Leon County Lakes Ecology

Lake Talquin

Coes Landing, 2002

McGlynn Labs Inc.

4.2: **Lake Talquin**

Surface Area: 8856 acres or 3,584 hectare (FDEP, 1987)
Drainage basin: 5957 km2
Classification: Eutrophic
Location: Tallahassee Hills/Gulf Coastal Lowlands
Number of Stations: 4
Duration of Monitoring: 05/92-09/04
Discharge (at dam): 45.7 m3/sec

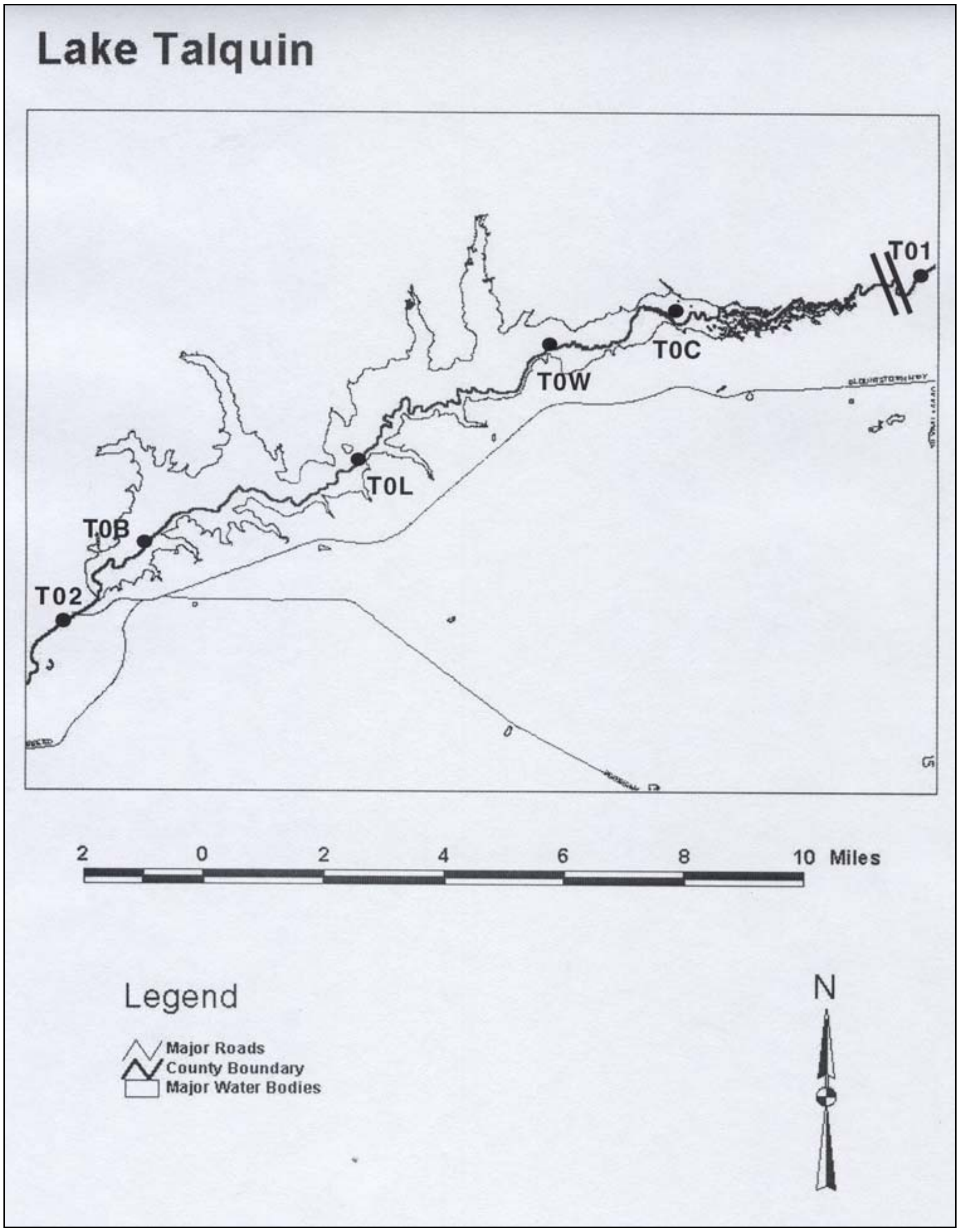


Figure 4.2.1: station map of Lake Talquin

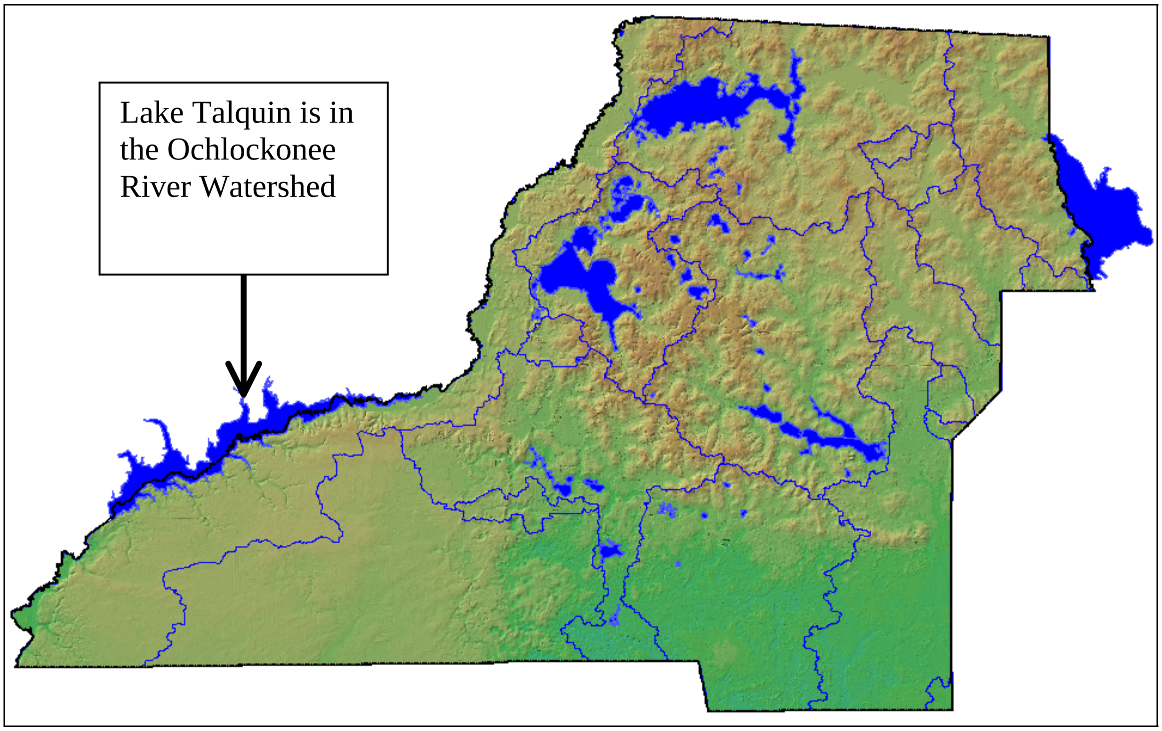


Figure 4.2.2: Map by Greg Mauldin, Tallahassee-Leon County GIS

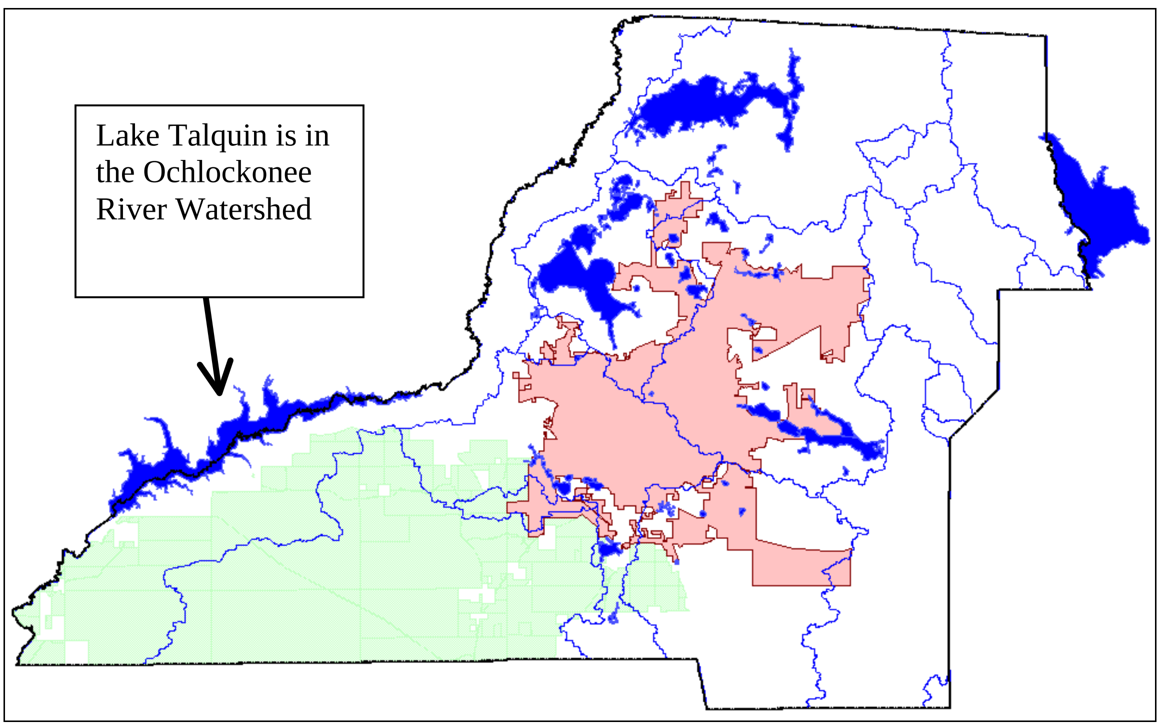


Figure 4.2.3: Map by Greg Mauldin, Tallahassee-Leon County GIS

Lake Talquin was created when the Jackson Bluffs Hydroelectric Dam was built across the Ochlockonee River (1928-1929). Lake Talquin's water quality is dependant on the water quality of the Ochlockonee River coming from Georgia.

Lake Talquin was added to the Leon County Lakes Ecology Program in October 1999 at the request of Leon County Commissioner Jane Saul. Four stations are monitored monthly within the Lake.

Lake Talquin has a surface area of 8850 acres; it is the largest single water body in Leon County. It is well known to bass fisherman as a fine place to float a boat or wet a hook. Lake Talquin is a prime location for recreational fishing. The lake is 15 miles long and up to a mile wide (FDEP, 1998). The headwaters originate in Worth County, Georgia and a majority of the flow originates in Georgia. The Ochlockonee River is 257 km long and flows through 3 physiographic regions, the Tifton Uplands in Georgia (77 km), and the Tallahassee Hills and the Gulf Coastal Lowlands in Florida (180 km). Lake Talquin is stressed by low quality water flowing into it from the Ochlockonee River.

Figure 4.2.4: On the shore of Lake Talquin

Figure 4.2.5: The Jackson Bluffs Hydroelectric Dam forms Lake Talquin by impounding the waters of the Ochlockonee River

As an ‘Outstanding Florida Waterbody’ we need to make sure Lake Talquin’s has good water quality. Leon County has taken the lead in protecting the water quality and quantity of water flowing into Leon County from Georgia within the Ochlockonee River. The waters of the Ochlockonee River flowing out of Georgia are in violation of Florida Class III Recreational Water Quality Standards.

Background Data

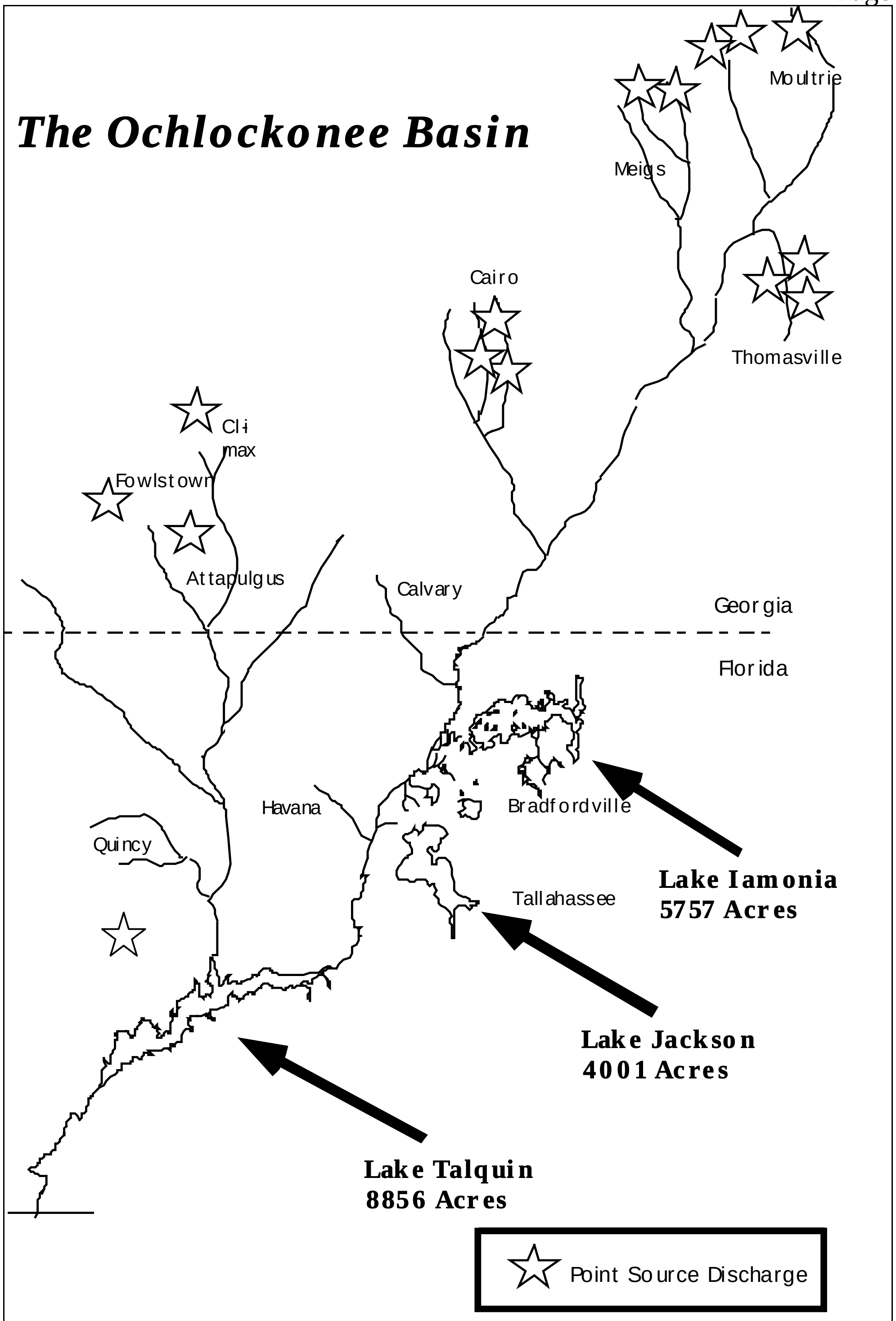
In this section we will discuss results regarding Lake Talquin. The poor quality water it receives from the Ochlockonee River stresses Lake Talquin. Water quality improves as the water passes through Lake Talquin. Lake Talquin is rather effective at removing nutrients. The nutrients removed within Lake Talquin are transformed and cause the growth of algae and aquatic plants.

Non-point pollution is a significant problem in Lake Talquin. Environmental consequences involve, "increased loads of organic matter and nutrients, depressed oxygen levels and elevated bacterial populations (FDEP, 1987).” Numerous mining operations can elevate turbidity and nutrient values (FDEP, 1987).” Intensive agriculture in the Ochlockonee Basin within Georgia may be the greatest problem (FDEP, 1987).”

Point source pollution is also a significant problem for Lake Talquin (Figure 4.1.5A). There is a lot of treated sewage discharged into the Ochlockonee River, mostly from Georgia. “Effluent constitutes most of the flow of the river at times of low water (FDEP, 1987).” The City of Doerun’s STP discharges into Mill Creek, which flows into the Ochlockonee. The City of Moultrie’s STP discharges directly into the Ochlockonee a little further to the south. The STP's of Meigs and Pelham discharge into the Ochlockonee. The City of Thomasville's STP discharges into Oquina Creek, which then flows into the Ochlockonee. The city of Cairo's STP discharges into Parkers Mill Creek and Little Tired Creek, which flow into the Ochlockonee. The City of Quincy (the only Florida source) discharges into Little River, which flows into the Ochlockonee.

Little River has multiple problems. It receives discharge from the Engelhard Corporation and wastewater discharges from the City of Quincy’s STP. The Engelhard Corporation is number twenty on EPA’s list of toxic waste discharger (by volume nationally). This company makes Kaolite, a catalyst used in the petroleum industry. Engelhard is more like a paper mill that Floridan and its effluent is often in excess of 40 mg/L nitrate (FDEP). According to monitoring reports their effluent also contains high concentrations of heavy metals (vanadium). Engelhard is required by its Georgia permit to run quarterly toxicity tests on its effluent but it is not required to pass them, which it rarely accomplishes. EPA has found a two mile long dead zone from the discharge point on Attapulgus Creek to the Florida border. Engelhard’s waste flows from Attapulgus Creek to Little River and then into Lake Talquin.

The major tributaries of the Ochlockonee that flow into Lake Talquin: Rocky Comfort Creek; Ocklawaha Creek and Bear Creek do not appear to have negative environmental impacts on Lake Talquin (FDEP, 1997).



The Ochlockonee River Basin, Point Source Discharges marked with Stars.

Figure 4.1.5A: Map of point source discharges to the Ochlockonee River

Figure 4.2.6: Goat Island, a popular destination for anglers. Near Lewis-Hall Landing, station T0L, central Lake Talquin.

Current Monitoring

Lake Talquin was definitely mesotrophic, on the high end, for the monitoring period 1992 through 2004. Early data was collected by FGS. Recent data trends seem to be improving with the TSI slipping below the eutrophic range. Trophic State Index, or TSI, The Trophic State Index, or TSI, is depicted in figures 4.2.7 – 4.2.10. All stations show similar trends with recent improvement possibly due to increasing rainfall, which flushes the lake. Lake Talquin is a flow through syatem, a dam on a river, so it woulkd not be expected to develop as high a TSI as a natural lake with similar nureint loading.

Nutrients, like inorganic nitrogen enter Lake Talquin with the waters of the Ochlockonee (station T01, figure 4.2.11). Then as the water flows south, through the Lake, the concentrations decrease. Nutrients are removed from the water column by plants and algae and cause growth and reproduction. Chlorophyll concentrations are low in the Ochlockonee River north of Lake Talquin. It is flowing and does not have the necessary time to grow algae. The Ochlockonee River slows as it enters Lake Talquin, chlorophyll concentrations increase as the algae take up the available nutrients from the river water. Chlorophyll levels measured in Lake Talquin were often very high and are a result of the

poor water quality. They indicate eutrophication due to nutrient enrichment (figure 4.2.12).
Another symptom of eutrophication is alternating low dissolved oxygen and supersaturation. Algae photosynthesize and produce oxygen. Decomposition processes in the sediments, where aerobic bacteria break down the algae and detritus, consume oxygen. Fish and other aquatic biota need oxygen to survive. Dissolved oxygen values low enough to cause stress and moralities in fish and benthic invertebrate populations were observed throughout the lake, particularly in the late summer months (figure 4.2.13). These fluctuations in DO are a sign of poor water quality. They can cause fish kills, especially when a series of cloudy days causes low light conditions and the aquatic plants and algae stop producing oxygen and begin to use it up.

Lake Talquin is a flow through system. It is an impoundment. Storms causing high flow events can cause a significant current in the lake. Turbidity, a measurement of the particulate matter in water, is shown from the Georgia border to the coast near the 98 Bridge in Ochlockonee Bay (figure 4.2.14). The data in depicts a winter storm in 2003. Water quality is worst in Georgia but improves as it passes through Florida. This shows that stormwater passes through Lake Talquin transporting turbid stormwater all the way the coast.

The LCL data from 1999 through 2004 were averaged (table 4.2.1) and depicted graphically (figures 4.2.15 – 4.2.17). The grouping of the parameters for graphical display was determined by their relative concentrations. The percent saturation of oxygen, dissolved oxygen, pH, chlorophyll, ammonia and organic nitrogen increases as the waters passes through Lake Talquin. Color and specific conductivity, turbidity, chloride, alkalinity, nitrate, ortho-phosphate, total phosphorus, total nitrogen and dissolved organic nitrogen decrease as the water passes through Lake Talquin. This follows classic the limnological model for nutrient uptake (decreasing TN, Nitrate, TIN, O-P and TP). Nutrient promoted growth (increasing chlorophyll and organic nitrogen). The effects of the growth of plants and algae, like dissolved oxygen fluctuations and increases in pH. Dilution and settling (decreasing turbidity, color, chlorides and alkalinity)

Water was coming from Georgia enters Lake Talquin and leaves a trail of pollutants as it passes through the lake on its way to the coast. The levels of nutrients entering Lake Talquin make the maintenance of a fishery and an “Outstanding Florida Waterbody” difficult.

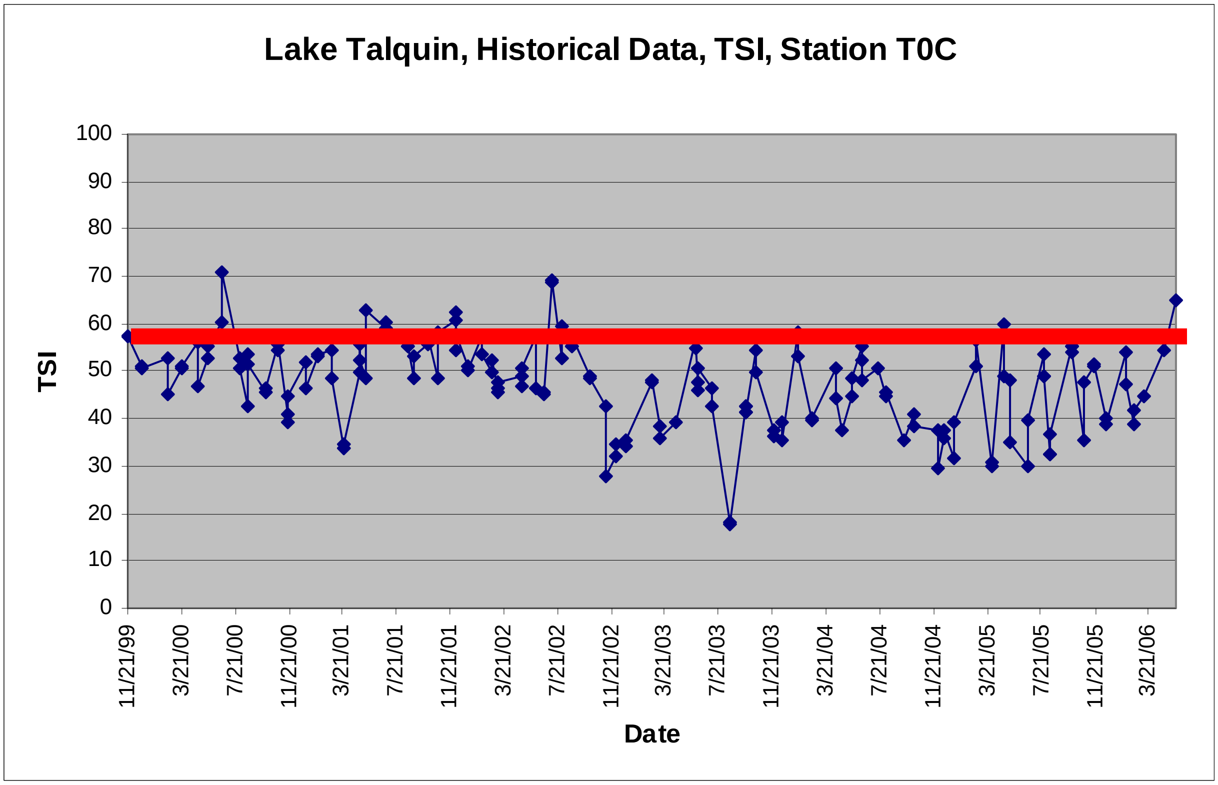


Figure 4.2.7: Lake Talquin,Station T0C (Near Coes Landing)
Tannic lake,
According to FDEP criteria this lake would be impaired at TSIs greater than 60 units,
Data duration: 11/99-05/06,
Data source LCL Data (McGlynn Laboratories Inc), data prior to 1995 from GFC.

*** Result: not potentially impaired and possibly getting worse.**

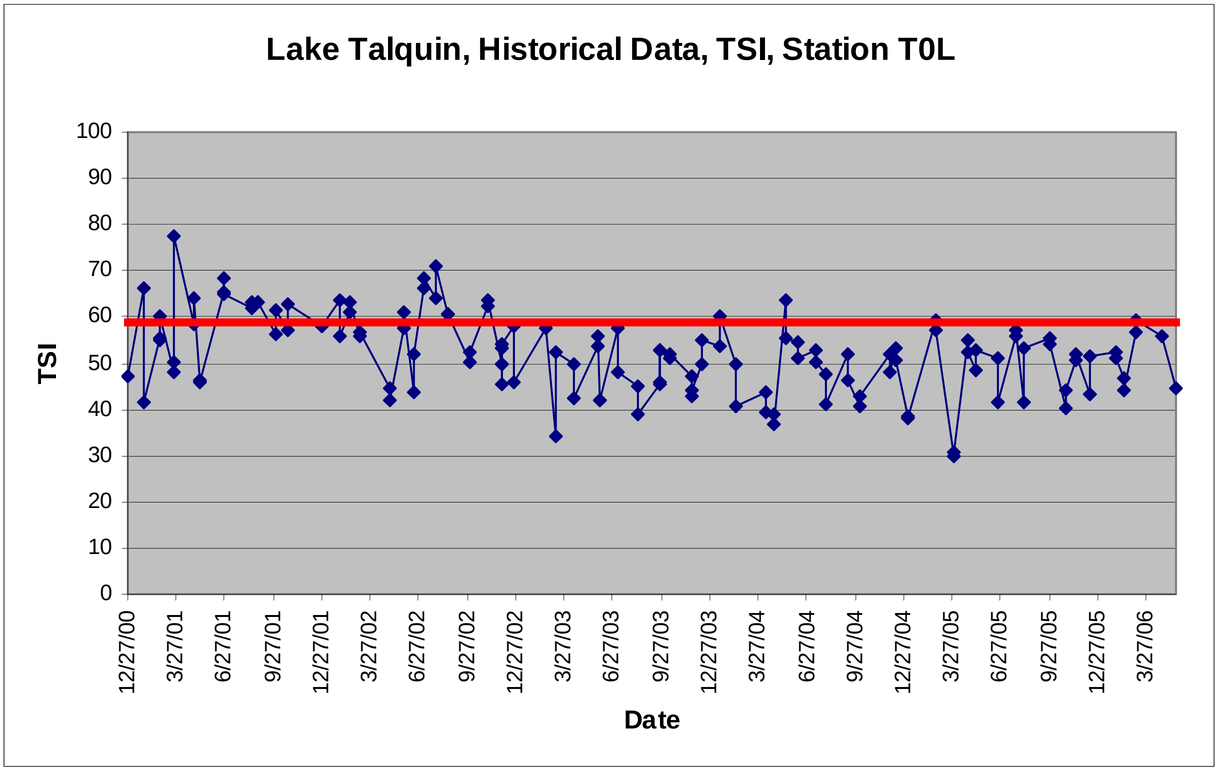


Figure 4.2.8: Lake Talquin, Station T0L (Near Lewis Hall Landing)
Tannic lake,
According to FDEP criteria this lake would be impaired at TSIs greater than 60 units,
Data duration: 12/00-05/06,
Data source LCL Data (McGlynn Laboratories Inc) , data prior to 1995 from GFC.

*** Result: not potentially impaired and seems rather stable.**

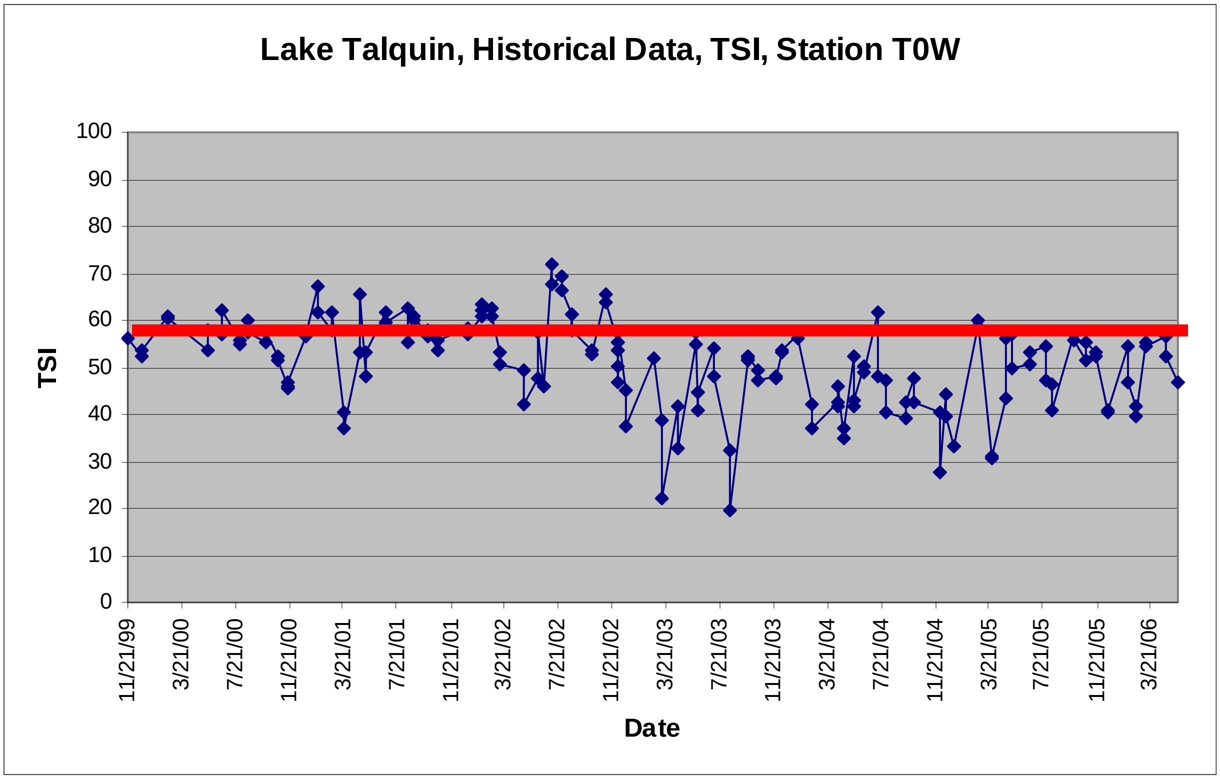


Figure 4.2.9: Lake Talquin, Station T0W (Near Williams Landing)
Tannic lake,
According to FDEP criteria this lake would be impaired at TSIs greater than 60 units,
Data duration: 11/99-05/06,
Data source LCL Data (McGlynn Laboratories Inc), data prior to 1995 from GFC.

*** Result: not potentially impaired and seems rather stable.**

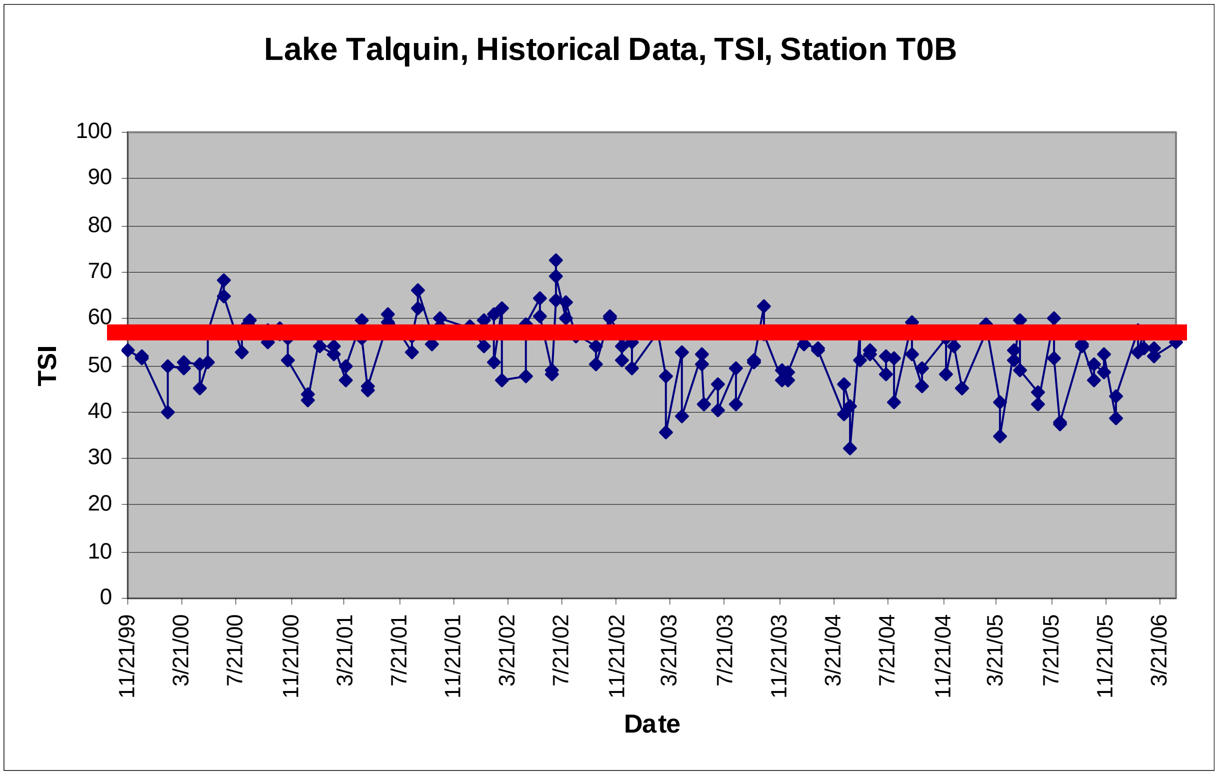


Figure 4.2.10: Lake Talquin, Station T0B (Just upstream from the Dam)
Tannic lake,
According to FDEP criteria this lake would be impaired at TSIs greater than 60 units,
Data duration: 11/99-05/06,
Data source LCL Data (McGlynn Laboratories Inc), data prior to 1995 from GFC.

*** Result: borderline potentially impaired and possibly getting worse.**

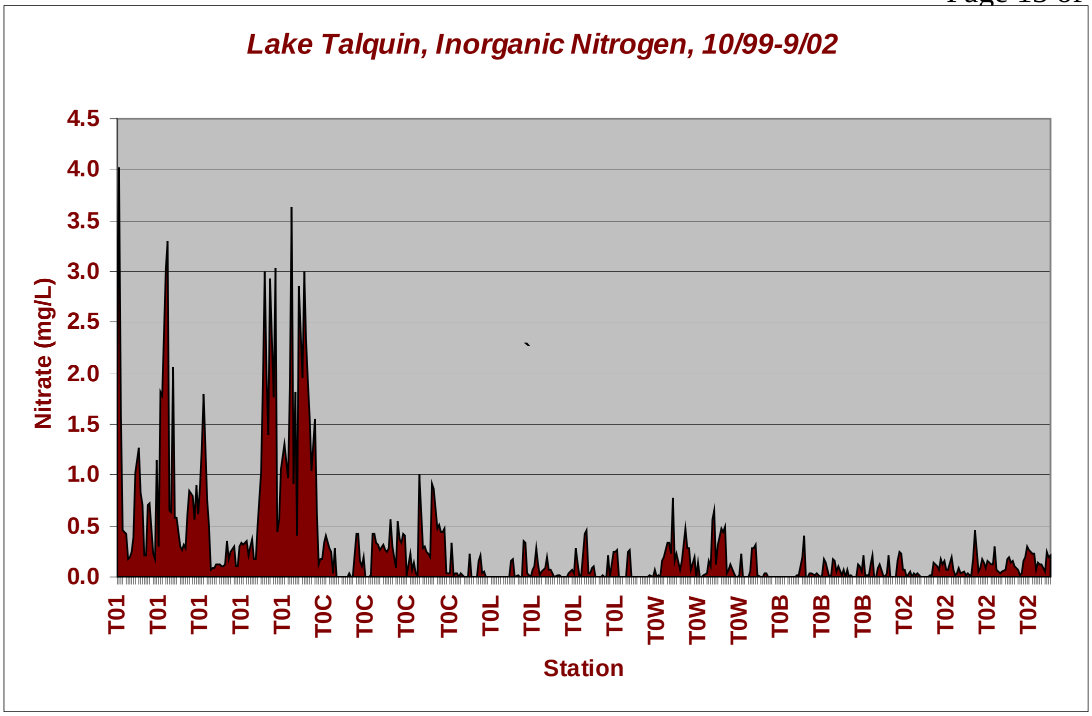


Figure 4.2.11: Nutrients, like inorganic nitrogen is absorbed in Lake Talquin causing aquatic macrophyte and algal growth

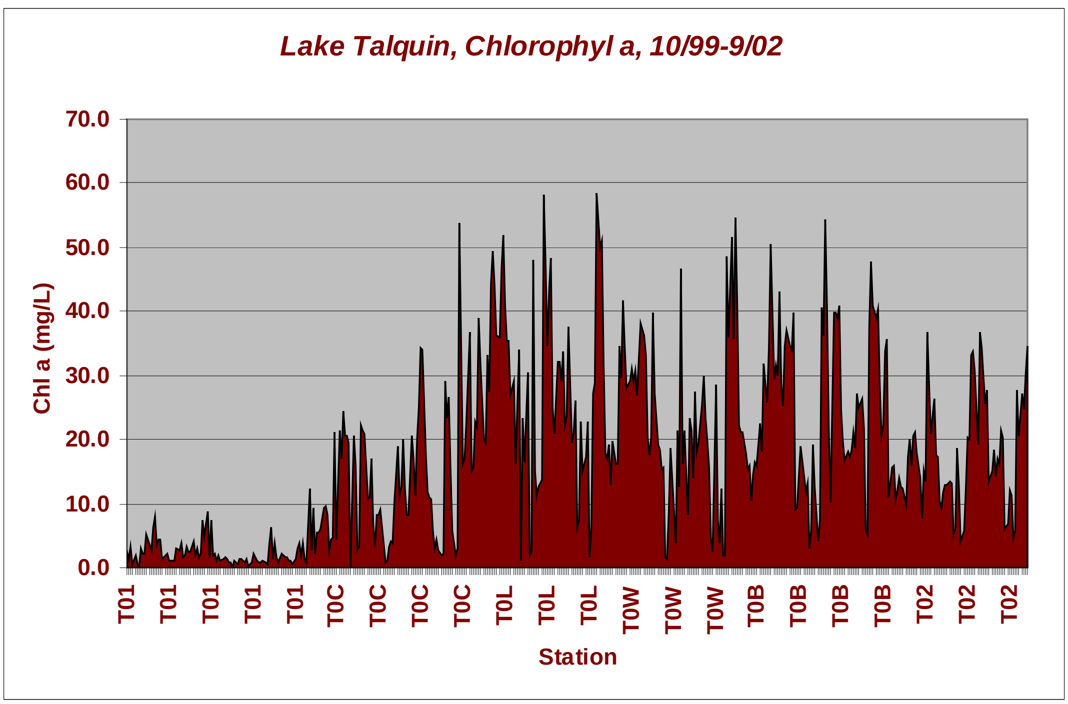


Figure 4.2.12: Algal growth in Lake Talquin is inversely related to the nutrient concentrations. Chlorophyll cocnetrations are proportional to algal densities. Algal densities peak in the center of Lake Talquin.

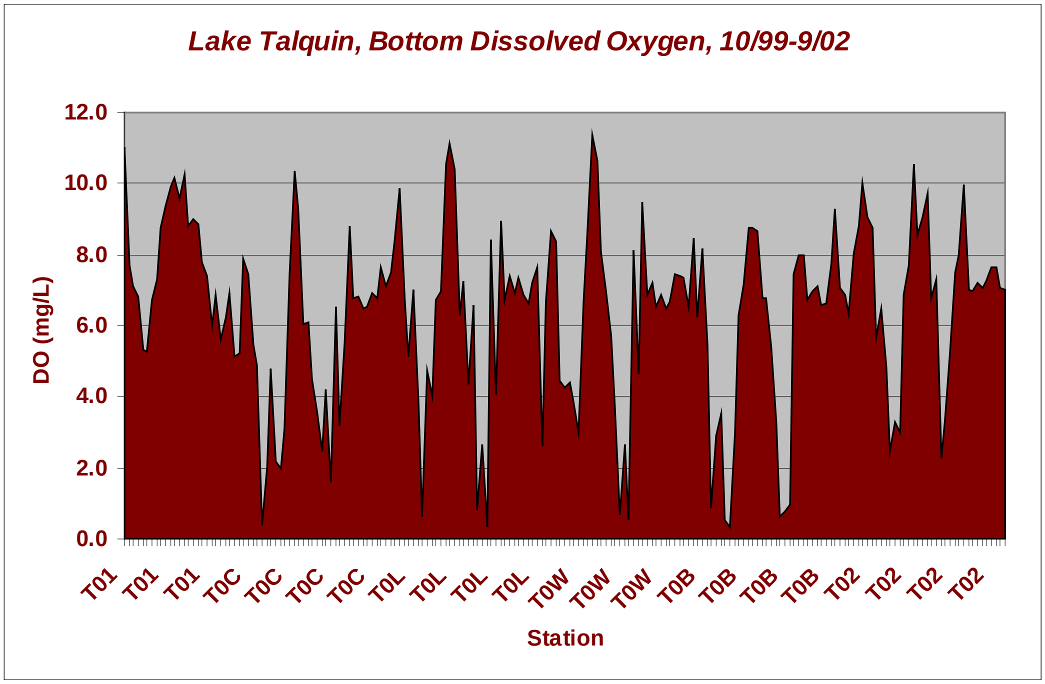


Figure 4.2.13: Lake Talquin has periods of low dissolved oxygen which are harmful to fish populations. Florida statute for Class III Fresh waters require waters not to be less than 5 mg/L DO. When algal populations die their decay can rob the water of oxygen.

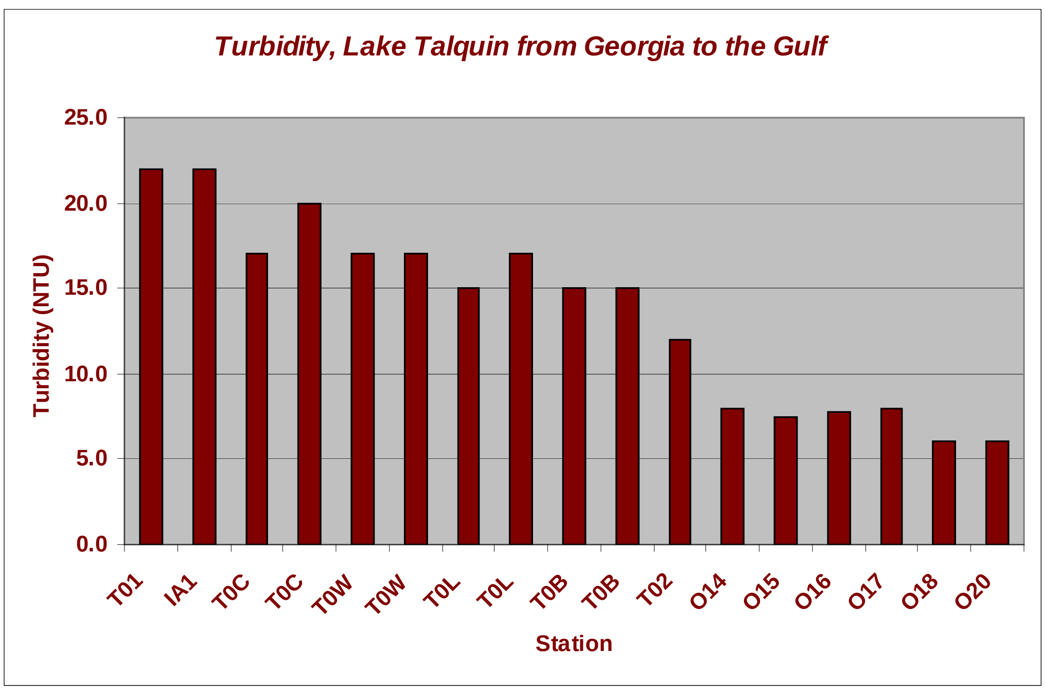


Figure 4.2.14: Turbidity and nutrients makes it all the way to the coast during a storm event at the left, station T01 is at the Georgia Border the other stations are arranged, going south, from left to right. Station O20 is located at the Highway 98 Bridge at Panacea Florida.

Table 4.2.1: Lake Talquin, average values of water quality parameters (1999-2004)

Averages	pH	SpCond	DO%	DO	chl a	Color	Nitrite
T0C	6.81	105.6	80.0	7.07	12.4	88.4	0.011
T0W	7.29	93.9	93.1	8.11	20.4	74.4	0.007
T0L	7.63	86.7	99.3	8.58	23.3	65.3	0.006
T0B	7.65	81.7	97.7	8.30	23.0	62.6	0.005
Averages	**Nitrate**	**Ortho-P**	**Turbidity**	**Alkalinity**	**Chloride**	**TSS**	**TDS**
T0C	0.179	0.036	7.5	20.3	16.9	5.9	149.8
T0W	0.125	0.022	7.0	18.5	15.0	7.6	126.8
T0L	0.097	0.015	5.7	17.2	13.7	5.7	149.5
T0B	0.066	0.013	4.4	16.0	12.6	4.5	159.7
Averages	**Ammonia**	**TKN**	**DIN**	**TON**	**TOP**	**TP**	**TN**
T0C	0.103	0.416	0.291	0.319	0.049	0.084	0.598
T0W	0.100	0.445	0.230	0.345	0.068	0.078	0.572
T0L	0.104	0.512	0.206	0.408	0.061	0.071	0.577
T0B	0.113	0.565	0.183	0.452	0.052	0.064	0.565

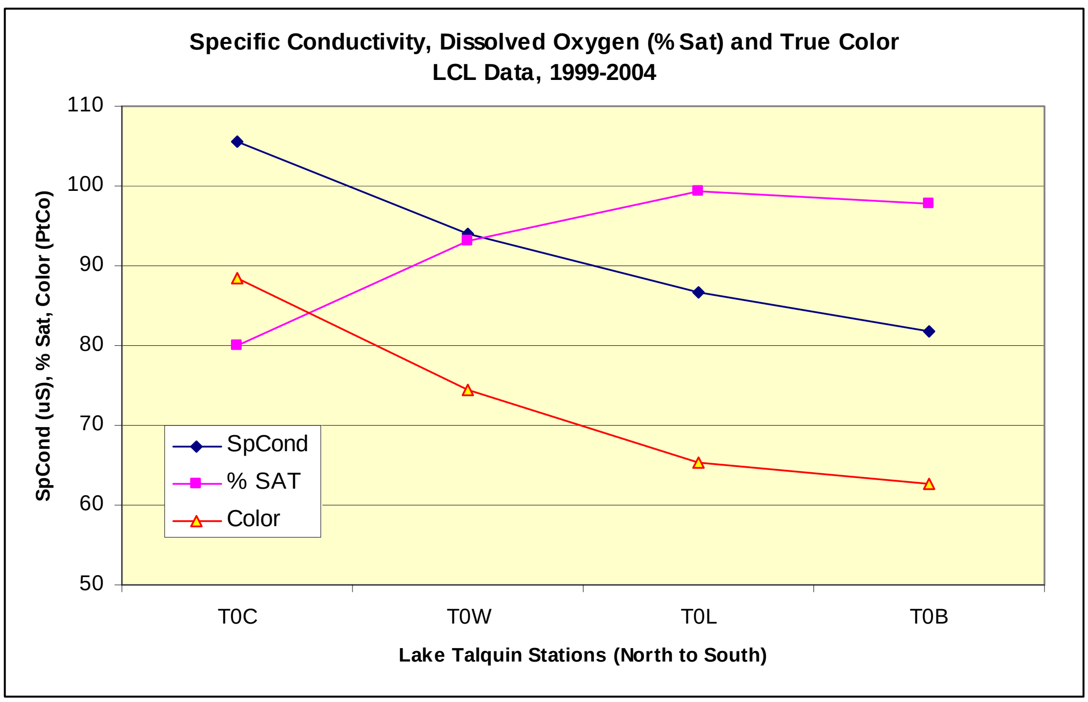


Figure 4.2.15: Selected water quality parameters. Lake Talquin stations arranged in the direction of flow from the Ochlockonee River, from left to right.

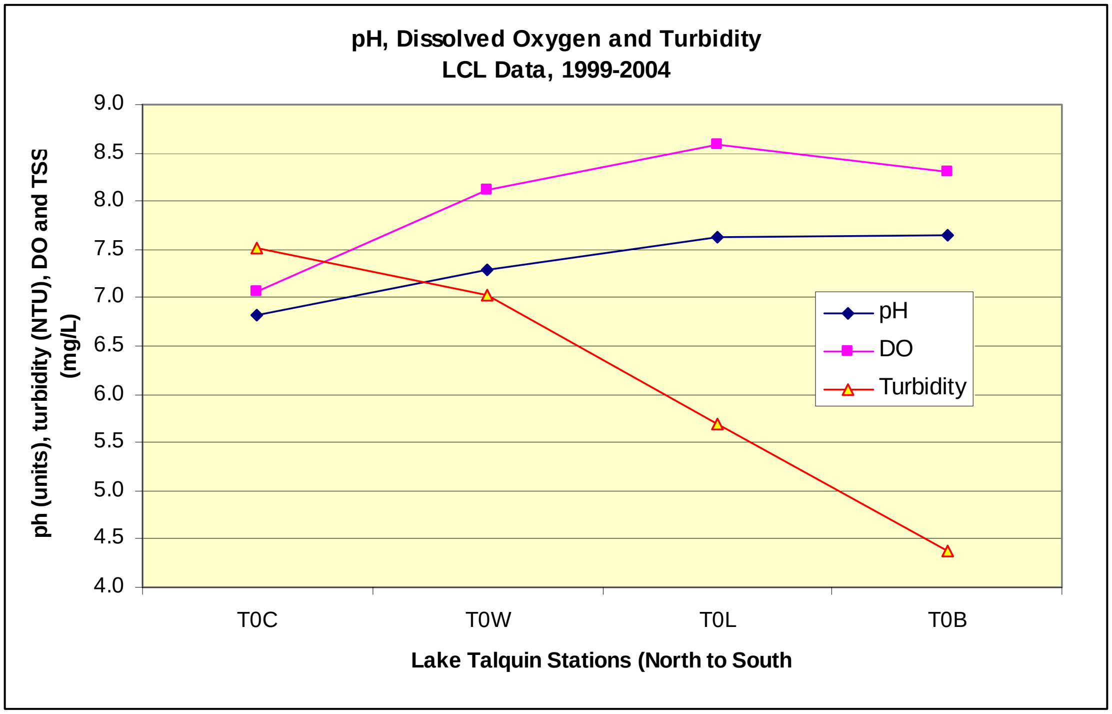


Figure 4.2.16: Selected water quality parameters. Lake Talquin stations arranged in the direction of flow from the Ochlockonee River, from left to right.

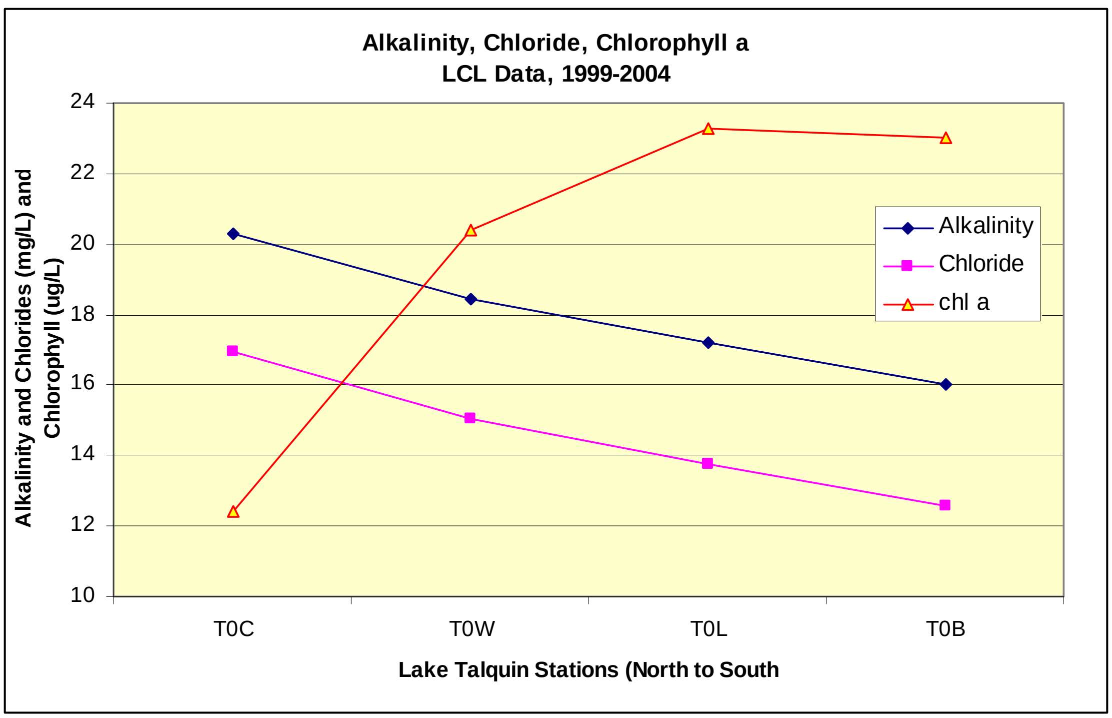


Figure 4.2.17: Selected water quality parameters (continued). Lake Talquin stations arranged in the direction of flow from the Ochlockonee River, from left to right.

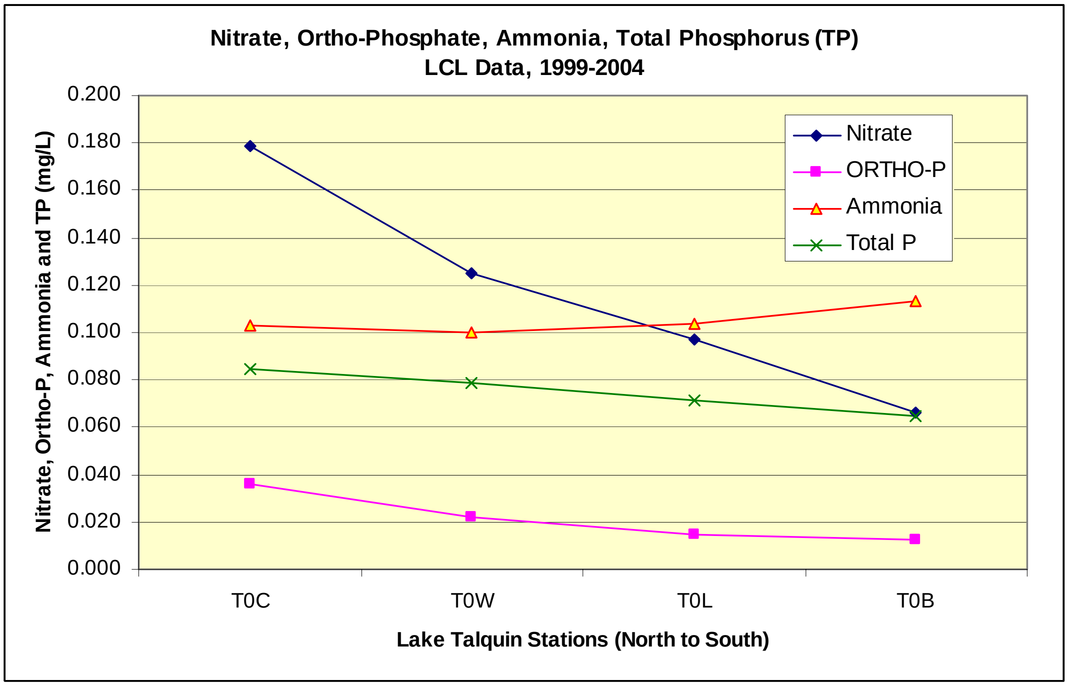


Figure 4.2.18: Selected water quality parameters (continued). Lake Talquin stations arranged in the direction of flow from the Ochlockonee River, from left to right.

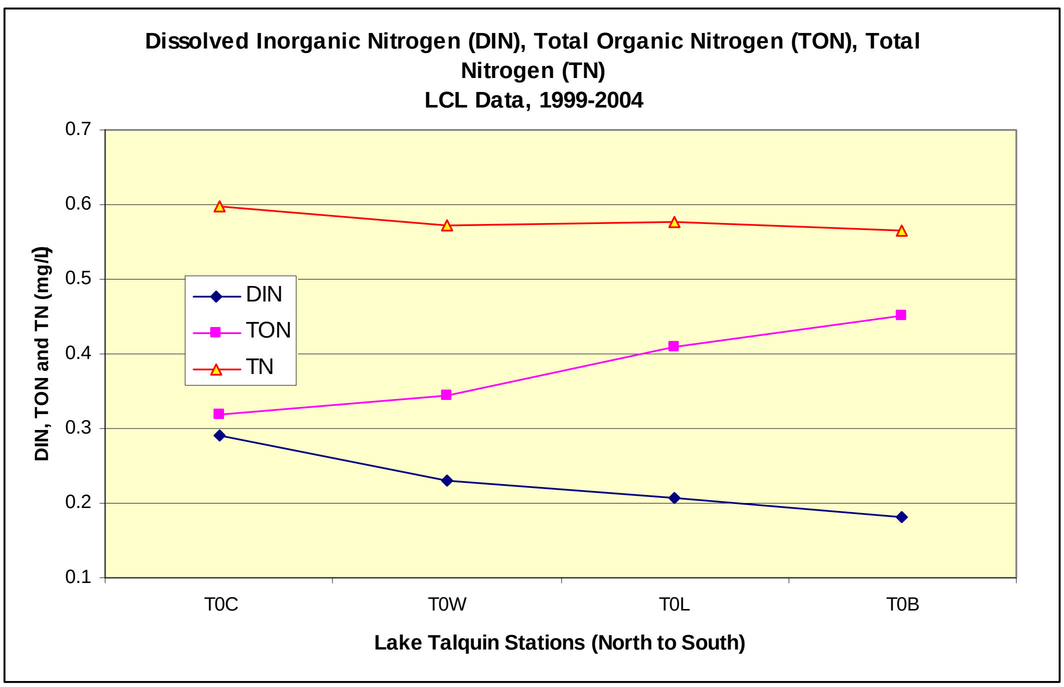


Figure 4.2.19: Selected water quality parameters (continued). Lake Talquin stations arranged in the direction of flow from the Ochlockonee River, from left to right.