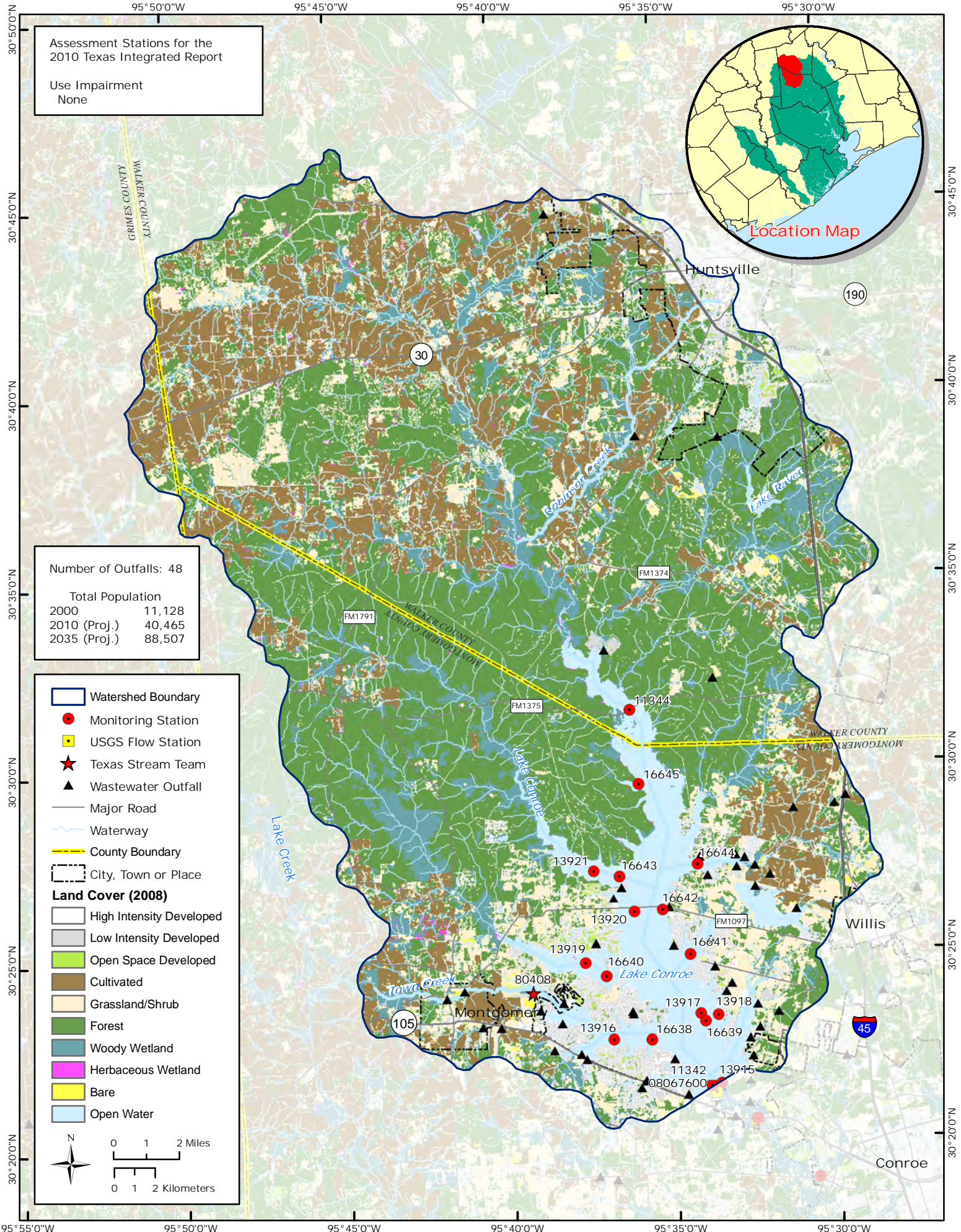


# LAKE CONROE - SEGMENT 1012





<b>Segment Number:</b>	<b>1012</b>	<b>Name:</b>	<b>Lake Conroe</b>			
<b>Length:</b>	52 miles	<b>Watershed Area:</b>	456 square miles	<b>Designated Uses:</b>	High Aquatic Life Use; Contact Recreation; Public Water Supply	
<b>Number of Active Monitoring Stations:</b>	19	<b>Texas Stream Team Monitors:</b>	2	<b>Permitted Outfalls:</b>	56	
<b>Description:</b>	From Conroe Dam in Montgomery County up to the normal pool elevation of 201 feet (impounds West Fork San Jacinto River)					

Degree of Impairment and Overall Trends						
Segment ID	Dissolved Oxygen	Bacteria	Nutrients	PCBs/Dioxin	Chlorophyll <i>a</i>	Other
1012					25	

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
11342	Lake Conroe at Dam	Monthly	SJRA	Field, Conventional, Bacteria, Chlorophyll- <i>a</i> (Qrtrly)
11344	Lake Conroe at FM 1375	Monthly	SJRA	Field, Conventional, Bacteria, Chlorophyll- <i>a</i> (Qrtrly)
13914	Lake Conroe USGS Site AC	Three Times/ Year	USGS	Field, Conventional
13915	Lake Conroe USGS Site AL	Three Times/ Year	USGS	Field
13916	Lake Conroe USGS Site BC	Three Times/ Year	USGS	Field
13917	Lake Conroe USGS Site CC	Three Time/ Year	USGS	Field
13918	Lake Conroe USGS Site CL	Three Times/ Year	USGS	Field
13919	Lake Conroe USGS Site DC	Three Times/ Year	USGS	Field
13920	Lake Conroe USGS Site EC	Three Times/ Year	USGS	Field, Conventional
13921	Lake Conroe USGS Site FC	Three Times/ Year	USGS	Field, Conventional
13922	Lake Conroe USGS Site GC	Three Times/ Year	USGS	Field, Conventional
16638	Lake Conroe at April Point	Monthly	SJRA	Field, Conventional, Bacteria, Chlorophyll- <i>a</i> (Qrtrly)
16639	Lake Conroe South End East Side	Monthly	SJRA	Field, Conventional, Bacteria, Chlorophyll- <i>a</i> (Qrtrly)
16640	Lake Conroe at Bentwater	Monthly	SJRA	Field, Conventional, Bacteria, Chlorophyll- <i>a</i> (Qrtrly)
16641	Lake Conroe at Aquarius Point	Monthly	SJRA	Field, Conventional, Bacteria, Chlorophyll- <i>a</i> (Qrtrly)
16642	Lake Conroe at Lake Midpoint	Monthly	SJRA	Field, Conventional, Bacteria, Chlorophyll- <i>a</i> (Qrtrly)
16643	Lake Conroe at Hunters Point	Monthly	SJRA	Field, Conventional, Bacteria, Chlorophyll- <i>a</i> (Qrtrly)
16644	Lake Conroe at Paradise Point	Monthly	SJRA	Field, Conventional, Bacteria, Chlorophyll- <i>a</i> (Qrtrly)
16645	Lake Conroe at Sandy Branch	Monthly	SJRA	Field, Conventional, Bacteria, Chlorophyll- <i>a</i> (Qrtrly)

Segment 1012			
<b>Standards</b>		<b>Screening Levels</b>	
Temperature (°C):	32	Ammonia (mg/L):	0.11
Dissolved Oxygen (24-Hr Average) (mg/L):	5.0	Nitrate-N (mg/L):	0.37
Dissolved Oxygen (Absolute Minima) (mg/L):	3.0	Orthophosphate Phosphorus (mg/L):	0.05
pH (standard units):	6.5-9.0	Total Phosphorus (mg/L):	0.20
<i>E. coli</i> (MPN/100 mL) (grab):	394	Chlorophyll- <i>a</i> (µg/L):	26.7
<i>E. coli</i> (MPN/100 mL) (geometric mean):	126		
Chloride (mg/L as Cl):	50		
Sulfate (mg/L as SO <sub>4</sub> ):	50		
Total Dissolved Solids (mg/L):	300		

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 Chlorophyll <i>a</i> Concentrations	C	C	1012_03, 1012_04, 1012_05	<ul style="list-style-type: none"> <li>- Fertilizer runoff from surrounding watershed promote algal growth in waterways</li> <li>- Nutrient loading from WWTPs effluent, sanitary sewer overflows, and malfunctioning OSSFs promote algal growth</li> </ul>	<ul style="list-style-type: none"> <li>- Improve storm water controls in new developments</li> <li>- Improve compliance and enforcement of existing storm water quality permits.</li> <li>- Support/continue/initiate public education regarding nutrients and consequences</li> <li>- Reduce or manage fertilizer runoff from agricultural areas</li> </ul>

**Segment Discussion**

**Watershed Characteristics:** This segment consists of the area draining to Lake Conroe and spans northern Montgomery County and Southern Walker County. Lake Conroe was formed by the damming of the West Fork of the San Jacinto River and occupies the most southerly portion of its watershed. The northern portion of the watershed contains large portions of Sam Houston National Forest, portions of the City of Huntsville, and Huntsville State Park. A significant portion of the watershed is undeveloped forest and grassland with limited but dense urban and suburban areas adjacent to Lake Conroe and the City of Huntsville. The upper third of the watershed contains large tracts of cultivated land. Development in the watershed has been rapid in the past decade, primarily in areas adjacent to existing urban centers.

**Water Quality Issues:** Water quality monitoring in the watershed is focused on Lake Conroe itself with few monitoring stations in the upper portion of the watershed. Existing data indicates good water quality with the exception of chlorophyll *a*. The 2008 Texas Integrated Report (IR) lists 6 of the 11 assessment units of segment 1012 for chlorophyll *a* concerns as compared to three assessment units in the *Draft* 2010 IR. The three AUs listed for concern in 2010 are among the six listed in 2008. Additional monitoring of the upper watershed may be necessary to adequately portray water quality throughout the watershed.

**Special Studies/Projects:** No special studies were conducted on this segment during the past five years. However, at the request of a few concerned citizens, the Clean Rivers Program added one sampling station near the confluence of a tributary and the lake to monitor the suspended solids flowing from the tributary. After two years, the station was dropped because there was no difference between the water quality data from the new location and than from what was collected out in the middle of the “finger” of the lake.

**Trends:** Regression analysis of watershed-level data revealed statistically significant trends for seven water quality parameters from 1995 through 2010. The annual medians of six parameters – alkalinity, chloride, DO, *E. coli*, specific conductance, and total hardness – are increasing over time while total phosphorus (TP) is showing a decline. It should be noted, however, that the TP decline is very slight – from 0.066mg/L to 0.030 mg/L. Bacterial density is not a concern in the lake at this time since the geometric means are very low. But in the past five years, a few individual results have exceeded the grab standard of 394 MPN/100 mL. One sample result was 1,700 MPN/100 mL which is unusually high.

Regression analysis on data from 17 individual monitoring stations revealed 90 significant trends. The most commonly identified trends were found in the parameters: chloride, specific conductance, total hardness, pH, alkalinity, and DO. All the trends for these parameters were increasing over time. All four orthophosphate phosphorus (OP) trends as well as eight of the nine trends found in TP were decreasing. The other parameter with multiple trends was *E. coli* bacteria where seven out of eight trends were increasing. In all cases, the sample results and geomeans are still within state standards and screening criteria. The concentrations of these parameters are just increasing over time. The most likely cause of these trends is the urban development around the lake. There are many subdivisions with water front property. Many subdivisions are on sanitary sewer but some are served by OSSFs. Within the lake is an island that is known as bird island. It is inhabited year round by gulls and egrets. This is probably a source for some of the bacteria being detected but not all.

**Recommendations:**

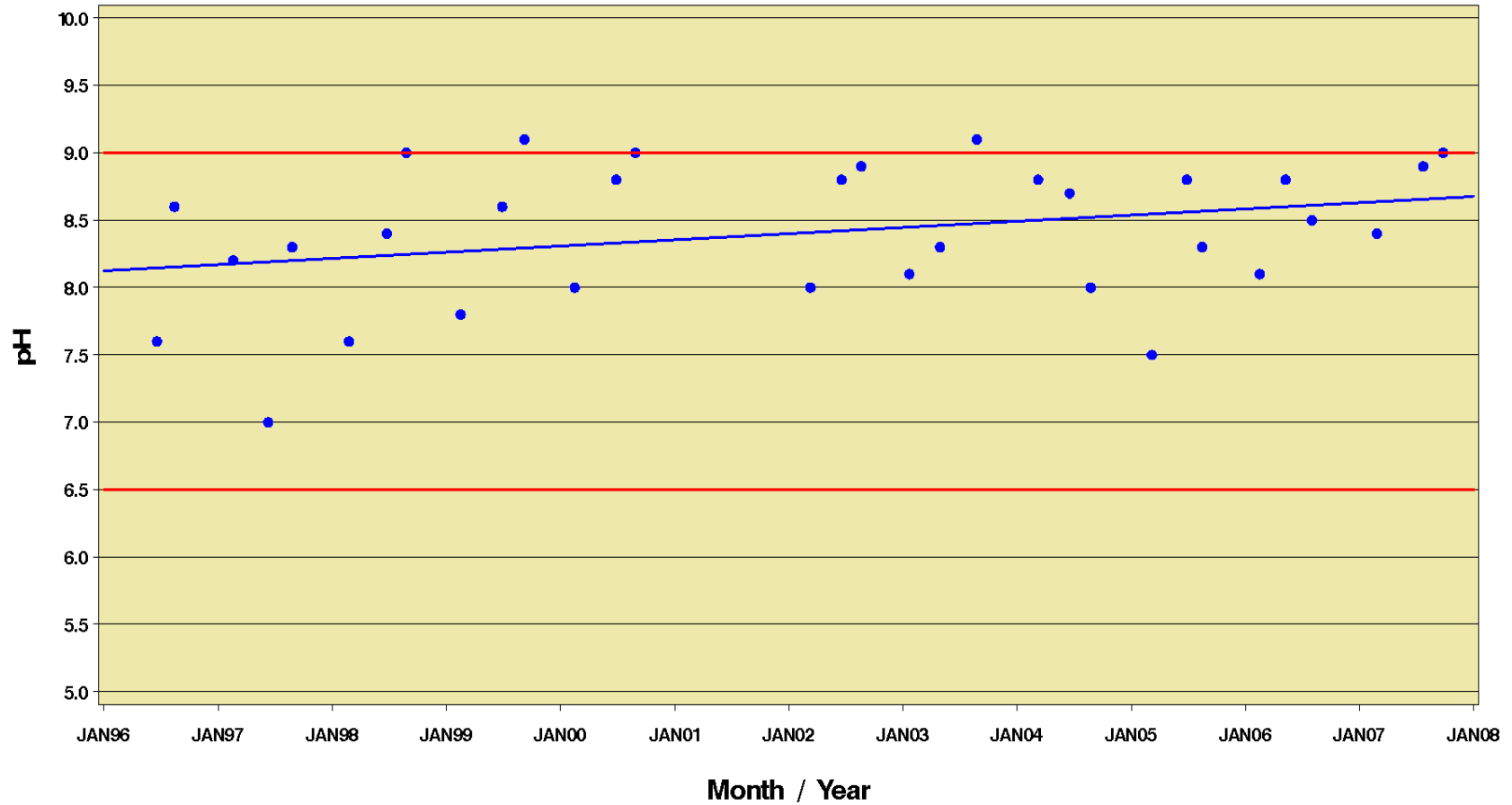
- Address the various concerns found in this segment summary through stakeholder participation.
- Continue collecting water quality data to support actions associated with watershed protection plan development and future modeling.
- Work with local partner and contract labs to lower detection limits for nutrients

## Lake Conroe

Station: 13918 Segment: 1012 Parameter: pH

Assessment Unit: 1012\_11

2010 Water Quality Standard: 6.5 – 9.0



Trends are considered significant if the p-value is  $< 0.10$

Trend is significant at  $p = 0.0791$  R-Square = 0.0992 T-Value = 1.8180 Number of samples: 32

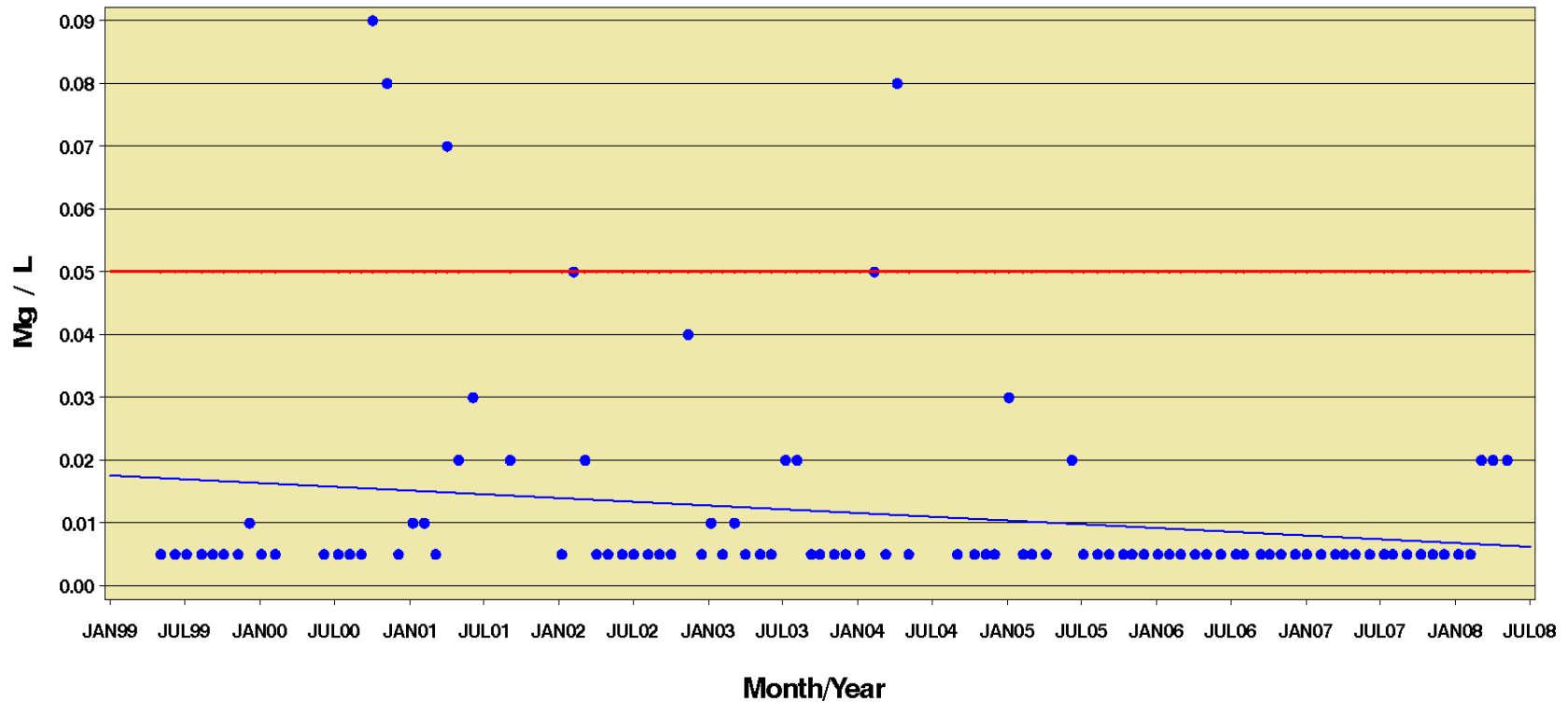
The blue regression line applies to the plot of actual values ; regression statistics are derived from regression of log-transformed data

Red lines indicate the 2010 Water Quality Standard



## Lake Conroe

Station: 16645 Segment: 1012 Parameter: Orthophosphate—P  
2010 Nutrient Screening Level: 0.05 Mg / L  
Assessment Unit: 1012\_02



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

Trend is significant at p=0.0909 R-Square= 0.0298 T-Value= -17080 Number of Samples= 97

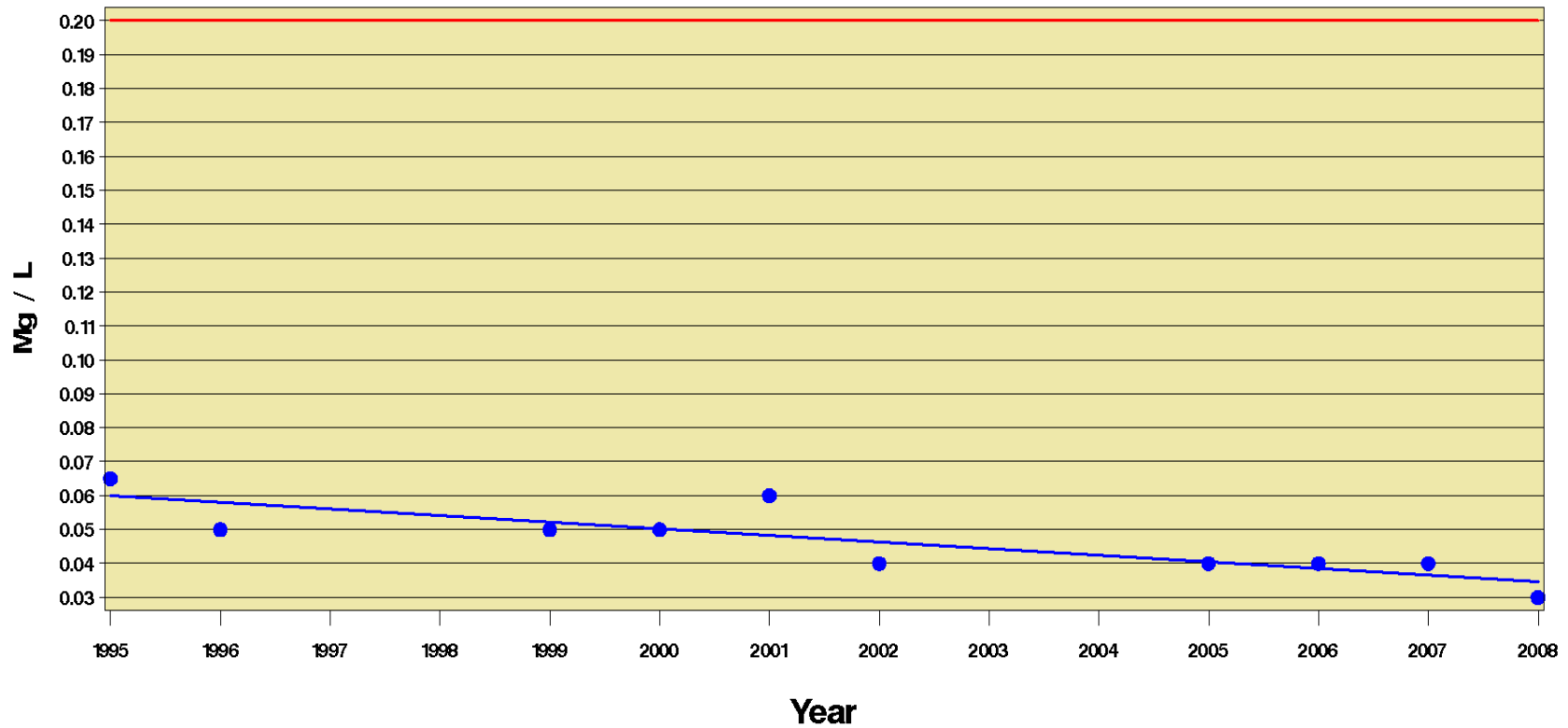
The blue regression line applies to the plot of actual values ; regression statistics are derived from regression of log-transformed data

Red line indicates the applicable 2010 Nutrient Screening Level

The regression analysis used to identify this water quality trend includes data submitted by the City of Houston Water Quality Control Laboratory for the period 2007 through 2009 that TCEQ has determined to be unsuitable for the Texas Integrated Report and other decision making purposes. The results are included here for illustrative purposes.

## Lake Conroe

Segment: 1012    Parameter: Total Phosphorus Annual Median  
Water Body Type: Classified Reservoir  
2010 Nutrient Screening Level : 0.20 Mg / L



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

Trend is significant at p= 0.0028    R-Square = 0.6934    T-Value = -4.253    Number of samples: 664

If present, the dashed red line indicates the 2010 Nutrient Screening Level

The regression analysis used to identify this water quality trend includes data submitted by the City of Houston Water Quality Control Laboratory for the period 2007 through 2009 that TCEQ has determined to be unsuitable for the Texas Integrated Report and other decision making purposes. The results are included here for illustrative purposes.