL - SEGMENT 1107



Segment Number:	1107	Name:	Chocolate Bayou Tidal
Length:	14 miles	Watershed Area:	37 square miles
Designated Uses:	Contact Recreation; High Aquatic Life		
Number of Active Monitoring Stations:	2	Texas Stream Team Monitors:	0
Permitted Outfalls:	20		
Description:	From the Chocolate Bay confluence 1.4 km (0.9 miles) downstream of FM 2004 to a point 4.2 km (2.6 miles) downstream of SH 35 in Brazoria County		

Degree of Impairment and Overall Trends

Segment ID	Dissolved Oxygen	Bacteria	Nutrients	PCBs/Dioxin	Chlorophyll *a*	Other
1107		100		100	100	

Indicates general improvement Indicates general degradation Numbers indicate percent of segment impaired

FY 2011 Active Monitoring Stations

Site ID	Site Description	Frequency	Monitoring Entity	Parameter Groups
11478	Chocolate Bayou at FM 2004	Quarterly	EIH	Field, Conventional, Bacteria, Chlorophyll-*a*
11478	Chocolate Bayou at FM 2004	Quarterly	TCEQ	Field, Conventional, Bacteria, Chlorophyll-*a*
11480	Chocolate Bayou at Liverpool	Quarterly	EIH	Field, Conventional, Bacteria

Segment 1005

Standards

Temperature (°C):	35
Dissolved Oxygen *(24-Hr Average)* (mg/L):	4.0
Dissolved Oxygen *(Absolute Minima)* (mg/L):	3.0
pH (standard units):	6.5-9.0
Enterococci (MPN/100mL) (grab):	89
Enterococci (MPN/100mL) (geometric mean):	35

Screening Levels

Ammonia-N (mg/L):	0.46
Nitrate-N (mg/L):	1.10
Orthophosphate Phosphorus (mg/L):	0.46
Total Phosphorus-P (mg/L):	0.66
Chlorophyll-*a* (µg/L):	21

Water Quality Issues Summary					
Issue	**2008 Assessment**	***Draft* 2010 Assessment**	**Affected Area**	**Possible Causes / Influences / Concerns Voiced by Stakeholders**	**Possible Solutions / Actions To Be Taken**
Elevated Levels of Bacteria	-	I	Entire segment	- WWTP non-compliance, overflows, collection system by-passes - Small, privately-run WWTP - Developments with septic tanks - Rapid urbanization and increased impervious cover - Constructed storm water controls failing - Direct and dry weather discharges - Waste haulers illegal discharges/improper disposal - Improper or no pet waste disposal - Animal waste from agricultural production, hobby farms, and riding stables	- Increase monitoring requirements for self-reporting - Impose new or stricter bacteria limits than those designated by TCEQ - Require all systems to develop and implement a utility asset management program and protect against power outages at lift stations or provide alternative power supplies during outages - Regionalize wastewater treatment to minimize number of small package plants and reduce OSSF dependency - Require larger partials of land in developments platted to use OSSFs - More public education regarding OSSF operations and maintenance - More public education regarding pet waste disposal - Improve storm water controls in new developments by adding bacteria reduction measures - Improve compliance and enforcement of existing storm water quality permits to minimize contaminated runoff - Improve construction oversight to minimize TSS discharges to waterways - Implement stream fencing or alternative water supplies to keep livestock out of or away from waterways - Promote and implement Water Quality Management Plans for individual agricultural properties

					- Protect or install vegetative buffers along all waterways
Dioxin/PCBs	-	I	Entire segment	- Concentrated deposits outside boundaries of the waste pits - Unknown industrial or urban sources	- Remove or contain contamination from locations already identified - Encourage additional testing to locate all unknown sources/deposits
Elevated Chlorophyll a Concentrations	C	C	Entire segment	- Fertilizer runoff from surrounding watershed promote algal growth in waterways - Nutrient loading from WWTPs effluent, sanitary sewer overflows, and malfunctioning OSSFs promote algal growth	- Improve storm water controls in new developments - Improve compliance and enforcement of existing storm water quality permits. - Support/continue/initiate public education regarding nutrients and consequences - Reduce or manage fertilizer runoff from agricultural areas

Segment Discussion:

Watershed Characteristics: The Chocolate Bayou Tidal Watershed is predominantly rural with only one urban center, the community of Liverpool. There are a few pockets of development scattered through the watershed and a large industrial complex in the southeast part of the watershed. Duck Lake and Monsanto Reservoir are used as water impoundments by these industries. The rest of the watershed is used for agriculture and contains a number of irrigation canals.

Water Quality Issues: The contact recreation and fish consumption uses are not supported in the tidal segment. It was found that 31% of the samples collected exceeded the enterococci bacteria single sample of 80MPN/100mL in the draft 2010 IR. However, the 2008 Texas Integrated Report (IR) did not list a bacteria impairment for this segment. High levels of dioxin and PCBs in edible tissue also led the Texas Department of State Health Services to issue a Limited Consumption Fish Advisory for this water body. Additionally, there is a water quality concern regarding chlorophyll *a* in the 2010 assessment because 30% of samples exceeded the screening level of 21 µg/L. There was a chlorophyll *a* concern listed in 2008 (IR) as well.

Special Studies/Projects: This segment is not a part of any special study or project at this time.

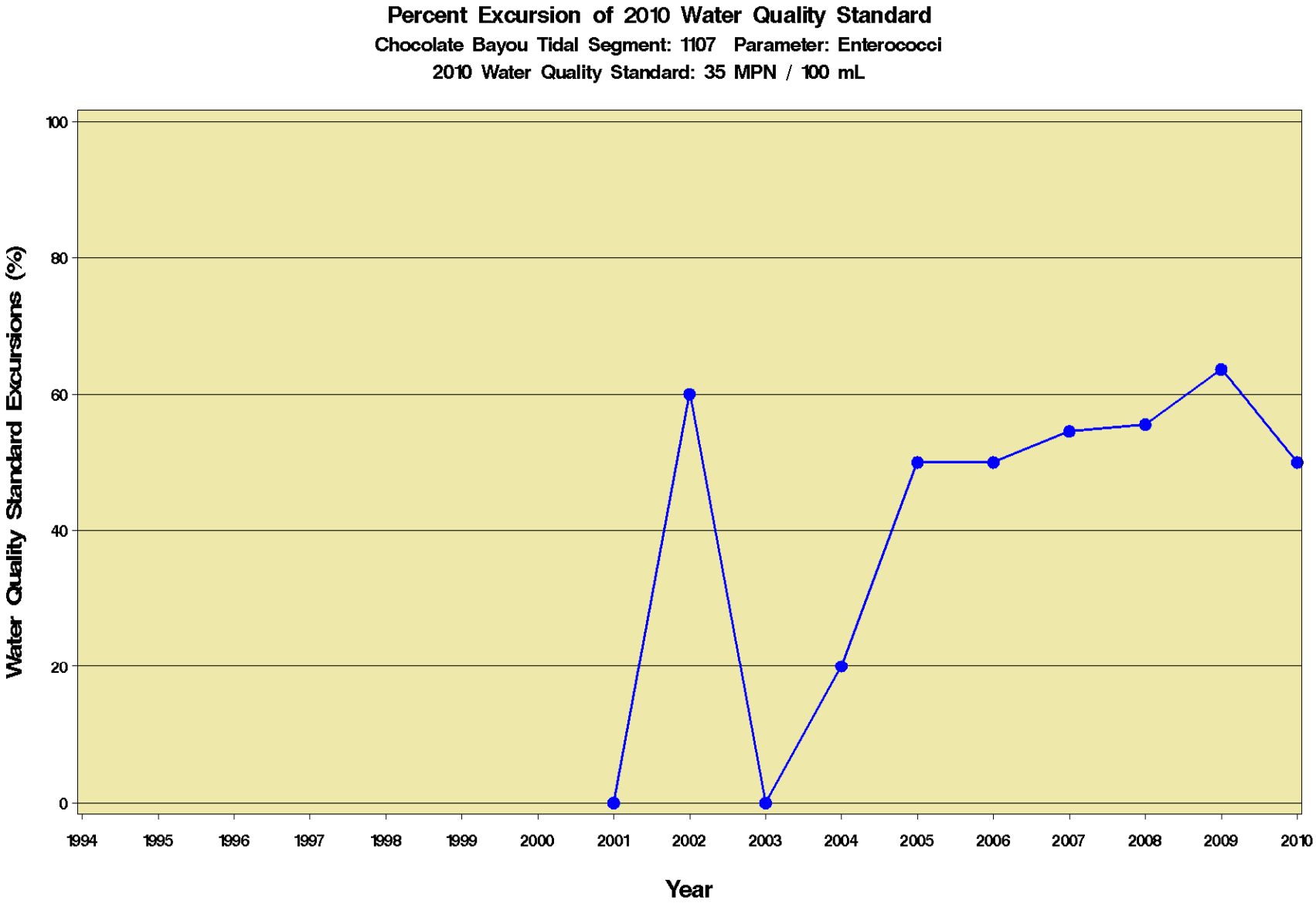
Trends: Regression analysis of watershed-level data revealed statistically-significant trends for nitrate nitrogen (nitrate) and total phosphorus (TP). Both are trending higher. Nutrients have been identified as a concern in the tidal portion of Chocolate Bayou. There are two stations in this segment. Data has been collected from station 11478 throughout the 15-year period selected for analysis. Analysis of data from this station supports the watershed level trend for nitrate and TP and revealed additional statistically-significant trends for chlorophyll-*a*, ammonia nitrogen (ammonia), orthophosphate phosphorus (OP), and total organic carbon (TOC). With the exception of the solids data, all trends indicate increasing concentrations of these constituents over the 15-year period. It should be noted that 20% of the samples collected have exceeded the chlorophyll *a* screening level, but only 3% of samples have exceeded the screening level for

ammonia. Nitrate, total phosphorus (TP), and OP screening levels have never been exceeded. Data from station 11480, which has been collected since 2004, show that volatile suspended solids (VSS) and total suspended solids (TSS) are trending downward. This watershed is currently listed as impaired for bacteria, but no significant trend exists. Twenty-two percent of samples collected over the period of record exceed the enterococci geometric standard of 35 MPN/100 mL.

Plots of chlorophyll *a*, nitrate, and TP concentrations measured at station 11478 appear below.

Recommendations:

- Address the various issues and concerns found in this segment summary through stakeholder participation on the Basin Steering Committee.
- Continue collecting water quality data to support actions associated with watershed protection plan development and future modeling.
- Pursue new local partners to Clean Rivers Program to collect addition data that would help better isolate problem areas.
- Work with local partner and contract labs to lower detection limits for nutrients

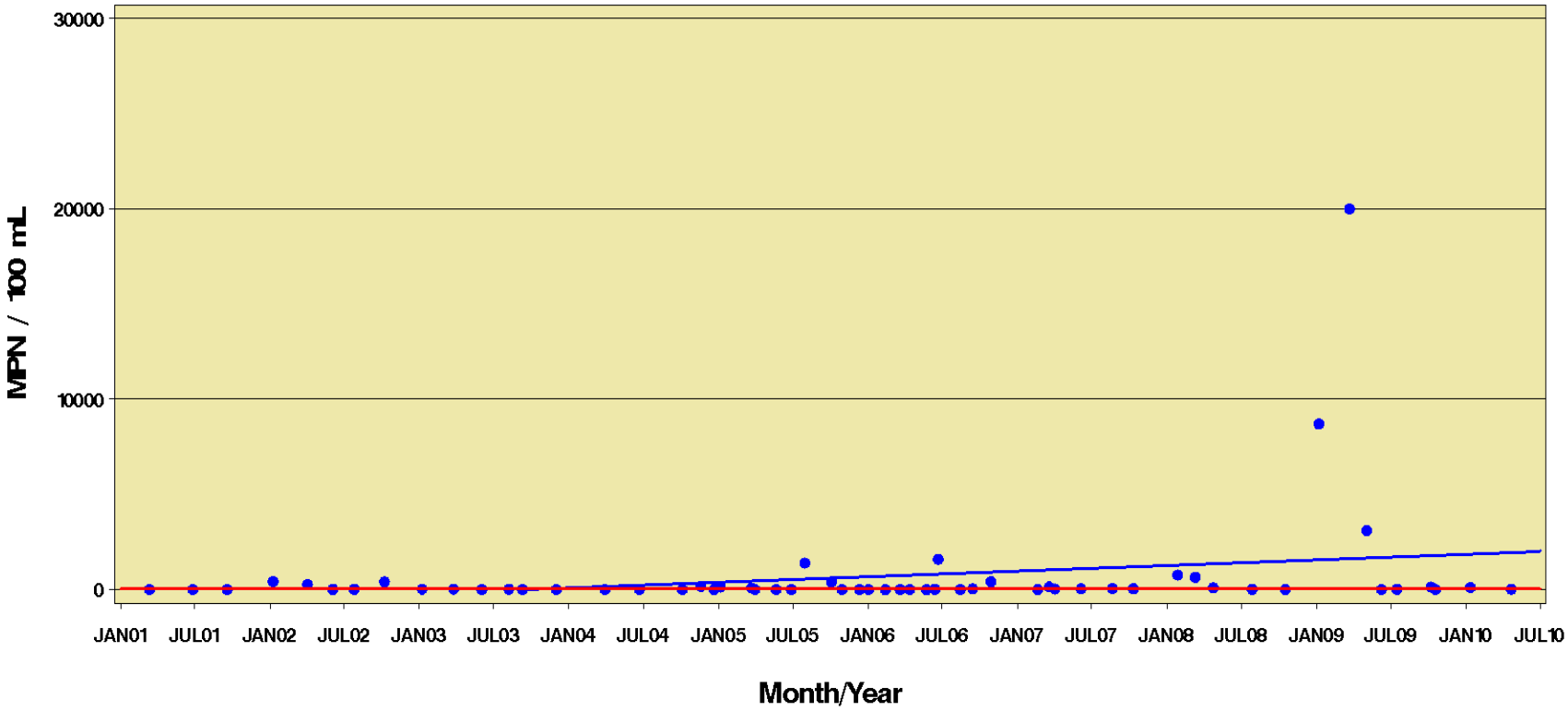

Percent Excursion of 2010 Water Quality Standard
Chocolate Bayou Tidal Segment: 1107 Parameter: Enterococci
2010 Water Quality Standard: 35 MPN / 100 mL
Water Quality Standard Excursions (%)
100
80
60
40
20
0
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
Year

Chocolate Bayou Tidal

Station: 11478 Segment: 1107 Parameter: Enterococci

2010 Water Quality Standard: 35 MPN / 100 mL

Assessment Unit: 1107_01



Trends are considered significant if the p–value is < 0.10

Trend is significant at p= 0.0642 R–Square= 0.0599 T–Value= 1.8880 Number of Samples= 58

The blue regression line applies to the plot of actual values ; regression statistics are derived from regression of log–transformed data

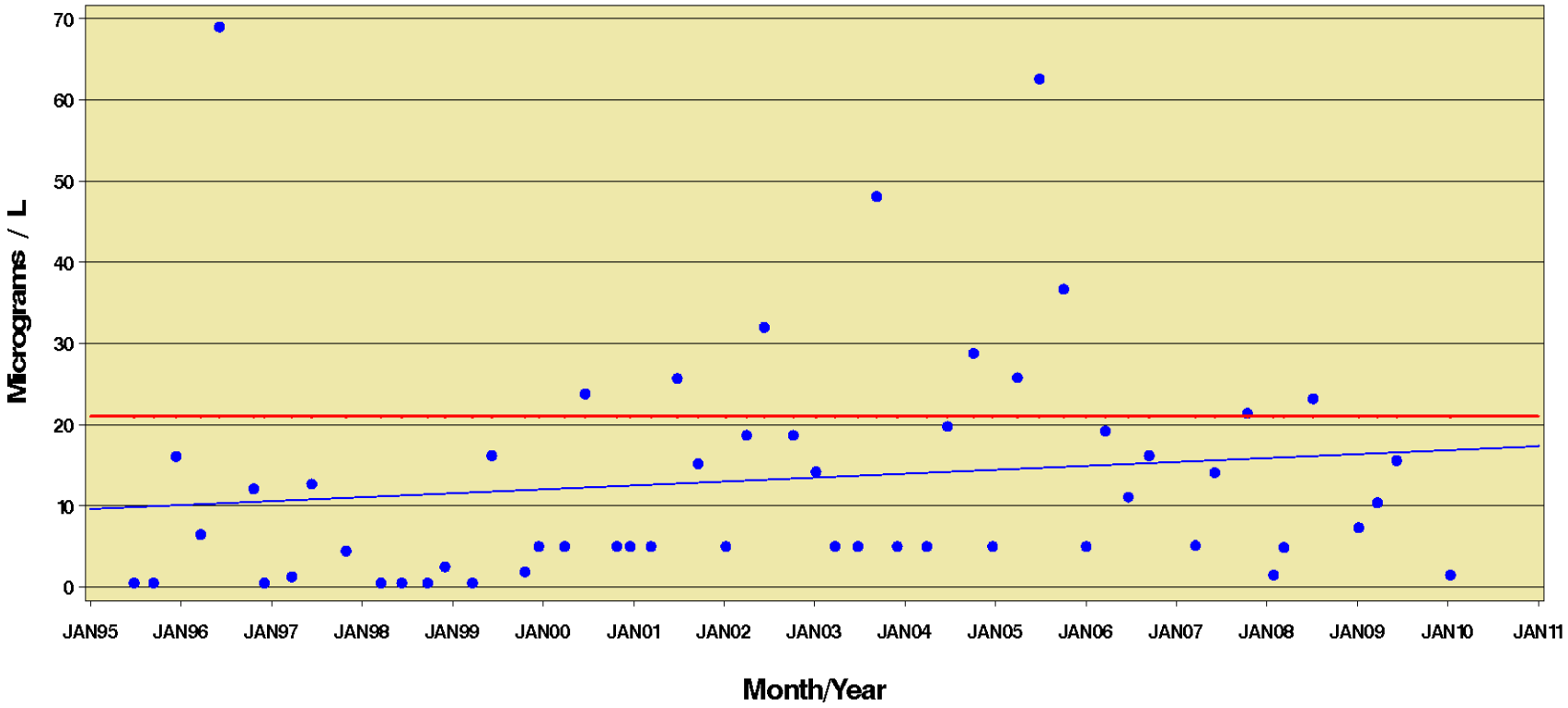
Red line indicates the applicable 2010 Water Quality Standard

Chocolate Bayou Tidal

Station: 11478 Segment: 1107 Parameter: Chlorophyll a

2010 Nutrient Screening Level: 21.0 Micrograms / L

Assessment Unit: 1107_01



Trends are considered significant if the p–value is < 0.10

Trend is significant at p= 0.0060 R–Square= 0.1337 T–Value= 2.8600 Number of Samples= 55

The blue regression line applies to the plot of actual values ; regression statistics are derived from regression of log–transformed data

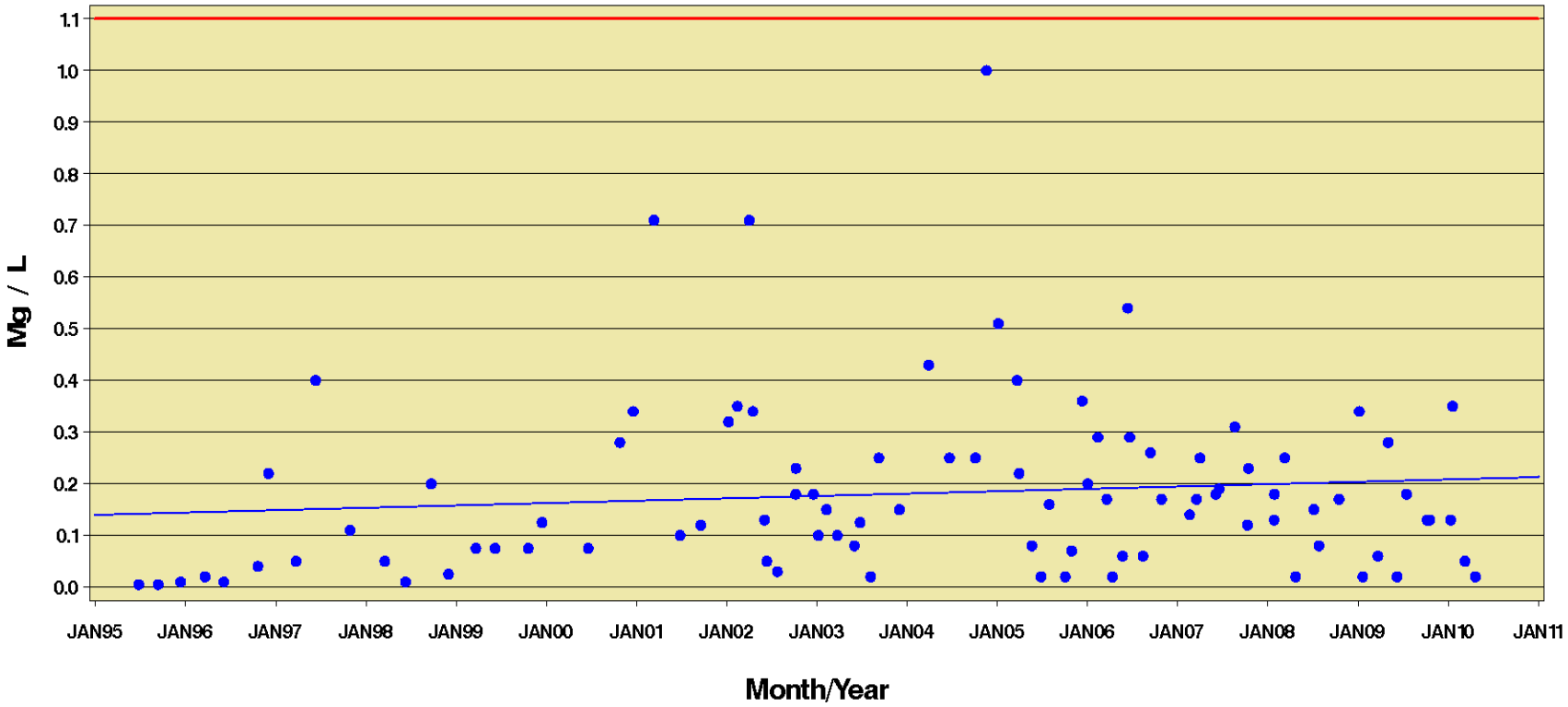
Red line indicates the applicable 2010 Nutrient Screening Level

Chocolate Bayou Tidal

Station: 11478 Segment: 1107 Parameter: Nitrate–N

2010 Nutrient Screening Level: 1.10 Mg / L

Assessment Unit: 1107_01



Trends are considered significant if the p–value is < 0.10

Trend is significant at p = 0.0048 R–Square= 0.0852 T–Value= 2.8950 Number of Samples= 92

The blue regression line applies to the plot of actual values ; regression statistics are derived from regression of log–transformed data

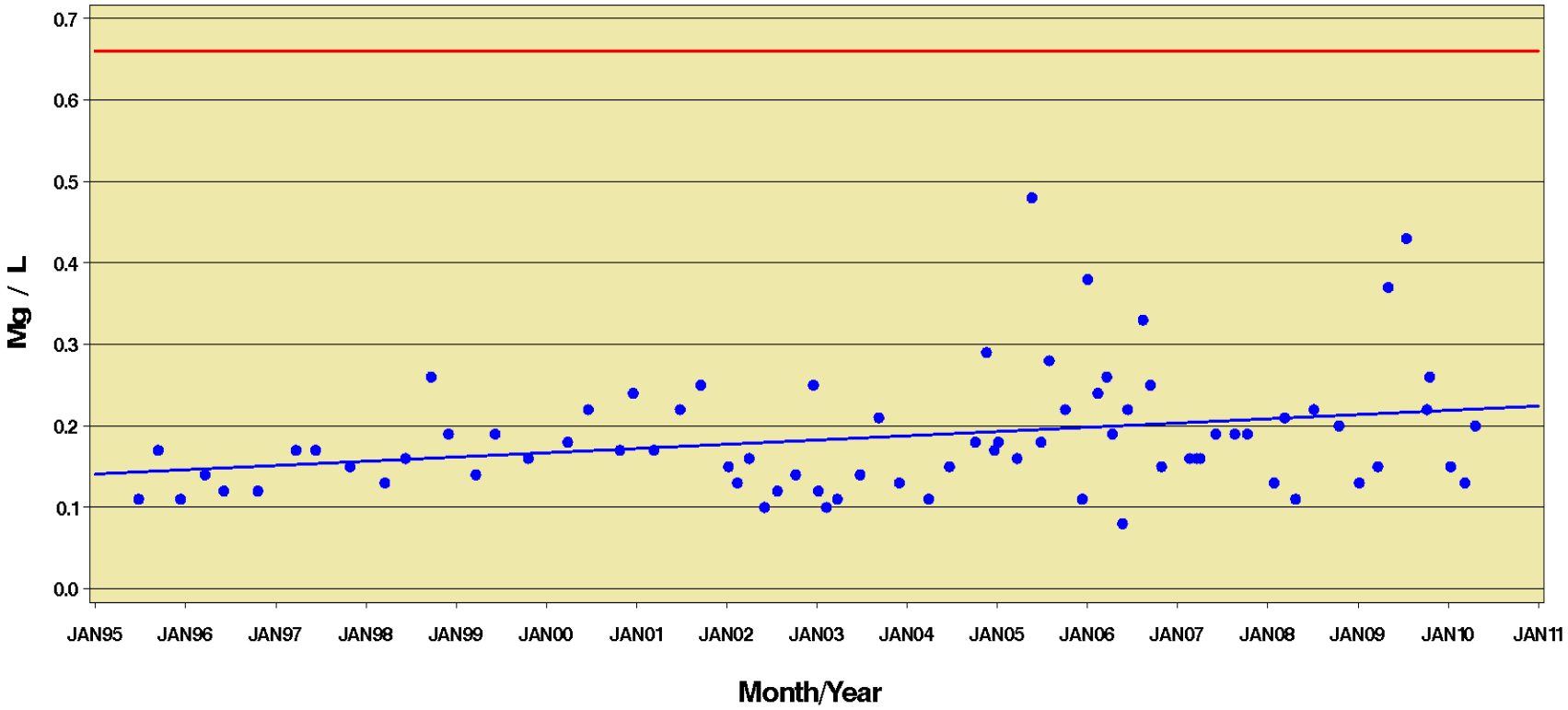
Red line indicates the applicable 2010 Nutrient Screening Level

Chocolate Bayou Tidal

Station: 11478 Segment: 1107 Parameter: Total Phosphorus

2010 Nutrient Screening Level: 0.66 Mg / L

Assessment Unit: 1107_01



Trends are considered significant if the p−value is < 0.10

Trend is significant at p= 0.0118 R−Square= 0.0816 T−Value= 2.5820 Number of Samples= 77

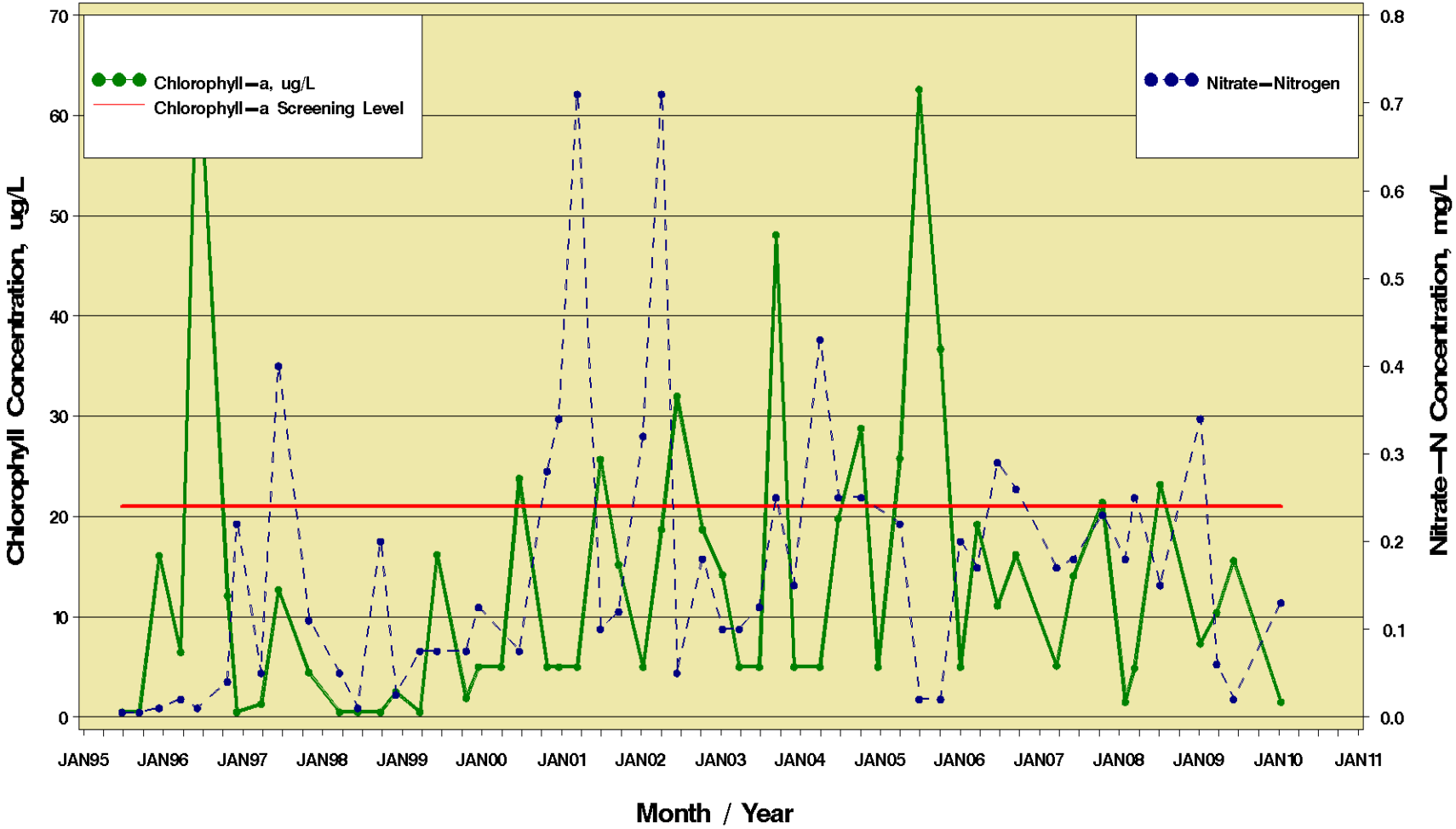
The blue regression line applies to the plot of actual values ; regression statistics are derived from regression of log−transformed data

Red line indicates the applicable 2010 Nutrient Screening Level

Chlorophyll—a and Nitrate—Nitrogen Trends

Segment: 1107 Watershed: Chocolate Bayou Tidal

Station: 11478 Assessment Unit: 1107_01



Chlorophyll—a and Total Phosphorus Concentrations

Segment: 1107 Watershed: Chocolate Bayou Tidal

Station: 11478 Assessment Unit: 1107_01