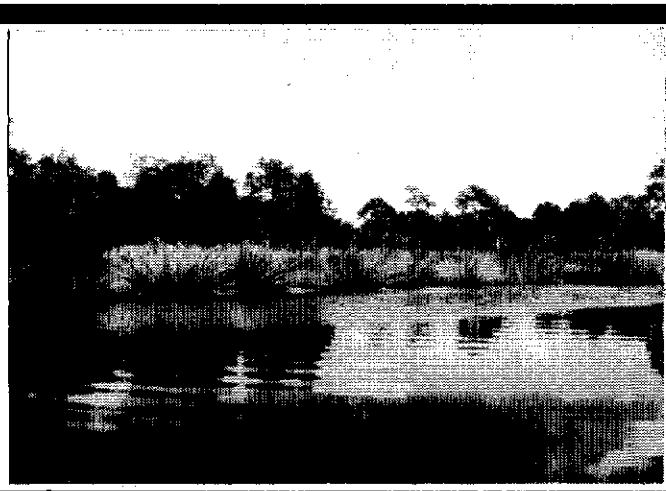
Typical Water Quality Values for Florida's Lakes, Streams and Estuaries



July 1989

Mark Friedemann and Joe Hand
Standards and Monitoring Section
Bureau of Surface Water Management

Acknowledgements

We would like to express our thanks to those individuals who took time to read this document and submit editorial comments, particularly Russ Frydenborg, Leslee Williams, Vicki Tauxe and Tom Swihart. We would also like to thank Wayne Magley for his comments and for providing the initial impetus for the project . We are also grateful to the Biology Section staff for the use of their laser printer and the time they spent helping out with some of the technical problems we encountered. Last, but certainly not least, we would like to thank Dean Jackman for the considerable effort involved in producing the summary chart of Florida Criteria for Water Quality Classifications.

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Introduction

Over the last twenty years, approximately five million water quality measurements have been taken in Florida waters. Information has been collected from all of Florida's major lakes, streams, and estuaries and the data have been placed in "STORET", EPA's water quality database. This document presents the range of typical values that have been sampled. Values are shown for the conventional water quality constituents including water temperature, nutrients, bacteria, oxygen, oxygen demanding substances, water clarity, pH, and biological diversity indices.

STORET contains data collected primarily by USGS and DER, but also contains data from local programs and water management districts. Water quality data were inventoried for approximately 1700 estuary stations, 1000 lake sites, and 2700 stream stations during the 1970 to 1987 time period. Station median water quality values were determined for 23 water quality constituents (Tables 1 and 2 in appendix A list the STORET parameter codes and the Florida criteria for all constituents). Station median values were determined by first calculating an annual median value at each site for each year of data and then by determining the station median from all the annual median values at each site (Fig.1). The reason for using this technique is to reduce the problem of outlier values, plus to use as many sites as possible to maximize the spatial coverage of sites.

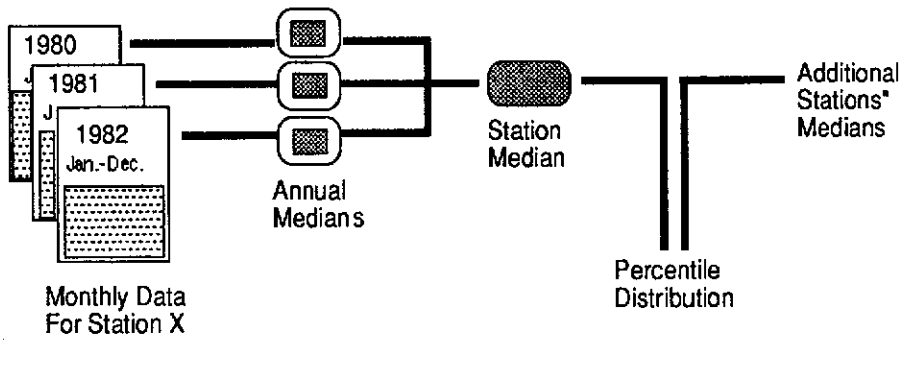
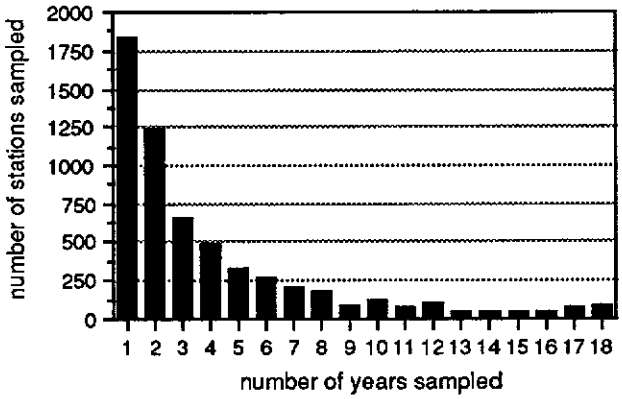


Figure 1

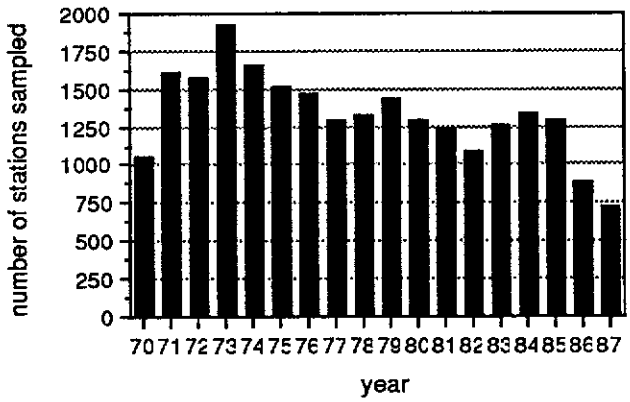
A percentile distribution was then created from the station medians and values were determined for the 5th percentile, 10th percentile, 20th percentile, etc. The fiftieth percentile represents the median station value of all the stations in Florida. No limitations were applied to a station's data before it could be included in the distribution (such as a minimum period of record or minimum parameter coverage). However, the station had to be assigned to one of Florida's 1322 water body "REACHES" before it was included. This eliminated stations which were not ambient sites (e.g., effluent samples), or stations which were located in hydrologically remote areas.

Figure 2



Most of the STORET stations have only one or two years period of record. Figure 2 shows that 1838 stations had 1 years worth of data, but only 100 stations had a period of record of 18 years. Also, there is a trend towards less data collection in recent years as shown by Figure 3. Almost 2000 stations were sampled in 1973 as compared to 800 in 1986. This means that the distribution of typical values shown in this report is slightly more oriented toward 1970's data than 1980's data.

Figure 3



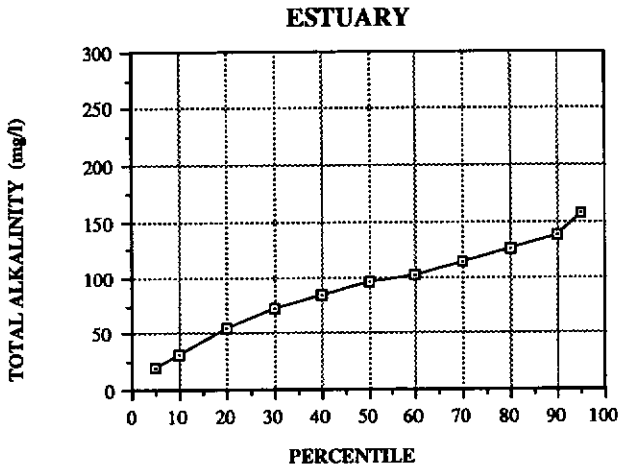
A couple of limitations should also be mentioned. First, water quality differences caused by the geographic north/south gradient were not considered in the distribution, which may be very significant for some parameters. Second, some STORET water quality constituents are measured by several different analytic techniques, as shown in table 1. Averaging different analysis techniqes may introduce a slight systematic error for those constituents measured by different analytical techniques (e.g., winkler versus probe measurements of dissolved oxygen; lab versus field measurement of pH; and membrane filter versus MPN counts for fecal coliform bacteria). However, the resulting distribution of data should nonetheless be a good overview of the variation found in Florida waters.

Total Alkalinity

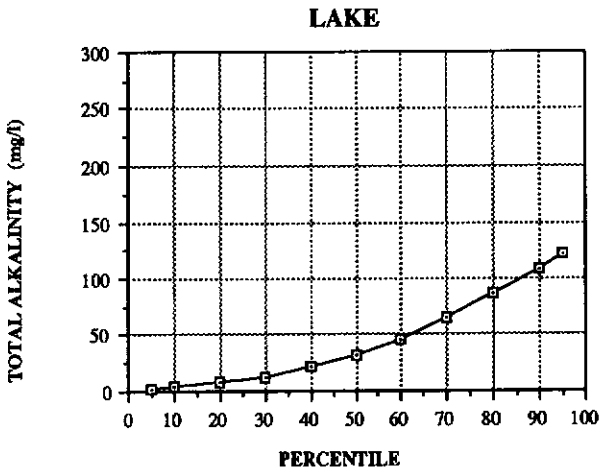
Alkalinity is a measurement of the components in water which tend to elevate pH and act as buffers against increases in acidity. The majority of components which contribute to alkalinity in water are naturally occurring substances, including carbonates, bicarbonates, phosphates, and hydroxides. These constituents are generally introduced through the process of limestone dissolution. However, not all alkalinity is introduced naturally. The addition of buffering agents in municipal water treatment plants and industrial facilities also contribute to the total alkalinity measured in water. These additives are designed to decrease the corrosive character of certain effluents by increasing the alkalinity. The relationship between alkalinity and pH is important, since the buffering effect of alkalinity exerts a major influence on pH, and pH has a direct effect on aquatic organisms and the toxic characteristics of certain pollutants which these organisms encounter.

Alkalinity (mg/l)

percentile	estuary	lake	stream
5	20.0	2.0	3.5
10	32.0	4.0	6.5
20	55.5	7.0	16.0
30	72.5	12.5	30.0
40	84.5	21.0	48.0
50	96.0	31.0	66.0
60	102.0	46.0	92.0
70	113.0	64.5	118.0
80	125.0	87.0	147.0
90	137.0	108.0	189.5
95	156.0	122.0	222.5



Number of Stations = 802



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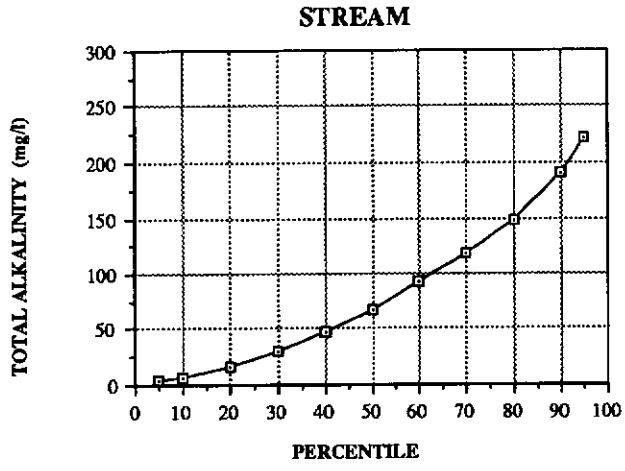


Number of Stations = 1859

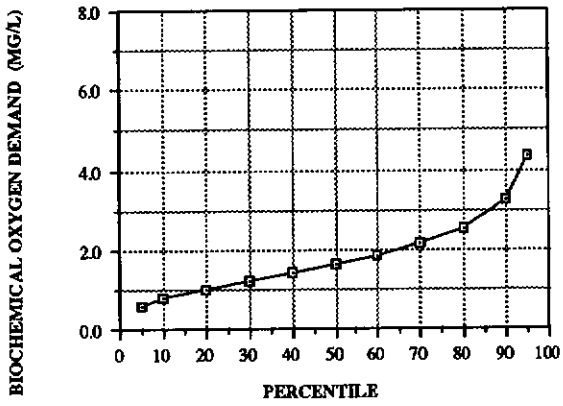
Biochemical Oxygen Demand

Biochemical oxygen demand (BOD) is a measurement of the quantity of dissolved oxygen required by microbial organisms to decompose organic matter which occurs naturally or is generated by human activities. The biochemical oxygen demand test was initially designed for use in determining engineering criteria for municipal and industrial plants which discharge to surface waters. It is also helpful in calculating the assimilative capacity of the receiving body of water. High biochemical oxygen demand is a major contributor to dissolved oxygen depletion and is normally indicative of poor water quality. A low BOD generally indicates good water quality.

Biochemical Oxygen Demand (mg/l)

percentile	estuary	lake	stream
5	0.6	0.6	0.6
10	0.8	0.7	0.7
20	1.0	0.9	0.9
30	1.2	1.1	1.1
40	1.4	1.3	1.3
50	1.6	1.7	1.5
60	1.9	2.0	1.7
70	2.1	2.9	2.0
80	2.5	4.1	2.8
90	3.3	6.0	4.4
95	4.4	7.8	7.0

ESTUARY



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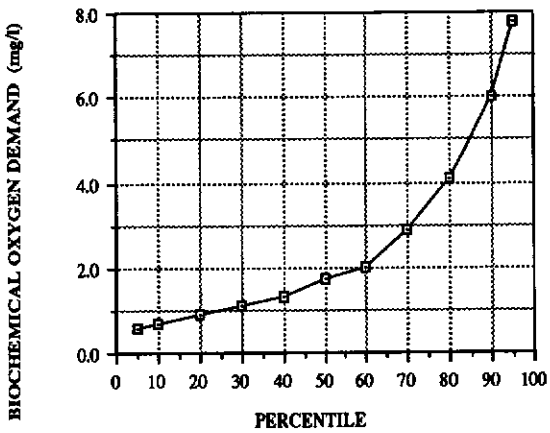
LAKE



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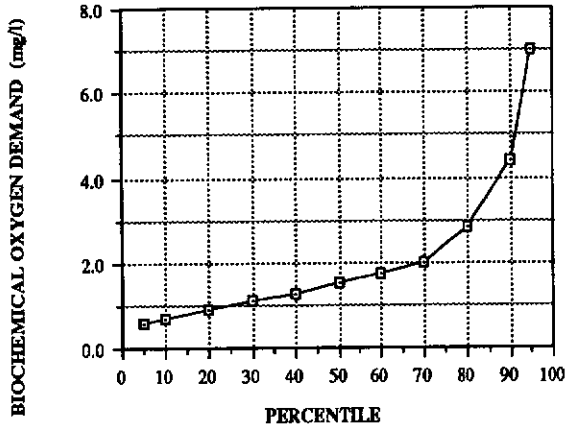
STREAM



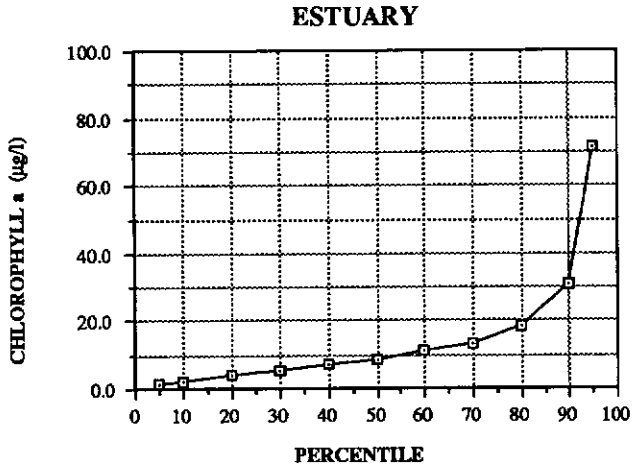
Number of Stations = 1837

Chlorophyll *a*

Chlorophyll is a green pigment found in plants and is an essential component in the process of converting light energy into chemical energy. There are several types of chlorophyll; however, the predominant form is chlorophyll *a* . The measurement of chlorophyll *a* in a water sample is a useful indicator of phytoplankton biomass, especially when used in conjunction with analysis concerning algal growth potential and species abundance. Chlorophyll *a* measurements are also used to estimate the trophic condition of a waterbody, particularly lentic waters. Chlorophyll *a* values ranging from 0 to 14 ug/l indicate oligotrophic conditions, 15 to 25 ug/l represents mestrophy, 26 to 40 ug/l indicates eutrophic conditions, and above 40 ug/l indicates hypereutrophic conditions. These designations are useful only as a general guide, except when used in conjunction with other biological and water chemistry data.

Chlorophyll a (µg/l)

percentile	estuary	lake	stream
5	1.0	1.5	0.0
10	2.0	2.3	1.0
20	4.0	5.0	1.5
30	5.0	6.8	3.0
40	7.0	11.0	4.0
50	8.5	18.5	5.5
60	11.0	26.5	8.0
70	13.0	34.3	12.0
80	18.5	46.5	17.5
90	31.0	67.5	32.0
95	71.0	94.8	61.5



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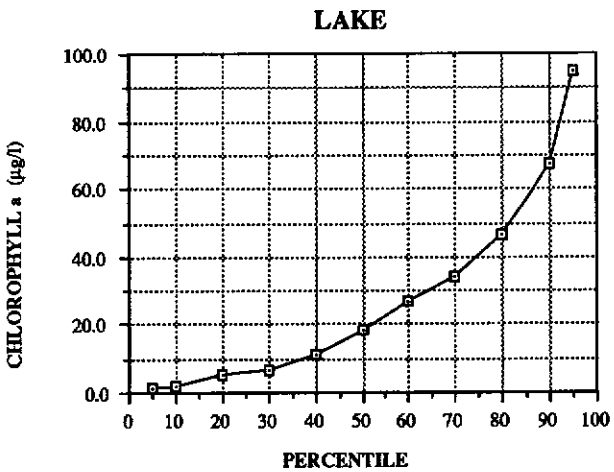

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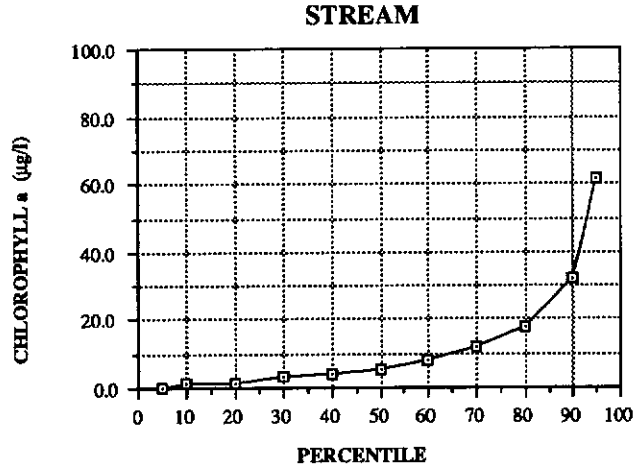


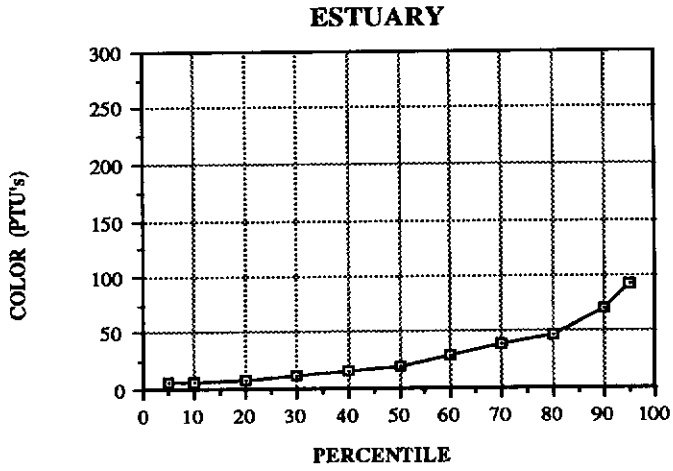
Number of Stations = 754

Color

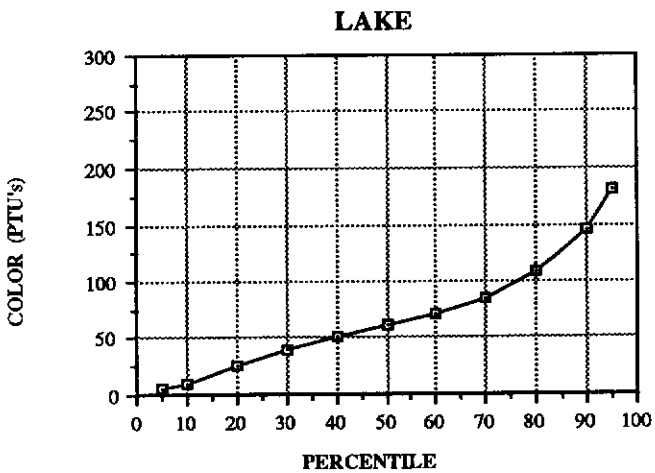
The coloration of water occurs naturally as a result of the decomposition of organic material. However, color may also be introduced through the discharge of industrial waste. Sources of natural color include humic substances and breakdown products from decomposing algae and vascular plants. High color values are frequently associated with acidic conditions (low pH values) and commonly occur in swamplands. Highly colored "blackwater" streams are common in Florida. Industrial sources of color include discharge from pulp and paper mills, textile factories, tanning industries, and chemical manufacturers. Color in the aquatic environment acts to decrease light penetration and consequently decreases primary productivity and shrinks the littoral zone. Unnatural sources of color depress benthic macrophyte growth and subsequently cause a loss of habitat and alterations in the entire aquatic community. Surface waters may often appear colored due to the presence of suspended particulate matter, including phytoplankton; however, this type of turbidity associated color is not true color, and is referred to as apparent color. Color, as reported here, is measured by the platinum-cobalt method.

Color (PTU's)

percentile	estuary	lake	stream
5	5.0	5.0	14.5
10	5.0	10.0	22.0
20	8.5	25.0	38.0
30	12.5	40.0	49.0
40	15.0	50.0	58.0
50	20.0	60.0	70.0
60	30.0	70.0	80.0
70	40.0	85.0	100.0
80	47.5	107.5	142.5
90	70.0	145.0	212.0
95	92.5	180.0	300.0



Number of Stations = 1189



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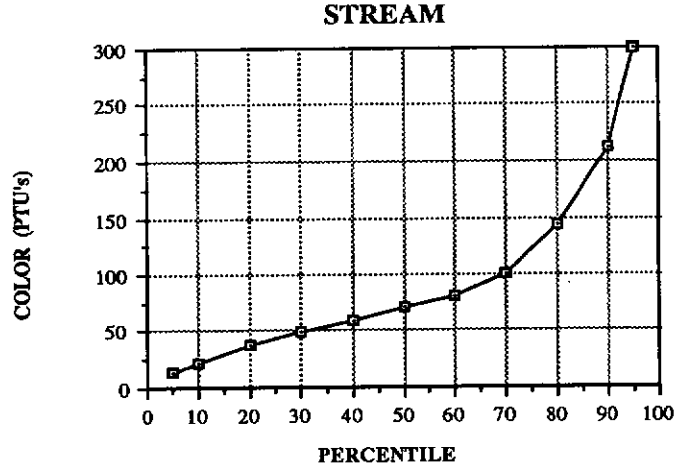


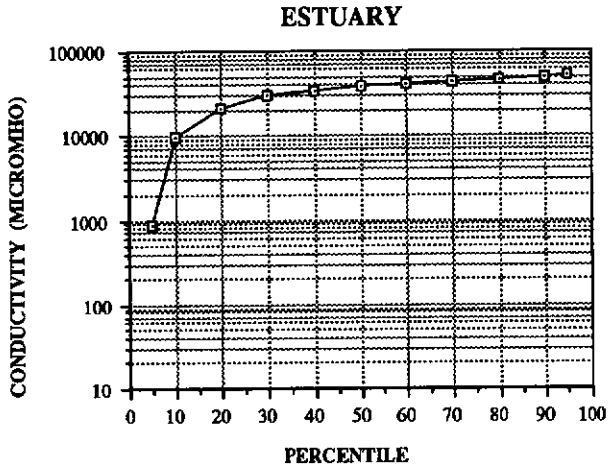
Number of Stations = 2078

Specific Conductance

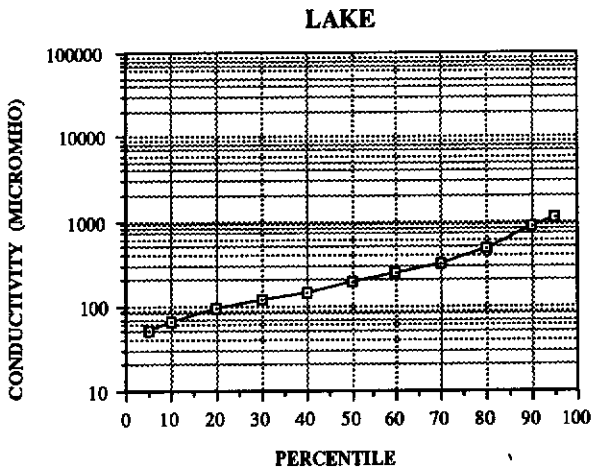
Specific conductance is a measurement of the ability of water to conduct an electrical current. The measurement of conductance is closely related to the total concentration of inorganic ionized substances present in the water. Organic substances do not readily dissociate in aqueous solution and thus conduct only negligible amounts of current. Specific conductivity is affected by drought, precipitation, and the concentration of biologically active organisms. The measurement of conductivity can be utilized as an early indicator of water quality changes since industrial and municipal waste discharges have been shown to increase inorganic ion concentrations and thus conductivity. High conductivities in the stream data (> 1500 micromhos) are the result of the influence of salt water on some stations.

Conductivity (micromhos)

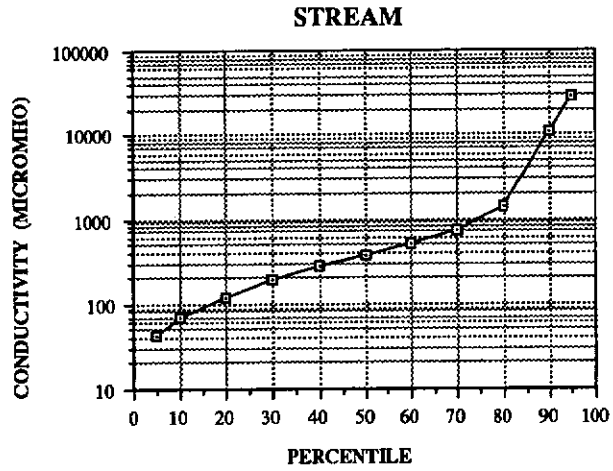
percentile	estuary	lake	stream
5	850	50	42
10	9672	65	67
20	21000	93	118
30	29900	117	196
40	34200	142	280
50	37125	188	366
60	39800	250	509
70	42000	305	730
80	45500	465	1379
90	49050	835	10750
95	50950	1100	28600



Number of Stations = 1439



Number of Stations = 888



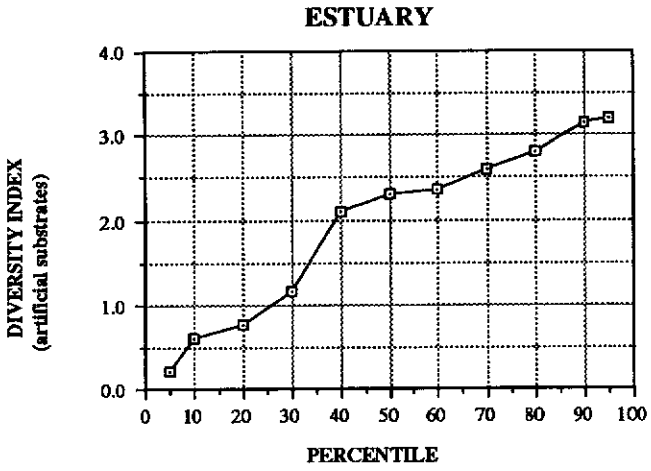
Number of Stations = 2476

Diversity Index, Artificial Substrates

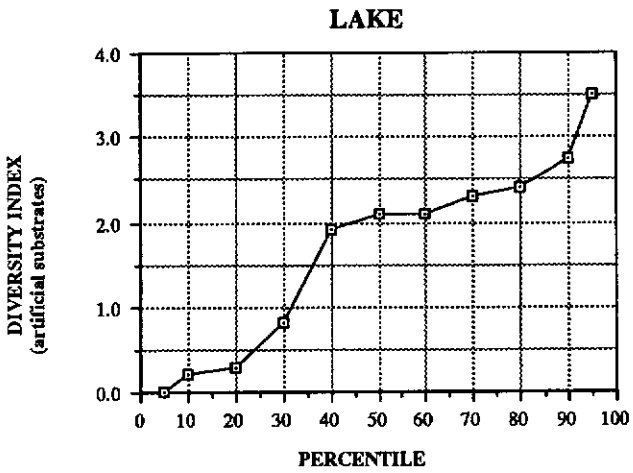
The calculation of diversity index is a useful statistical method which produces a single number summary describing the health of the macroinvertebrate community. The calculation is based upon species richness and the distribution of individuals among the species. The index is most instructive when it is used in conjunction with data pertaining to taxa richness, community structure, and indicator organism studies. The diversity index is most useful as an indicator of organic loading (e.g. from a wastewater treatment plant discharge). Artificial substrates (Hester-Dendy samplers) and natural substrates (ponar and dredge samplers) are both used for collecting macroinvertebrates. In streams, index values of 3 or greater indicate clean conditions, values between 2 and 3 indicate moderate stress, and values below 2 indicate severe stress; however, the assessment of the index values vary somewhat depending on the type of water body, generally being lower in lentic environments.

Diversity Index, Artificial Substrates

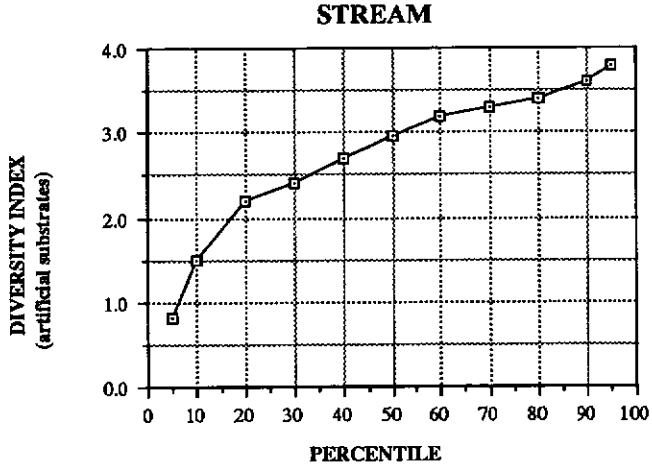
percentile	estuary	lake	stream
5	0.2	0.0	0.8
10	0.6	0.2	1.5
20	0.8	0.3	2.2
30	1.1	0.8	2.4
40	2.1	1.9	2.7
50	2.3	2.1	3.0
60	2.4	2.1	3.2
70	2.6	2.3	3.3
80	2.8	2.4	3.4
90	3.1	2.8	3.6
95	3.2	3.5	3.8



Number of Stations = 23



Number of Stations = 13



Number of Stations = 99

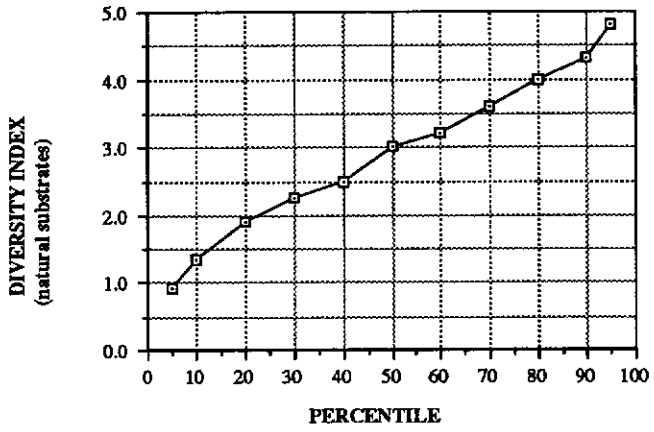
Diversity Index, Natural Substrates

The calculation of diversity index is a useful statistical method which produces a single number summary describing the health of the macroinvertebrate community. The calculation is based upon species richness and the distribution of individuals among the species. The index is most instructive when it is used in conjunction with data pertaining to taxa richness, community structure, and indicator organism studies. The diversity index is most useful as an indicator of organic loading (e.g. from a wastewater treatment plant discharge). Artificial substrates (Hester-Dendy samplers) and natural substrates (ponar and dredge samplers) are both used for collecting macroinvertebrates. In streams, index values of 3 or greater indicate clean conditions, values between 2 and 3 indicate moderate stress, and values below 2 indicate severe stress; however the assessment of the index values vary somewhat depending on the type of water body, generally being lower in lentic environments.

Diversity Index, Natural Substrates

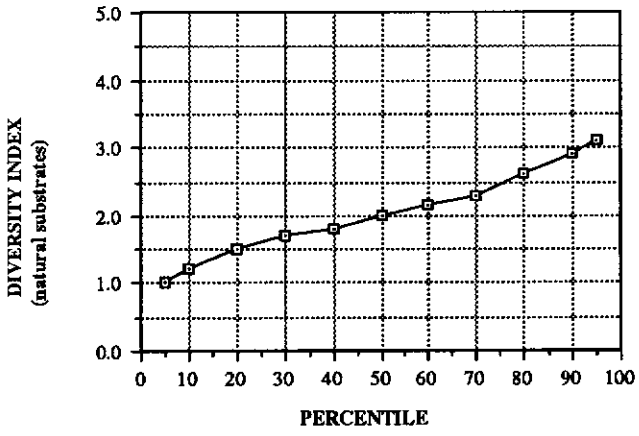
percentile	estuary	lake	stream
5	0.9	1.0	0.9
10	1.4	1.2	1.4
20	1.9	1.5	1.7
30	2.3	1.7	2.0
40	2.5	1.8	2.2
50	3.0	2.0	2.4
60	3.2	2.2	2.7
70	3.6	2.3	2.9
80	4.0	2.6	3.1
90	4.3	2.9	3.4
95	4.8	3.1	3.7

ESTUARY



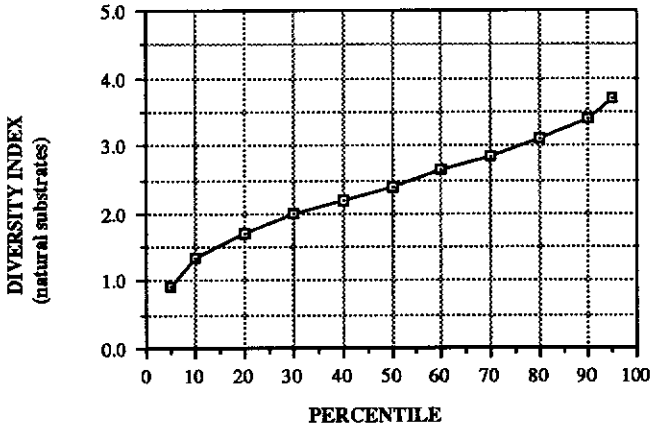
Number of Stations = 99

LAKE



Number of Stations = 48

STREAM



Number of Stations = 156

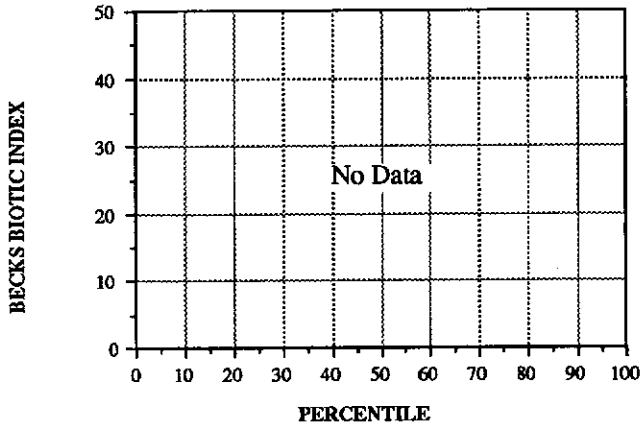
Beck's Biotic Index

Beck's Biotic Index was created by Bill Beck in the mid 1950's after years of analyzing distribution patterns in Florida's macroinvertebrate community. The index, now better known as the Florida Index, is based on macroinvertebrate pollution tolerance and is most applicable to stream inhabitants. Organisms are divided into five different classes, of which class I and II are most important. Samples are collected, sorted and then scored. Class I organisms are very sensitive to pollution and are found only in the most pristine conditions. Organisms falling into the class I category receive 2 points. Class II organisms are somewhat sensitive to pollution, but can sometimes be found in slightly stressed environments and thus receive 1 point. Organisms in class III and IV do not receive points since these macroinvertebrates are tolerant of polluted conditions or are air breathers. When organisms collected from a site fall exclusively in the class III - IV category the water is considered severely degraded. Class V organisms are of unknown tolerance. Obviously, higher index numbers reflect better conditions. Biologists from DER have revised the index to reflect current knowledge of Florida's macroinvertebrate population.

Beck's Biotic Index

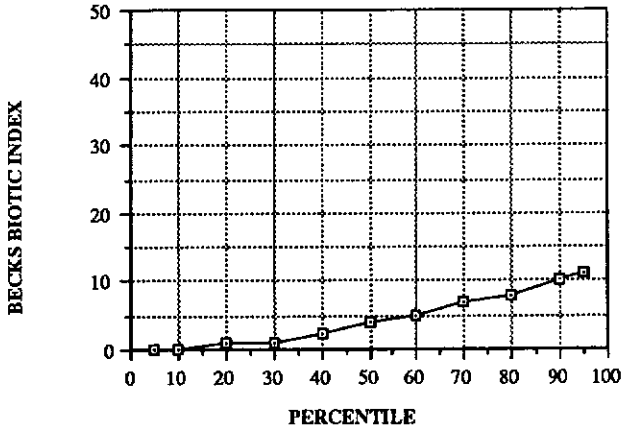
percentile	estuary	lake	stream
5	0	0.0	2.0
10	0	0.0	4.0
20	0	1.0	6.0
30	0	1.0	9.0
40	0	2.3	12.0
50	0	4.0	16.5
60	0	5.0	20.0
70	0	7.0	22.5
80	0	7.8	25.8
90	0	10.0	38.0
95	0	11.0	47.5

ESTUARY



Number of Stations = 0

LAKE



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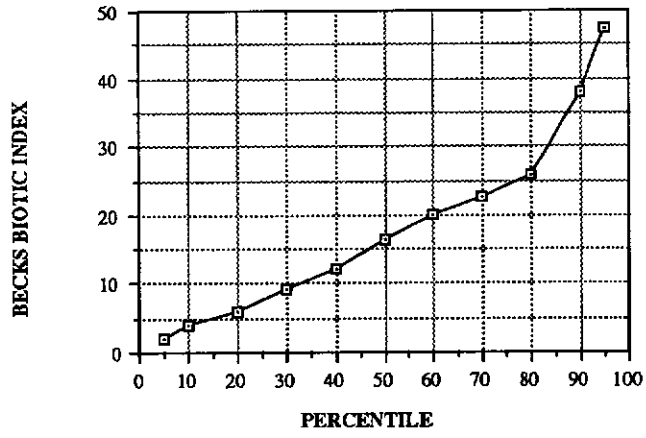
STREAM



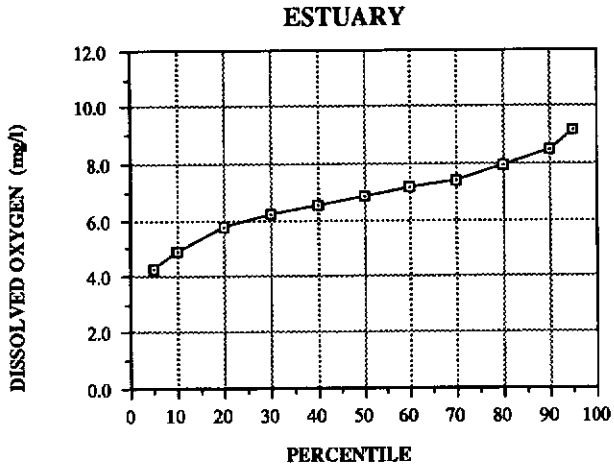
Number of Stations = 115

Dissolved Oxygen

Dissolved oxygen is an essential component in the aquatic environment. The health of a body of water can, to a large degree, be determined by observing dissolved oxygen concentrations. A vast array of organisms are dependent upon adequate levels of dissolved oxygen for survival. Generally, waters with dissolved oxygen concentrations of 5.0 mg/l or higher can support a well-balanced, healthy biological community. However, some species can not tolerate even slight depletion, and when concentrations fall below natural levels the result is often a complete alteration of the community structure. The consequences of these changes frequently have both ecological and economic significance. It should be noted that some systems with "good" water quality exhibit naturally low dissolved oxygen concentrations (e.g., swamps). It is also important to note that day time and mean measurements of dissolved oxygen have limited significance, since nocturnal respiration and other episodic instances of low dissolved oxygen have a significant impact on aquatic biota. Diurnal dissolved oxygen studies are a necessity for gaining a full understanding of the oxygen cycle in a particular body of water.

Dissolved Oxygen (mg/l)

percentile	estuary	lake	stream
5	4.2	4.6	2.2
10	4.9	5.8	3.0
20	5.7	6.8	4.1
30	6.2	7.4	4.8
40	6.5	7.7	5.3
50	6.8	8.0	5.8
60	7.1	8.3	6.2
70	7.4	8.7	6.7
80	7.9	9.2	7.2
90	8.5	10.0	8.0
95	9.1	10.7	8.6



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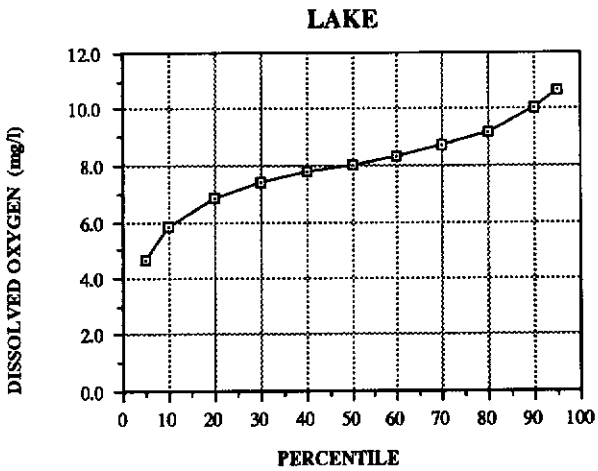

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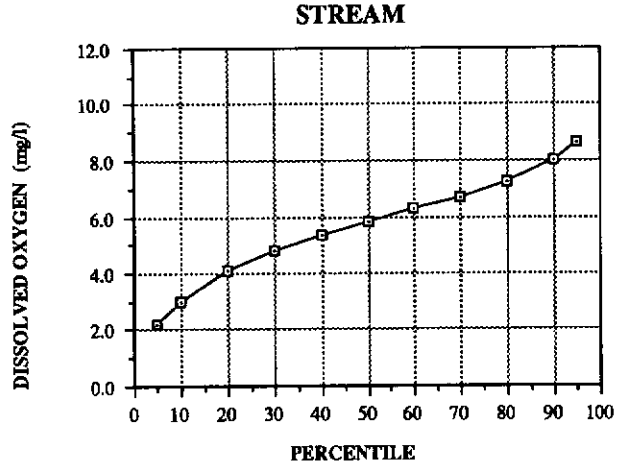


Number of Stations = 2605

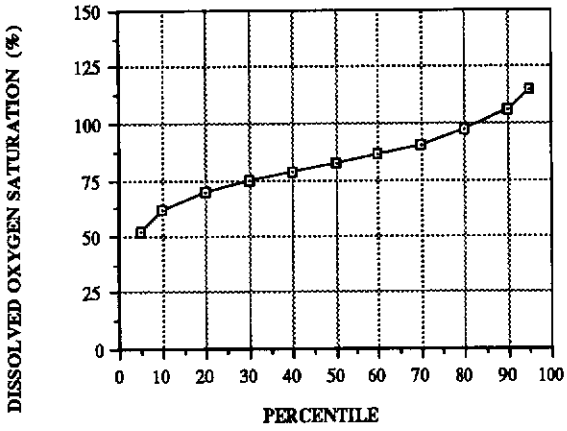
Dissolved Oxygen, Percent Saturation

The concentration of dissolved oxygen is an important indicator of existing water quality and reflects the ability of a body of water to support a healthy and diverse biological community. Measuring oxygen based on the percent saturation in the water is a method of measurement that takes into account the temperature and conductivity of the water, both of which affect its capacity to hold oxygen. Diurnal variation in dissolved oxygen levels are generally higher in lakes and estuaries than in streams due to the higher rates of primary productivity in these water bodies.

Dissolved Oxygen, Percent Saturation

percentile	estuary	lake	stream
5	52.0	53.0	26.0
10	62.0	67.0	34.5
20	70.0	79.0	48.0
30	75.0	86.0	56.0
40	78.0	90.0	62.0
50	82.0	93.0	67.0
60	86.0	95.0	71.5
70	90.0	98.0	77.0
80	97.0	103.0	82.0
90	105.5	113.0	88.0
95	115.0	125.0	94.0

ESTUARY



Number of Stations = 1650

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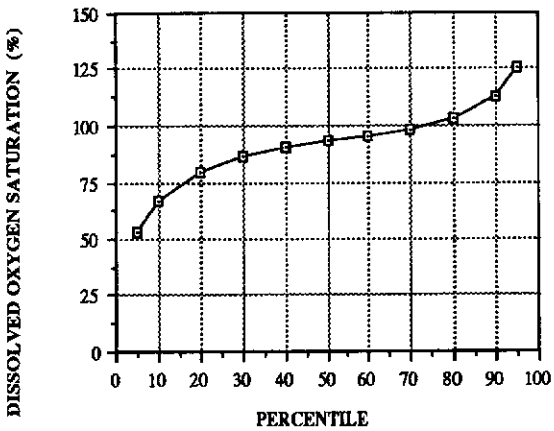
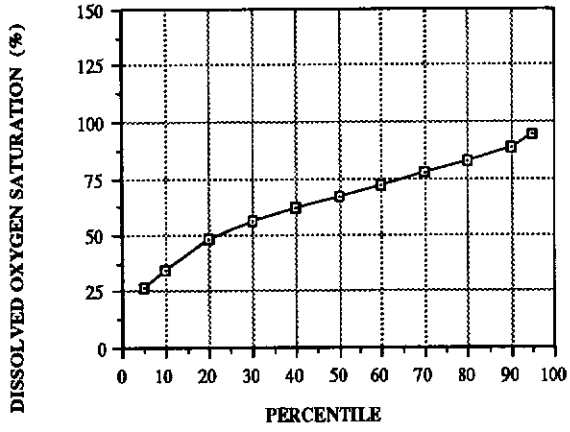


Number of Stations = 974

STREAM



Number of Stations = 2582

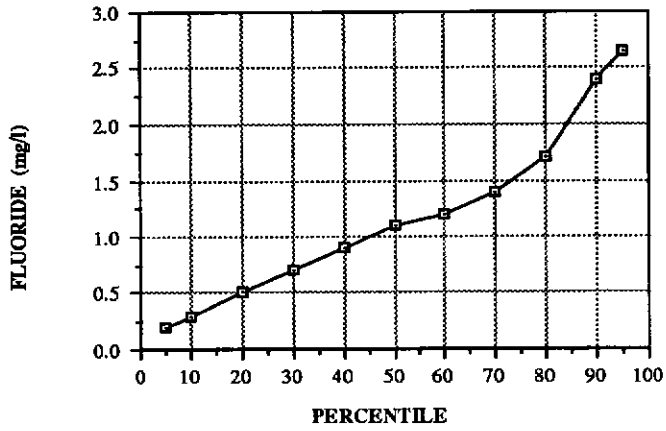
Fluoride

Fluoride is a naturally occurring element found in water; however, it is generally observed at low concentrations. At concentrations of approximately 1.0 mg/l in drinking water, fluoride serves as an effective agent in the prevention of dental caries. The growing use of fluoride in public water supplies has made testing essential for the purposes of human health, and has increased the importance of sampling for this element in surface waters.

Fluoride (mg/l)

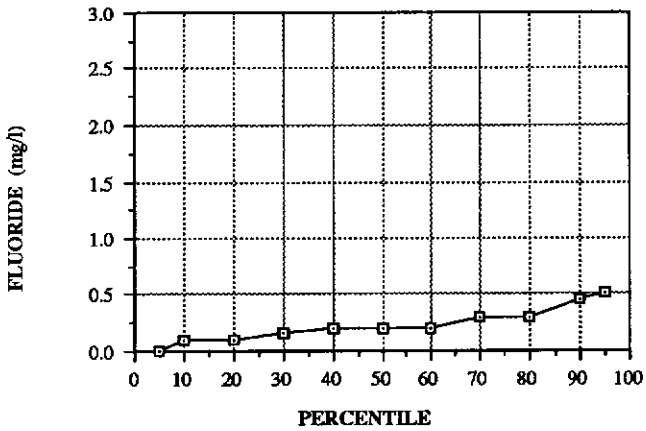
percentile	estuary	lake	stream
5	0.2	0.0	0.1
10	0.3	0.1	0.1
20	0.5	0.1	0.1
30	0.7	0.2	0.2
40	0.9	0.2	0.2
50	1.1	0.2	0.3
60	1.2	0.2	0.3
70	1.4	0.3	0.4
80	1.7	0.3	0.6
90	2.4	0.5	0.9
95	2.6	0.5	1.6

ESTUARY



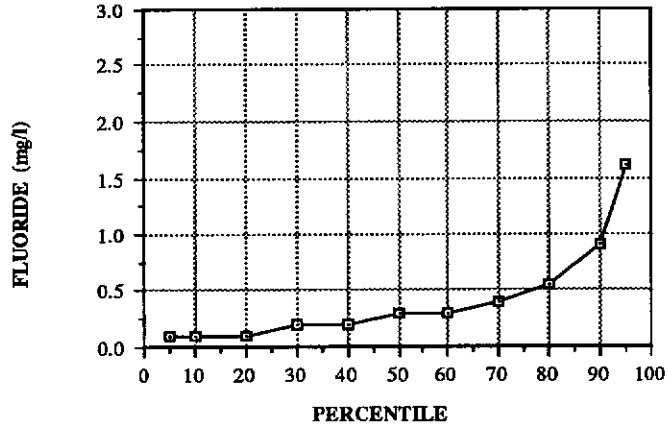
Number of Stations = 291

LAKE



Number of Stations = 222

STREAM



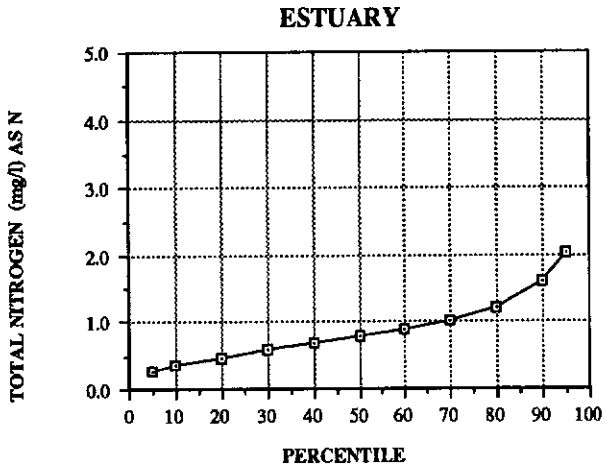
Number of Stations = 1067

Total Nitrogen

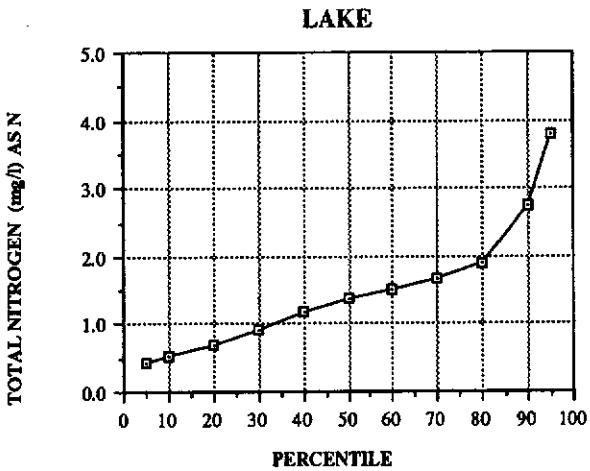
Total nitrogen is the combined measurement of nitrate, nitrite, ammonia and organic nitrogen found in water. Nitrogen compounds function as important nutrients to many aquatic organisms and are essential constituents in the dynamic chemical processes which exist between land, air, and water. The most readily bioavailable forms of nitrogen are ammonia and nitrate. These nitrogenous compounds, in conjunction with other nutrients, serve as an important nutrient base for primary productivity. The major source of excessive amounts of nitrogen in surface water is the effluent from municipal treatment plants and runoff from agricultural sites. When the concentration of nutrients consistently exceed natural levels, a nutrient imbalance is produced, which can cause undesirable changes in the biological community. This imbalance can drive an aquatic system into an accelerated rate of eutrophication. Usually, the eutrophication process is observed as a change in the structure of the algal community and includes severe algal blooms which may cover large areas for extended periods of time. Large algal blooms are generally followed by a depletion in dissolved oxygen concentrations as a result of algal decomposition.

Total Nitrogen (mg/l)

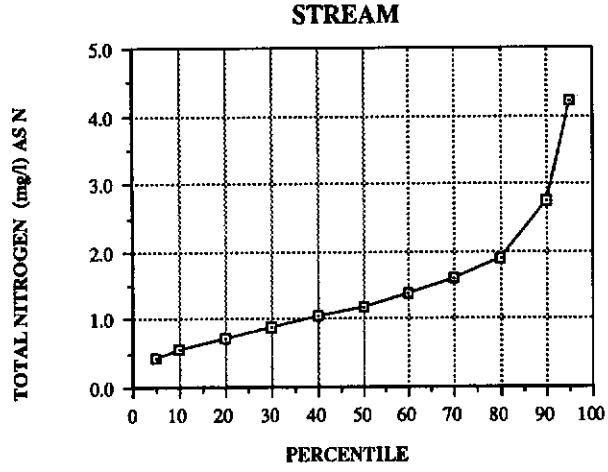
percentile	estuary	lake	stream
5	0.3	0.4	0.4
10	0.4	0.5	0.6
20	0.5	0.7	0.7
30	0.6	0.9	0.9
40	0.7	1.2	1.1
50	0.8	1.4	1.2
60	0.9	1.5	1.4
70	1.0	1.7	1.6
80	1.2	1.9	1.9
90	1.6	2.7	2.7
95	2.0	3.8	4.2



Number of Stations = 1471



Number of Stations = 781



Number of Stations = 2320

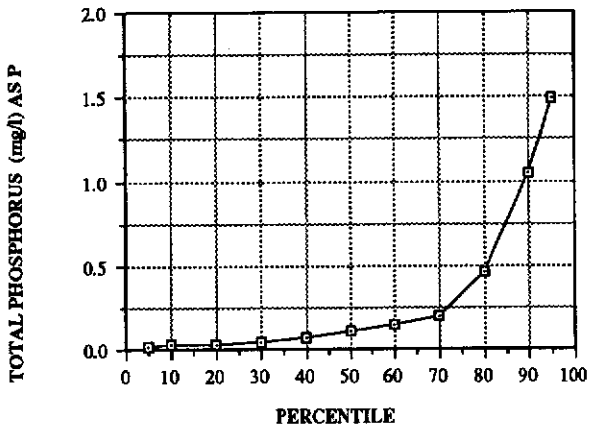
Total Phosphorus

Phosphorus is one of the primary nutrients that regulates algal and macrophyte growth in natural waters, particularly in fresh water. Phosphate, the form in which almost all phosphorus is found in the water column, can enter the aquatic environment in a number of ways. Natural processes transport phosphate to water through atmospheric deposition, groundwater percolation, and terrestrial runoff. Municipal treatment plants, industries, agriculture, and domestic activities also contribute to phosphate loading through direct discharge and natural transport mechanisms. The very high levels of phosphorus in some of Florida's streams and estuaries are usually related to phosphate mining and fertilizer processing activities. High phosphorus concentrations are frequently responsible for accelerating the process of eutrophication. Once phosphorus and the other important nutrients enter the ecosystem they are extremely difficult to remove. These nutrients become entwined in the system, either tied up in the biomass or deposited in the sediments. Nutrients, particularly phosphates, deposited in the sediments generally undergo redistribution to the water column. This type of cycling compounds the difficulty of halting the eutrophication process.

Total Phosphorus (mg/l)

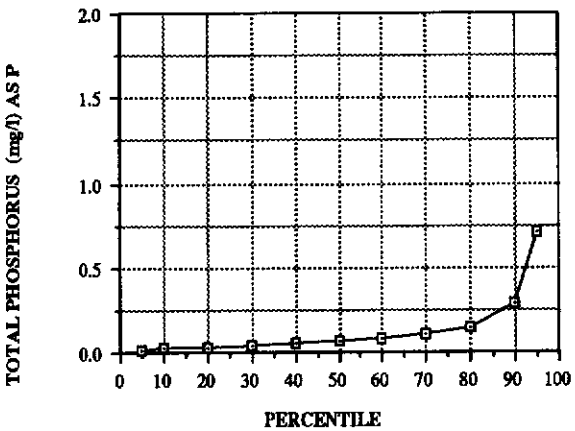
percentile	estuary	lake	stream
5	0.01	0.01	0.02
10	0.02	0.02	0.03
20	0.03	0.03	0.04
30	0.04	0.04	0.05
40	0.07	0.05	0.07
50	0.10	0.07	0.11
60	0.14	0.08	0.15
70	0.19	0.11	0.22
80	0.46	0.15	0.41
90	1.05	0.29	0.87
95	1.49	0.71	1.99

ESTUARY



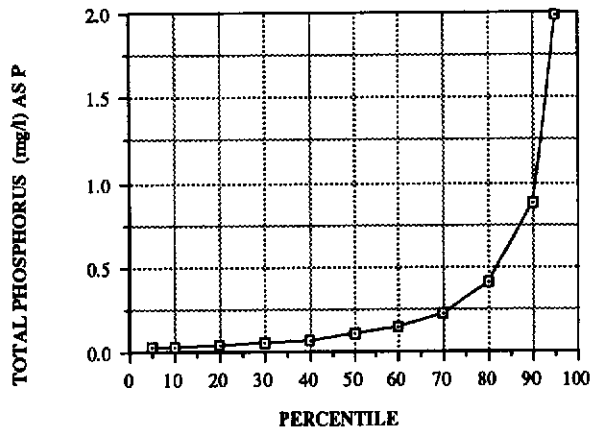
Number of Stations = 1497

LAKE



Number of Stations = 864

STREAM



Number of Stations = 2524

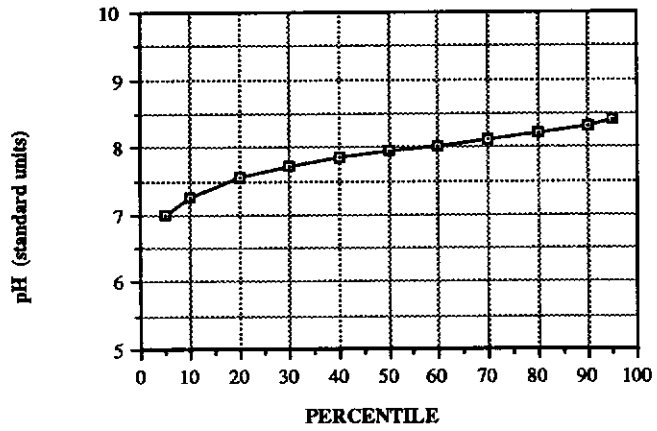
pH

The pH of a body of water is an expression which denotes the hydrogen ion activity, based on the negative logarithm of hydrogen ion concentration. A solution with a pH ranging from 1 to 7 is acidic; pH 7 is neutral; and a pH of 7 to 14 is alkaline. The chemical and biological interactions associated with the aquatic environment are affected significantly by pH. This is of particular concern in the consideration of the effects of toxic substances on aquatic organisms, especially in regard to the release of metals from sediments. Under certain pH conditions a particular toxicant may increase in toxicity or become more soluble and thus more likely to affect aquatic organisms. Acidic deposition and the acidification of lakes and streams is an important issue, which has gained widespread attention. However, certain biological communities are adapted to acidic conditions (e.g., blackwater stream systems, where pH ranges between 4 and 5) or to slightly alkaline conditions (e.g., spring runs, where pH values of 8 are not unusual) and are endangered only when the natural conditions are altered.

pH (standard units)

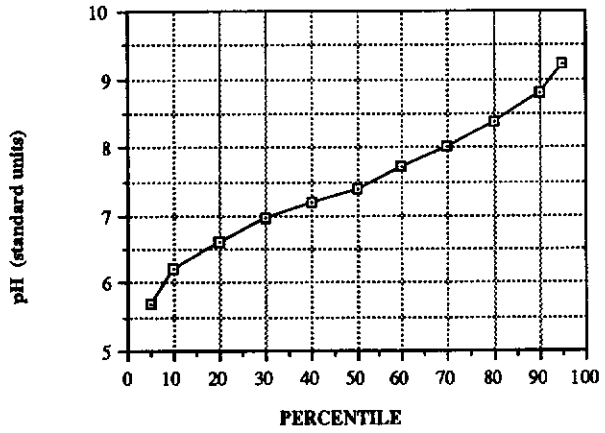
percentile	estuary	lake	stream
5	7.0	5.7	5.7
10	7.3	6.2	6.1
20	7.6	6.6	6.6
30	7.7	7.0	6.9
40	7.9	7.2	7.0
50	8.0	7.4	7.2
60	8.0	7.7	7.4
70	8.1	8.0	7.5
80	8.2	8.4	7.7
90	8.3	8.8	7.9
95	8.4	9.2	8.0

ESTUARY



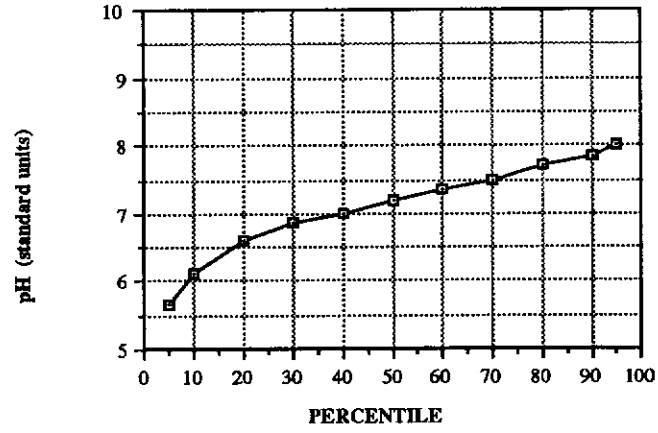
Number of Stations = 1552

LAKE



Number of Stations = 861

STREAM



Number of Stations = 2656

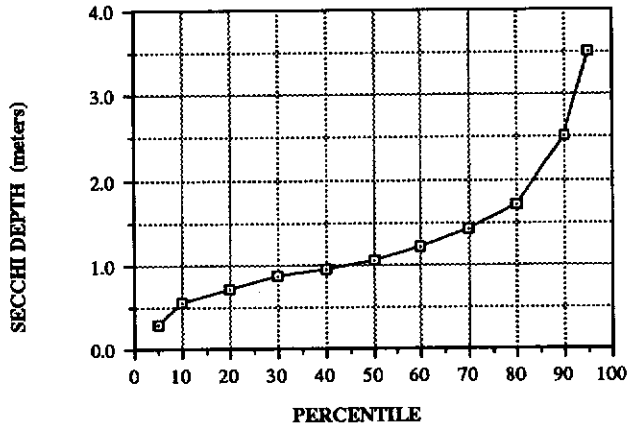
Secchi Depth

Secchi depth is a simple and effective measurement of water clarity. It is determined by observation of the depth at which a black and white painted disc becomes indistinguishable when viewed from the waters surface. This recorded depth is largely dependent upon turbidity, water color, and total suspended solids. High values generally indicate good water quality; however, some highly colored waters (e.g., blackwater streams and some estuaries) may have very good water quality but a low secchi depth value.

Secchi Depth (meters)

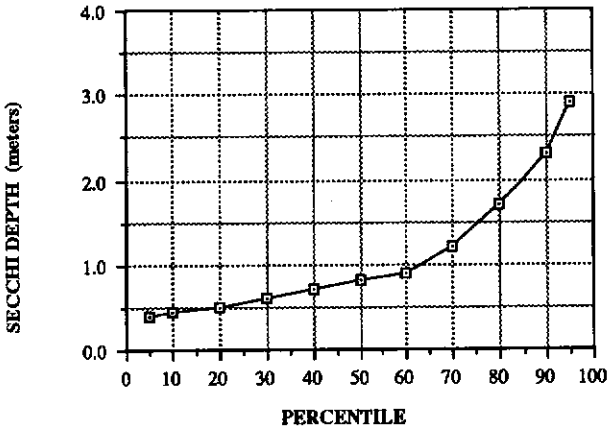
percentile	estuary	lake	stream
5	0.3	0.4	0.3
10	0.6	0.5	0.4
20	0.7	0.5	0.5
30	0.9	0.6	0.6
40	1.0	0.7	0.7
50	1.1	0.8	0.8
60	1.2	0.9	0.9
70	1.4	1.2	1.1
80	1.7	1.7	1.3
90	2.5	2.3	1.8
95	3.5	2.9	2.8

ESTUARY



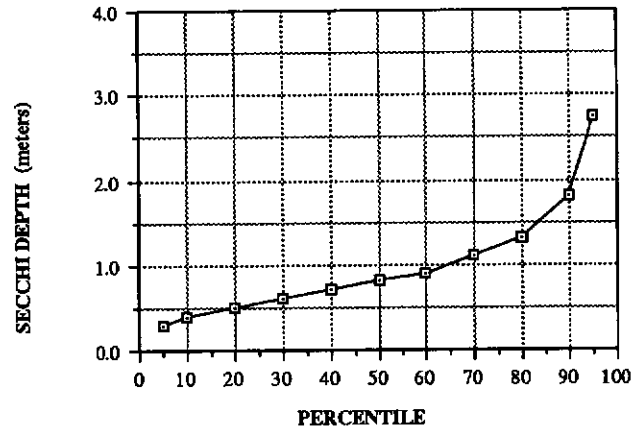
Number of Stations = 876

LAKE



Number of Stations = 782

STREAM



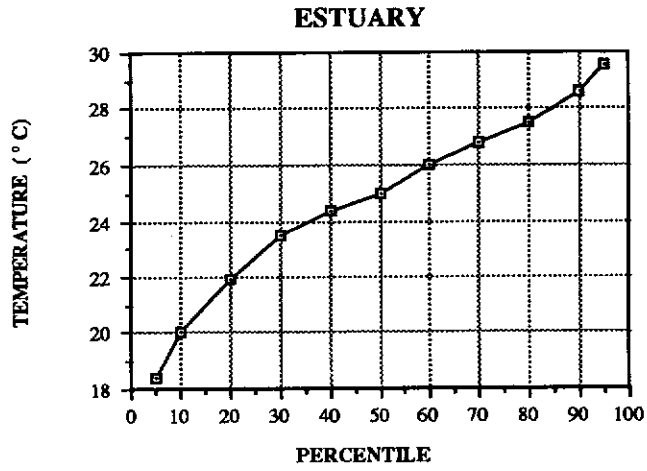
Number of Stations = 1189

Temperature

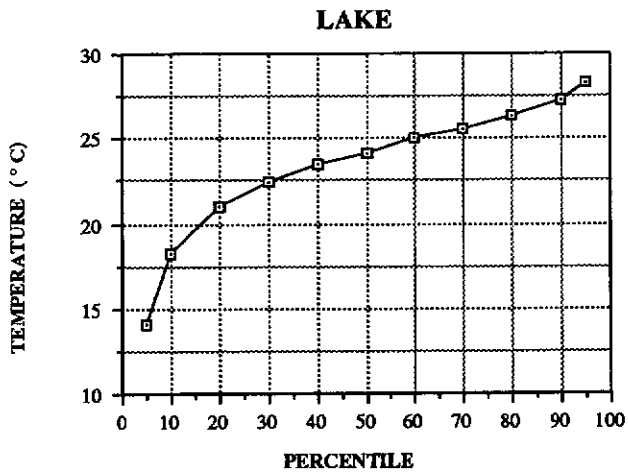
Water temperature is an important factor in controlling chemical interactions and reactivity in the water column. Temperature also affects biological activity, since many aquatic organisms have strict temperature requirements and thus are susceptible to temperature fluctuations. There is a large variation in annual average water temperature from northern to southern Florida, which significantly affects several water quality constituents such as dissolved oxygen saturation and biological productivity parameters.

Temperature (°C)

percentile	estuary	lake	stream
5	18.4	14.0	16.5
10	20.0	18.3	18.7
20	21.9	21.0	20.7
30	23.5	22.4	22.0
40	24.4	23.5	23.0
50	25.0	24.1	23.8
60	26.0	25.0	24.5
70	26.8	25.5	25.1
80	27.5	26.3	26.0
90	28.6	27.3	27.0
95	29.5	28.3	28.0



Number of Stations = 1697



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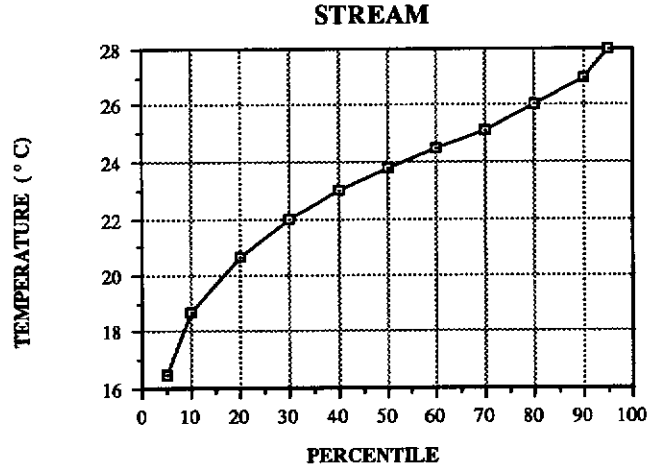


Number of Stations = 2731

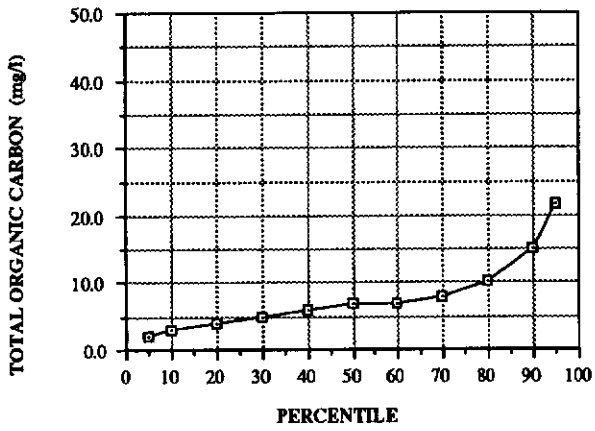
Total Organic Carbon

Total organic carbon is a measurement of the concentration of carbonaceous material found in the water column. The results of TOC analysis are useful in assessing the potential amount of oxygen demanding organic matter present in a body of water. Combined with information pertaining to nutrients, TOC analysis is one of the conventional measures of eutrophication.

Total Organic Carbon (mg/l)

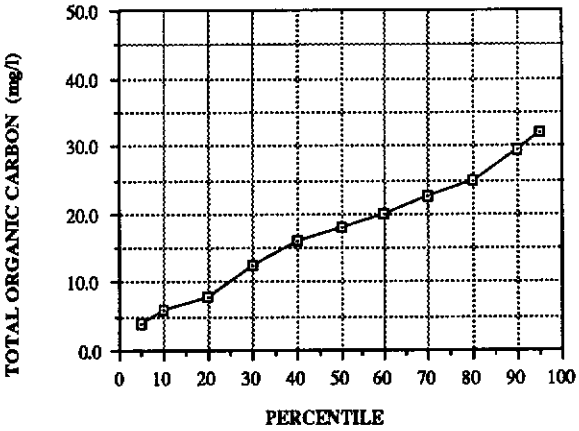
percentile	estuary	lake	stream
5	2.0	4.0	4.0
10	3.0	6.0	6.0
20	4.0	8.0	8.0
30	5.0	12.5	11.0
40	6.0	16.0	14.0
50	7.0	18.0	16.0
60	7.0	20.0	19.0
70	8.0	22.5	22.0
80	10.0	25.0	26.0
90	15.0	29.5	35.0
95	21.5	32.0	48.0

ESTUARY



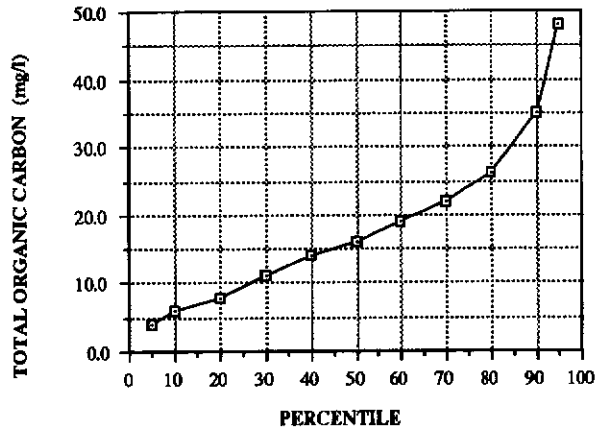
Number of Stations = 567

LAKE



Number of Stations = 228

STREAM



Number of Stations = 990

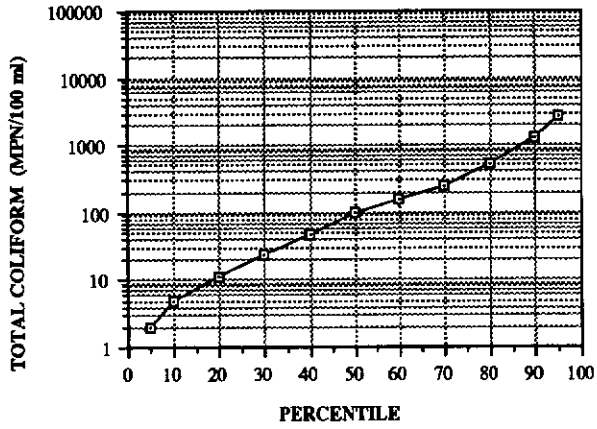
Total Coliform Bacteria

Total coliform measurements are used to determine the size of the coliform population in a body of water. Organisms in the coliform group are rod shaped gram negative bacteria that ferment lactose at 35° Celsius. Total coliform measurements are commonly used to determine when shellfish harvesting can safely occur and whether or not swimming areas are indeed safe for swimming. The total coliform procedure is generally used in conjunction with other tests which differentiate fecal and non-fecal bacterial contamination.

Total Coliform (MPN/100 ml)

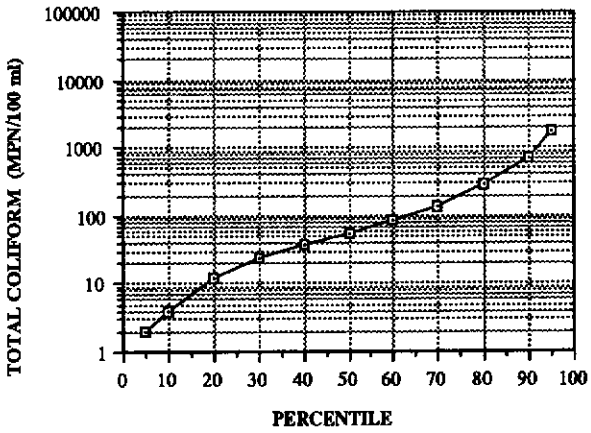
percentile	estuary	lake	stream
5	2	2	42
10	5	4	94
20	11	12	200
30	23	24	300
40	46	37	460
50	97	55	625
60	150	87	920
70	245	130	1300
80	515	280	2200
90	1267	675	5450
95	2727	1750	14700

ESTUARY



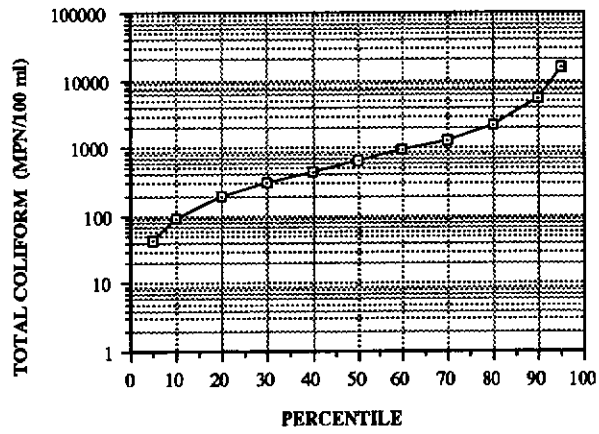
Number of Stations = 984

LAKE



Number of Stations = 271

STREAM



Number of Stations = 1265

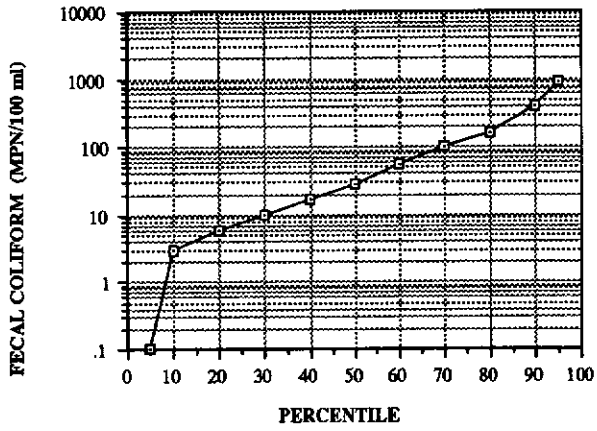
Fecal Coliform Bacteria

The fecal coliform MPN procedure is a method used to determine the presence of fecal coliform bacteria in the water column. The predominant species in the fecal coliform group is *Escherichia coli* , a species indicative of fecal coliform pollution (and possibly the presence of enteric pathogens). The presence of large numbers of fecal coliform colonies may indicate seepage from faulty septic tanks, domestic sewage, or runoff from agricultural operations. The information gained from this test method is generally used in conjunction with the fecal strep procedure and the total coliform procedure.

Fecal Coliform (MPN/100 ml)

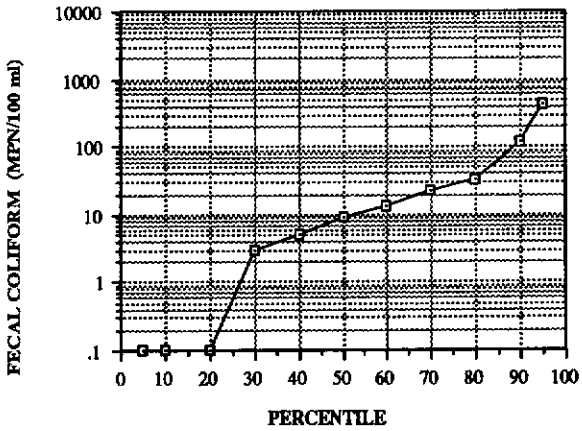
percentile	estuary	lake	stream
5	0	0	7
10	3	0	15
20	6	0	32
30	10	3	48
40	16	5	71
50	28	9	100
60	54	13	150
70	100	23	220
80	160	34	345
90	407	118	900
95	902	412	2374

ESTUARY



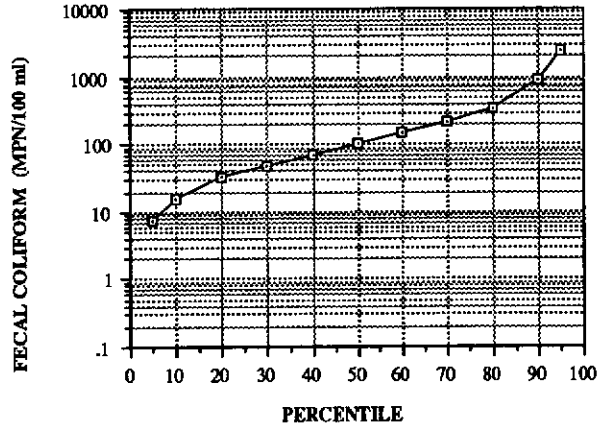
Number of Stations = 707

LAKE



Number of Stations = 242

STREAM



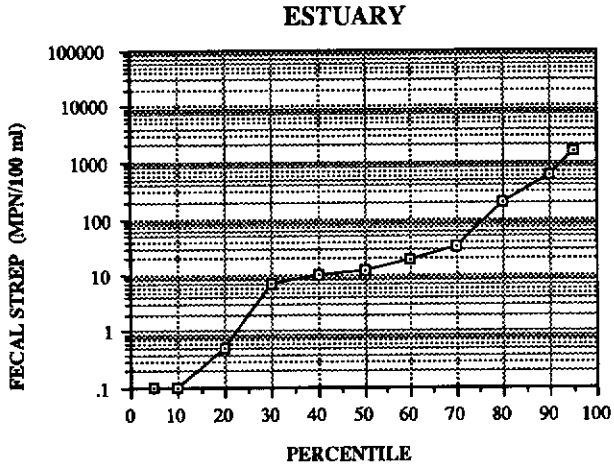
Number of Stations = 1216

Fecal Streptococci Bacteria

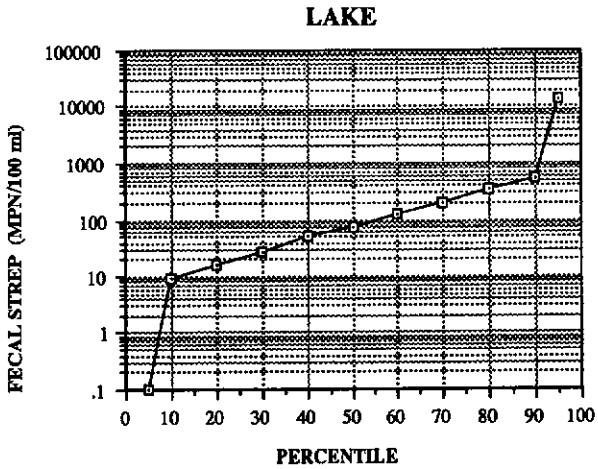
The fecal streptococcal test is a method used to determine the sources of mammalian fecal matter which may be present in a body of water. Test results from freshwater samples are reliable; however, results from samples taken in estuarine environments may be subject to inflated values due to the presence of a naturally occuring streptococcal organism. The information gained from this test method is used in conjunction with the fecal coliform procedure and the total coliform procedure to differentiate human associated bacterial contamination from non-human and soil associated sources of bacteria.

Fecal Strep (MPN/100 ml)

percentile	estuary	lake	stream
5	0	0	20
10	0	9	35
20	0	16	57
30	7	28	78
40	10	50	112
50	12	73	166
60	18	120	230
70	33	192	370
80	193	340	657
90	600	550	1675
95	1545	14000	3075



Number of Stations = 75



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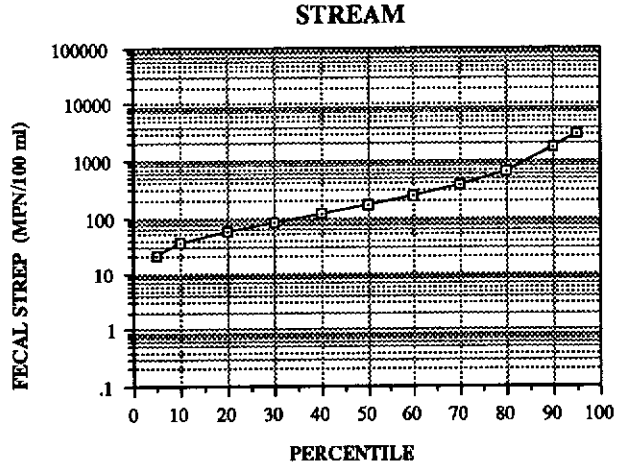


Number of Stations = 379

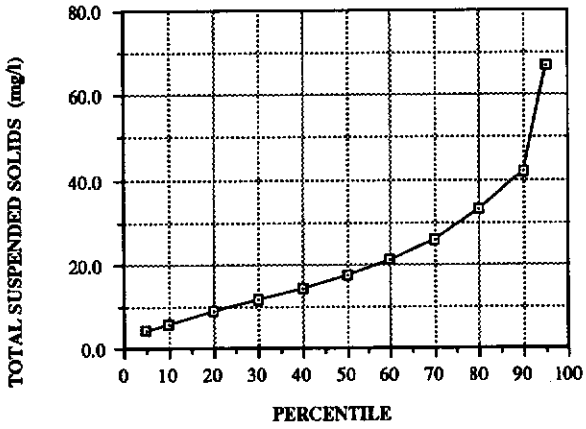
Total Suspended Solids

The measurement of total suspended solids (TSS) consists of a dry weight determination of the particulates in the water column. Both organic and inorganic materials contribute to TSS in water. The effects from increased TSS are basically the same as those associated with turbidity. Suspended solids can affect the aquatic environment and its organisms by damaging macroinvertebrate communities through the processes of deposition; by reducing the abundance of food for fish; by directly affecting fish growth rates and resistance to disease; and by reducing the areas available for spawning and interfering with fish egg and larval development. The deposition of organic matter can also remove dissolved oxygen from the overlying water. A major source of TSS, and thus turbidity, in natural waters is runoff from urban and agricultural areas. Another source is planktonic algae itself and in these cases TSS is another indicator of eutrophication.

Total Suspended Solids (mg/l)

percentile	estuary	lake	stream
5	4.0	1.0	1.0
10	6.0	2.0	2.0
20	9.0	3.0	3.0
30	11.5	4.0	4.0
40	14.0	6.0	5.5
50	17.5	8.0	7.0
60	21.0	10.0	9.0
70	25.5	13.0	12.0
80	33.0	17.0	17.0
90	42.0	32.0	28.0
95	67.0	42.5	38.0

ESTUARY



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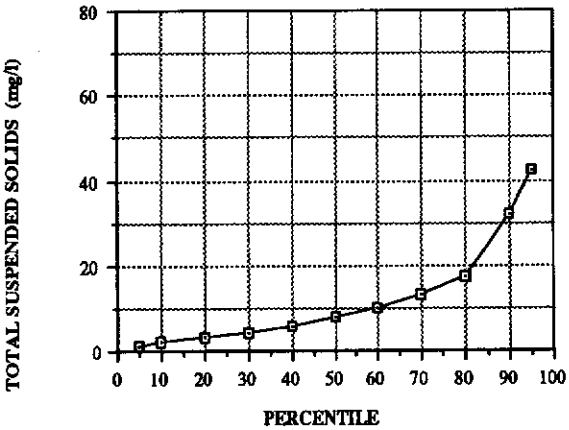

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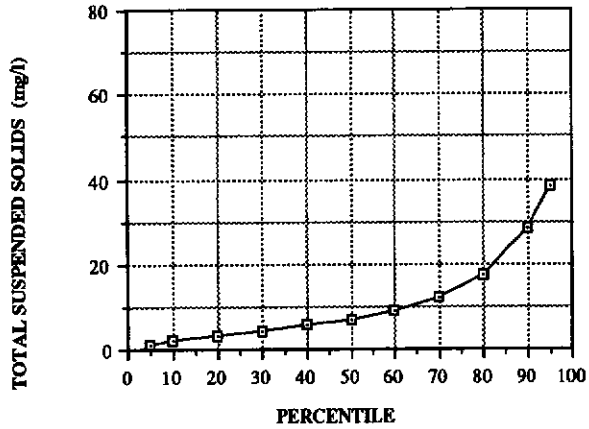


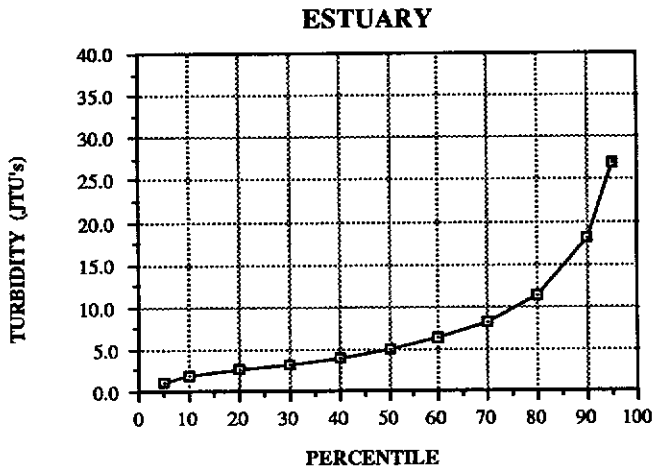
Number of Stations = 1203

Turbidity

Turbidity is the measurement of light dispersion caused by particulate material present in the water column. Organic matter, including phytoplankton and inorganic particles, both contribute to turbidity. Obviously, turbidity and total suspended solids (TSS) are closely related. Turbidity, as well as TSS, contribute to decreased light penetration in the water column, and thus affect primary productivity. In turn, as primary productivity declines, the entire food chain is affected. Generally, material causing turbidity is eventually deposited on the stream bed, a downstream lake, or in an estuary . The deposition of excessive amounts of organic and inorganic matter has numerous adverse effects including damage to the macroinvertebrate community, reduction in areas used as spawning beds, and the removal of dissolved oxygen from the water column if the material is organic in nature. Note that the turbidity data reported in the graphs and tables below consist of turbidities measured in either FTU's or JTU's.

Turbidity (JTU's)

percentile	estuary	lake	stream
5	1.0	1.0	1.0
10	1.7	1.3	1.5
20	2.5	2.0	2.0
30	3.3	2.8	2.6
40	4.0	3.8	3.3
50	5.0	5.0	4.2
60	6.4	7.0	5.5
70	8.0	10.0	7.0
80	11.3	17.9	10.5
90	18.0	30.8	20.0
95	27.0	40.0	28.5



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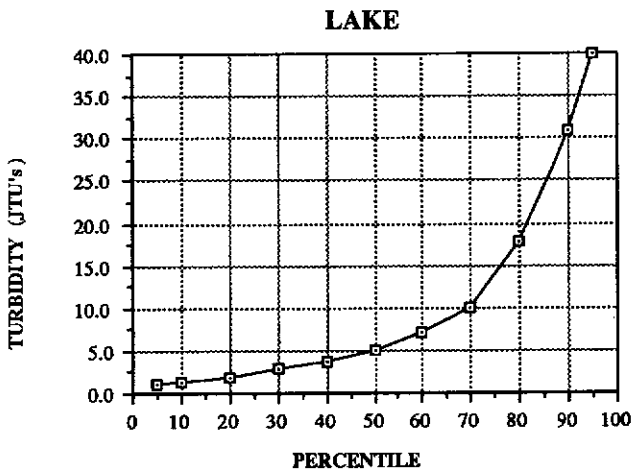
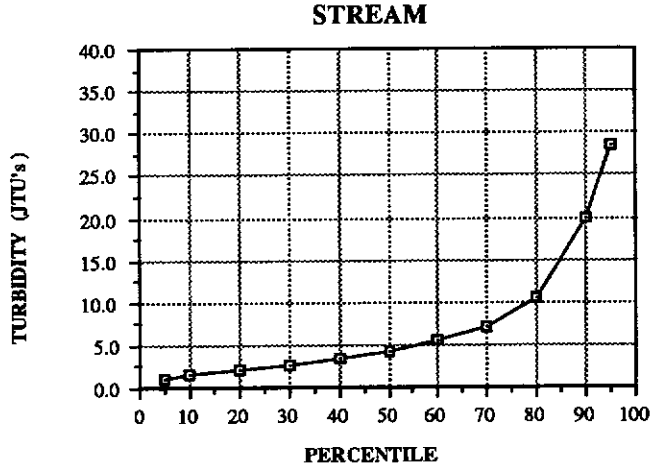


Number of Stations = 622



Number of Stations = 2139

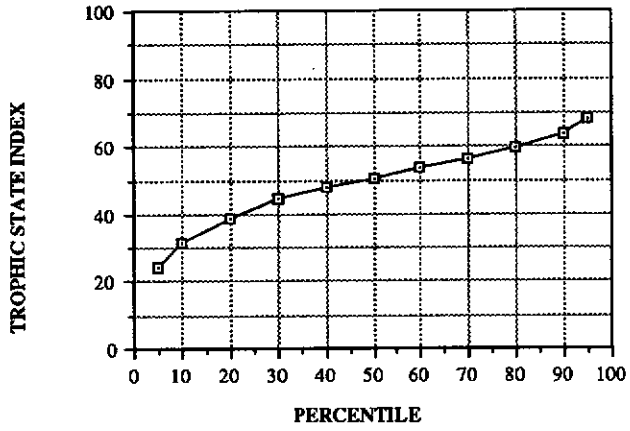
Water Quality Indices

In order to provide an adequate means of assessing Florida waters, the Florida Stream Water Quality Index (WQI) and the Lake and Estuary Trophic State Index (TSI) were developed. The WQI and the TSI are single numeric values condensed from several individual water quality constituents. Raw annual median data are converted into index values ranging from 0 to 100 based on the distribution of data collected from STORET. The 1988 305(b) Report Technical Appendix documents the formulas used to calculate the indices. Cut-off values used to determine the quality of water vary for each type of water body. For estuaries (TSI), 0 to 49 = good, 50 to 59 = fair, and 60 to 100 = poor. For lakes (TSI), 0 to 59 =good, 60 to 69 = fair, and 70 to 100 = poor. For streams (WQI), 0 to 45 = good, 46 to 59 = fair, and 60 to 100 = poor water quality.

Water Quality Indices

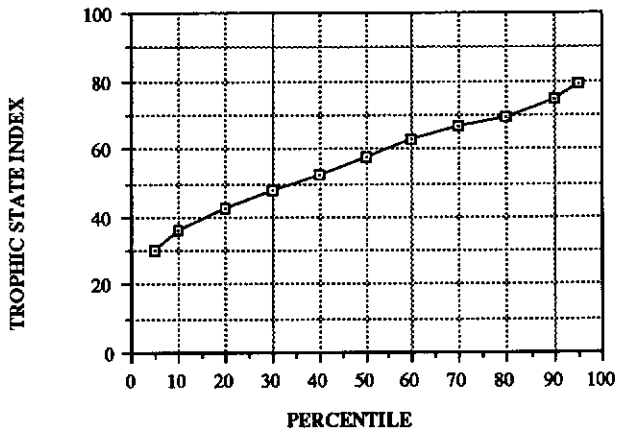
percentile	estuary	lake	stream
5	24.4	29.8	15.0
10	31.5	35.7	20.0
20	38.8	42.8	28.5
30	44.5	47.5	34.5
40	47.8	52.5	39.0
50	50.2	57.6	43.0
60	53.4	62.5	47.5
70	56.1	66.6	52.0
80	59.2	69.4	58.0
90	63.7	74.8	67.5
95	68.3	79.1	74.0

ESTUARY



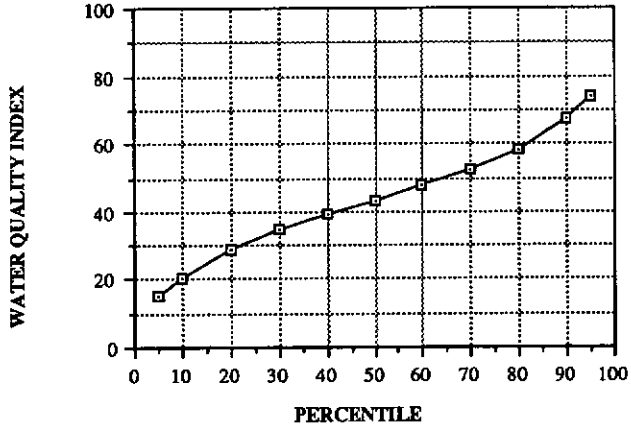
Number of Stations = 1349

LAKE



Number of Stations = 756

STREAM



Number of Stations = 2861

APPENDIX A

Table 1. STORET Water Quality Parameter Codes

Table 2. Summary of the Florida Water Quality Criteria

TABLE 1. STORET WATER QUALITY ASSESSMENT PARAMETERS

STORET PARAMETER NAME	MEASUREMENT UNIT	STORET CODE NUMBER
TOTAL ALKALINITY	MG/L AS CACO3	410
BIOCHEMICAL OXYGEN DEMAND	MG/L (5 DAY)	310
CHLOROPHYLL A	MG/L	32230
CHLOROPHYLL A	UG/L	32210
CHLOROPHYLL A (CORRECTED)	UG/L	32211
CHLORRPHYLL TOTAL	UG/L	32216
CHLOROPHYLL TOTAL	MG/L	32234
COLOR APPARENT	PT-CO UNITS	81
COLOR	PT-CO UNITS	80
SPECIFIC CONDUCTANCE (FIELD)	MICROMHO	94
SPECIFIC CONDUCTANCE (AT 25C)	MICROMHO	95
DIVERSTY INDEX (ARTIFICIAL SUBSTRATE)	SHANNON WEAVER INDEX	82251
DIVERSTY INDEX (NATURAL SUBSTRATE)	SHANNON WEAVER INDEX	82246
BECK'S BIOTIC INDEX	BECK'S BIOTIC INDEX	82256
DISSOLVED OXYGEN	MG/L	300
DISSOLVED OXYGEN (PROBE)	MG/L	299
DISSOLVED OXYGEN PERCENT SATURATION	% SATURATION	301
FLUORIDE TOTAL	MG/L AS F	951
FLUORIDE DISSOLVED	MG/L AS F	950
NITROGEN NITRATE DISSOLVED	MG/L AS N	71851
NITROGEN NO2+NO3	MG/L AS N	630
NITROGEN NO3-N DISSOLVED	MG/L AS N	618
NITROGEN AMMONIA DISSOLVED	MG/L AS N	71846
NITROGEN NO3-N TOTAL	MG/L AS N	620
NITROGEN NH3+NH4- TOTAL	MG/L AS N	610
NITROGEN ORGANIC	MG/L AS N	605
NITROGEN NITRATE TOTAL	MG/L AS N	71850
NITROGEN NH3+NH4- DISSOLVED	MG/L AS N	608
NITROGEN NO2+NO3 DISSOLVED	MG/L AS N	631
NITROGEN TOTAL KJELDAHL	MG/L AS N	625
NITROGEN TOTAL N	MG/L AS N	600
NITROGEN TOTAL N AS NO3	MG/L AS NO3	71887
PHOSPHORUS TOTAL AS P	MG/L AS P	665
PHOSPHORUS TOTAL AS PO4	MG/L AS PO4	71886
PHOSPHORUS ORTHO AS PO4	MG/L AS PO4	660
PH LAB	STANDARD UNIT	403
PH	STANDARD UNIT	400
TRANSPARENCY SECCHI	METERS	78
TRANSPARENCY SECCHI	INCHES	77
TEMPERATURE WATER	CENTEGRADE	10
TOTAL ORGANIC CARBON	MG/L AS C	680
TOTAL COLIFORM MFIMENDO	#/100ML	31501
TOTAL COLIFORM MPN	#/100ML	31505
FECAL COLIFORM MFM-FCBR	#/100ML	31616
FECAL COLIFORM MPNECMED	#/100ML	31615
FECAL STREP MFKFAGAR	#/100ML	31673
FECAL STREP MF M-ENT	#/100ML	31679
TOTAL SUSPENDED SOLIDS RESIDUE TOT NFLT	MG/L	530
TURBIDITY	JTU	70
TURBIDITY HACH	FTU	76

Table 2.

Summary of Florida Criteria for Water Quality Classifications

Bureau of Surface Water Management
Standards and Monitoring Section

The following chart was prepared as a summary of chapter 17-3 F.A.C., Water Quality Standards, as well as portions of chapter 17-550 F.A.C., Drinking Water Standards. It is not intended to be a substitute for these rules, but can be used as a guide to the numeric criteria and to provide references to the appropriate sections in the complete rule. One must go directly to the rule itself to determine the more complex and narrative criteria. Where the rule is more complicated than can be expressed in the table, the phrase "see rule" is added. The table is up to date as of February 1, 1989. However, a reorganization and renumbering of chapter 17-3 is expected to occur in late 1989.

Example

< 10 ug/L ---------- criteria
see rule ---------- complex rule, see reference below
[17-3.091(21) (d)] --- reference to rule

Common abbreviations used in this summary are as follows:

ug/L	= micrograms/liter	umho/cm	= micromhos/centimeter
mg/L	= milligrams/liter	cfs	= cubic feet/second
(P)	= Primary drinking water standard	NB	= natural background
(S)	= Secondary drinking water standard	pCi/L	= picocuries/liter
≥	= greater than or equal to	<	= less than
≤	= less than or equal to	>	= greater than

Summary Table of Water Quality Standards 17-3 (12-28-88) and 17-550 (1-18-89)

	SURFACE WATER QUALITY CLASSIFICATIONS (17-3)						Drinking Water (17-550)
PARAMETER	POTABLE WATER SUPPLIES CLASS I	SHELLFISH PROPAGATION OR HARVESTING CLASS II	RECREATION, FISH & WILDLIFE CLASS III-FRESH	RECREATION, FISH & WILDLIFE CLASS III-MARINE	AGRICULTURAL WATER SUPPLIES CLASS IV	NAVIGATION UTILITY INDUSTRIAL CLASS V	
2-4-5-TP	≤10 µg/L [17-3.091(21)(d)]						≤0.01 mg/L (P) [17-550.310(2)(b)]
2-4-D	≤100 µg/L [17-3.091(21)(c)]						≤0.1 mg/L (P) [17-550.310(2)(b)]
ALDRIN+DIELDRIN	≤0.003 µg/L [17-3.091(21)(a)]	≤0.003 µg/L [17-3.111(18)(a)]	≤0.003 µg/L [17-3.121(20)(a)]	≤0.003 µg/L [17-3.121(20)(a)]			
ALKALINITY ($CaCO_3$)	≥20 mg/l [17-3.091(1)]		≥20 mg/l [17-3.121(1)]		≤600 mg/L [17-3.131(1)]		
ALUMINUM		≤1.5 mg/L [17-3.111(1)]		≤1.5 mg/L [17-3.121(2)]			
AMMONIA (UNIONIZED)	≤0.02 mg/l [17-3.091(2)]		≤0.02 mg/l [17-3.121(3)]				
ANTIMONY		≤0.2 mg/L [17-3.111(2)]		≤0.2 mg/L [17-3.121(4)]			
ARSENIC	≤0.05 mg/L [17-3.061(3)(a)]	≤0.05 mg/L [17-3.061(3)(a)]	≤0.05 mg/L [17-3.061(3)(a)]	≤0.05 mg/L [17-3.061(3)(a)]	≤0.05 mg/L [17-3.061(3)(a)]	≤0.05 mg/L [17-3.061(3)(a)]	≤0.05 mg/L (P) [17-550.310(1)(a)]
BACTERIOLOGICAL (FECAL COLIFORM BACTERIA)	≤200/100ml in min.-5 samples/30 days. >400/100ml in <10% complex-see rule [17-3.091(3)]	≤14/100ml median >43/100 in <10% complex-see rule [17-3.111(3)]	≤200/100ml average >400/100 in <10% ≤800/100 complex-see rule [17-3.121(5)]	≤200/100ml average >400/100 in <10% ≤800/100 complex-see rule [17-3.121(5)]			
BACTERIOLOCICAL (TOTAL COLIFORM BACTERIA)	≤1000/100ml average >1000/100ml in <20% ≤2400/100ml complex-see rule [17-3.091(3)]	≤70/100ml median >230/100ml in <10% complex-see rule [17-3.111(3)]	≤1000/100ml average >1000/100ml in <20% ≤2400/100ml complex-see rule [17-3.121(5)]	≤1000/100ml average >1000/100ml in <20% ≤2400/100ml complex-see rule [17-3.121(5)]			2 types, avg. and single sample complex-see rule [17-550.310(4)]
BARIUM	≤1 mg/l [17-3.091(4)]						≤1.0 mg/L (P) [17-550.310(1)(a)]
BERYLLIUM	≤0.011 mg/l when hardness ≤150 mg/L ≤1.1 mg/l when hardness >150 mg/L [17-3.091(5)]		≤0.011 mg/l when hardness ≤150 mg/L ≤1.1 mg/l when hardness >150 mg/L [17-3.121(6)]		≤0.1 mg/L when hardness ≤250 mg/L ≤0.5 mg/L when hardness >250 mg/L [17-3.131(2)]		

Summary Table of Water Quality Standards 17-3 (12-28-88) and 17-550 (1-18-89)

	SURFACE WATER QUALITY CLASSIFICATIONS (17-3)						Drinking Water (17-550)
PARAMETER	POTABLE WATER SUPPLIES CLASS I	SHELLFISH PROPAGATION OR HARVESTING CLASS II	RECREATION, FISH & WILDLIFE CLASS III-FRESH	RECREATION, FISH & WILDLIFE CLASS III-MARINE	AGRICULTURAL WATER SUPPLIES CLASS IV	NAVIGATION UTILITY INDUSTRIAL CLASS V	
BIOLOGICAL INTEGRITY	not reduced to less than 75% of background [17-3.091(6)]	not reduced to less than 75% of background [17-3.111(4)]	not reduced to less than 75% of background [17-3.121(7)]	not reduced to less than 75% of background [17-3.121(7)]			
BIOCHEMICAL OXYGEN DEMAND	complex-see rule [17-3.061(3)(b)]	complex-see rule [17-3.061(3)(b)]	complex-see rule [17-3.061(3)(b)]	complex-see rule [17-3.061(3)(b)]	complex-see rule [17-3.061(3)(b)]	complex-see rule [17-3.061(3)(b)]	
BORON					≤0.75mg/L [17-3.131(3)]		
BROMATES		≤100 mg/L [17-3.111(5)]		≤100 mg/L [17-3.121(8)]			
BROMINE		≤0.1 mg/L as free Br [17-3.111(5)]		≤0.1 mg/L as free Br [17-3.121(8)]			
CADMIUM	≤0.8 µg/L when hardness ≤150 ≤1.2 µg/L when hardness >150 [17-3.091(7)]	≤5 µg/L [17-3.111(6)]	≤0.8 µg/L when hardness ≤150 ≤1.2 µg/L when hardness >150 [17-3.121(9)]	≤5 µg/L [17-3.121(9)]			≤0.01 mg/L (P) [17-550.310(1)(a)]
CHLORDANE	≤0.01 µg/L [17-3.091(21)(b)]	≤0.004 µg/L [17-3.111(18)(b)]	≤0.01 µg/L [17-3.121(20)(b)]	≤0.004 µg/L [17-3.121(20)(b)]			
CHLORIDES	≤250 mg/L [17-3.091(8)]	Not >10% above background [17-3.061(3)(c)]	Not >10% above background [17-3.061(3)(c)]	Not >10% above background [17-3.061(3)(c)]	Not >10% above background [17-3.061(3)(c)]	Not >10% above background [17-3.061(3)(c)]	≤250 mg/L (S) [17-550.320]
CHLORINE	≤0.01 mg/L [17-3.091(9)]	≤0.01 mg/L [17-3.111(7)]	≤0.01 mg/l [17-3.121(10)]	≤0.01 mg/l [17-3.121(10)]			
CHROMIUM	≤0.05 mg/L complex-see rule [17-3.061(3)(d)]	≤0.05 mg/L complex-see rule [17-3.061(3)(d)]	≤0.05 mg/L complex-see rule [17-3.061(3)(d)]	≤0.05 mg/L complex-see rule [17-3.061(3)(d)]	≤0.05 mg/L complex-see rule [17-3.061(3)(d)]	≤0.05 mg/L complex-see rule [17-3.061(3)(d)]	≤0.05 mg/l (P) [17-550.310(1)(a)]
COLOR					Complex-see rule [17-3.131(4)]		≤15 Color units (S) [17-550.320]
CONDUCTANCE, SPECIFIC	≤50% increase or 1275 µmho/cm max [17-3.061(3)(o)]	≤50% increase or 1275 µmho/cm max [17-3.061(3)(o)]	≤50% increase or 1275 µmho/cm max [17-3.061(3)(o)]		≤50% increase or 1275 µmho/cm max [17-3.061(3)(o)]	≤4000 µmho [17-3.141(8)]	

Summary Table of Water Quality Standards 17-3 (12-28-88) and 17-550 (1-18-89)

	SURFACE WATER QUALITY CLASSIFICATIONS (17-3)						Drinking Water (17-550)
PARAMETER	POTABLE WATER SUPPLIES CLASS I	SHELLFISH PROPAGATION OR HARVESTING CLASS II	RECREATION, FISH & WILDLIFE CLASS III-FRESH	RECREATION, FISH & WILDLIFE CLASS III-MARINE	AGRICULTURAL WATER SUPPLIES CLASS IV	NAVIGATION UTILITY INDUSTRIAL CLASS V	
COPPER	≤30 µg/L [17-3.091(10)]	≤0.015 mg/L [17-3.111(8)]	≤0.03 mg/L [17-3.121(11)]	≤0.015 mg/L [17-3.121(11)]	≤0.5 mg/L [17-3.061(3)(e)]	≤0.5 mg/L [17-3.061(3)(e)]	≤1 mg/l (S) [17-550.320]
CYANIDE	≤5 µg/L [17-3.091(11)]	≤5 µg/L [17-3.111(9)]	≤5 µg/L [17-3.121(12)]	≤5 µg/L [17-3.121(12)]	≤5 µg/L [17-3.131(4)]	≤5 µg/L [17-3.141(1)]	
DDT	≤0.001 µg/L [17-3.091(21)(e)]	≤0.001 µg/L [17-3.111(18)(c)]	≤0.001 µg/L [17-3.121(20)(c)]	≤0.001 µg/L [17-3.121(20)(c)]			
DEMETON	≤0.1 µg/L [17-3.091(21)(f)]	≤0.1 µg/L [17-3.111(18)(d)]	≤0.1 µg/L [17-3.121(20)(d)]	≤0.1 µg/L [17-3.121(20)(d)]			
DETERGENTS	≤0.5 mg/L [17-3.061(3)(f)]	≤0.5 mg/L [17-3.061(3)(f)]	≤0.5 mg/L [17-3.061(3)(f)]	≤0.5 mg/L [17-3.061(3)(f)]	≤0.5 mg/L [17-3.061(3)(f)]	≤0.5 mg/L [17-3.061(3)(f)]	
DISSOLVED OXYGEN	complex-see rule [17-3.061(3)(g)] ≥5 mg/L [17-3.091(12)]	complex-see rule [17-3.061(3)(g)] ≥5 mg/L avg.24 hrs. ≥4 mg/L [17-3.111(10)]	complex-see rule [17-3.061(3)(g)] ≥5 mg/L [17-3.121(13)]	complex-see rule [17-3.061(3)(g)] ≥5 mg/L avg 24 hrs. ≥4 mg/L [17-3.121(13)]	complex-see rule [17-3.061(3)(g)] ≥4 mg/L 24 hr avg. ≥3 mg/L [17-3.131(6)]	complex-see rule [17-3.061(3)(g)] ≥0.3 mg/L 50% of time where flow >250 cfs ≥0.1 mg/L [17-3.141(2)]	
DISSOLVED SOLIDS	≤500 mg/L average ≤1000 mg/L [17-3.091(13)]						≤500 mg/L complex-see rule (S) [17-550.320]
ENDOSULFAN	≤0.003 µg/L [17-3.091(21)(g)]	≤0.001 µg/L [17-3.111(18)(e)]	≤0.003 µg/L [17-3.121(20)(e)]	≤0.001 µg/L [17-3.121(20)(e)]			
ENDRIN	≤0.004 µg/L [17-3.091(21)(h)]	≤0.004 µg/L [17-3.111(18)(f)]	≤0.004 µg/L [17-3.121(20)(f)]	≤0.004 µg/L [17-3.121(20)(f)]			≤0.0002 mg/l (P) [17-550.310(2)(a)]
FLUORIDES	≤1.5 mg/l [17-3.091(14)]	≤1.5 mg/l [17-3.111(11)]	≤10 mg/L [17-3.061(3)(h)]	≤5 mg/L [17-3.121(14)]	≤10 mg/L [17-3.061(3)(h)]	≤10 mg/L [17-3.061(3)(h)]	≤4 mg/L (P) [17-550.310(1)(a)] ≤2 mg/L (S) [17-550.320]
FOAMING AGENTS							≤0.5 mg/L (S) [17-550.320]

Summary Table of Water Quality Standards 17-3 (12-28-88) and 17-550 (1-18-89)

	SURFACE WATER QUALITY CLASSIFICATIONS (17-3)						Drinking Water (17-550)
PARAMETER	POTABLE WATER SUPPLIES CLASS I	SHELLFISH PROPAGATION OR HARVESTING CLASS II	RECREATION, FISH & WILDLIFE CLASS III-FRESH	RECREATION, FISH & WILDLIFE CLASS III-MARINE	AGRICULTURAL WATER SUPPLIES CLASS IV	NAVIGATION UTILITY INDUSTRIAL CLASS V	
"FREE FROMS"	complex-see rule [17-3.051]	complex-see rule [17-3.051]	complex-see rule [17-3.051]	complex-see rule [17-3.051]	complex-see rule [17-3.051]	complex-see rule [17-3.051]	
GUTHION	≤0.01 µg/L [17-3.091(21)(i)]	≤0.01 µg/L [17-3.111(18)(g)]	≤0.01 µg/L [17-3.121(20)(g)]	≤0.01 µg/L [17-3.121(20)(g)]			
HEPTACHLOR	≤0.001 µg/L [17-3.091(21)(j)]	≤0.001 µg/L [17-3.111(18)(h)]	≤0.001 µg/L [17-3.121(20)(h)]	≤0.001 µg/L [17-3.121(20)(h)]			
INJURIOUS SUBSTANCES	none [17-3.061(3)(p)]	none [17-3.061(3)(p)]	none [17-3.061(3)(p)]	none [17-3.061(3)(p)]	none [17-3.061(3)(p)]	none [17-3.061(3)(p)]	
IRON	≤0.3 mg/L [17-3.091(15)]	≤0.3 mg/L [17-3.111(12)]	≤1 mg/L [17-3.121(15)]	≤0.3mg/L [17-3.121(15)]	≤1 mg/L [17-3.131(7)]		≤0.3 mg/L (S) [17-550.320]
LEAD	≤0.03 mg/L [17-3.091(16)]	≤0.05 mg/L [17-3.061(3)(i)]	≤0.03 mg/L [17-3.121(16)]	≤0.05 mg/L [17-3.061(3)(i)]	≤0.05 mg/L [17-3.061(3)(i)]	≤0.05 mg/L [17-3.061(3)(i)]	≤0.05 mg/L (P) [17-550.310(1)(a)]
LINDANE	≤0.01 µg/L [17-3.091(21)(k)]	≤0.004 µg/L [17-3.111(18)(l)]	≤0.01 µg/L [17-3.121(20)(i)]	≤0.004 µg/L [17-3.121(20)(i)]			≤0.004 mg/L (P) [17-550.310(2)(a)]
MALATHION	≤0.1 µg/L [17-3.091(21)(l)]	≤0.1 µg/L [17-3.111(18)(j)]	≤0.1 µg/L [17-3.121(20)(j)]	≤0.1 µg/L [17-3.121(20)(j)]			
MANGANESE		≤0.1 mg/L [17-3.111(13)]					≤0.05 mg/L (S) [17-550.320]
MERCURY	≤0.2 µg/L [17-3.091(17)]	≤0.1 µg/L [17-3.111(14)]	≤0.2 µg/L [17-3.121(17)]	≤0.1 µg/L [17-3.121(17)]	≤0.2 µg/L [17-3.131(8)]	≤0.2 µg/L [17-3.141(3)]	≤0.002 mg/L (P) [17-550.310(1)(a)]
METHOXYCHLOR	≤0.03 µg/L [17-3.091(21)(m)]	≤0.03 µg/L [17-3.111(18)(k)]	≤0.03 µg/L [17-3.121(20)(k)]	≤0.03 µg/L [17-3.121(20)(k)]			≤0.1 mg/L (P) [17-550.310(2)(a)]
MIREX	≤0.001 µg/L [17-3.091(21)(n)]	≤0.001 µg/L [17-3.111(18)(l)]	≤0.001 µg/L [17-3.121(20)(l)]	≤0.001 µg/L [17-3.121(20)(l)]			
NICKEL	≤0.1 mg/l [17-3.091(18)]	≤0.1 mg/l [17-3.111(15)]	≤0.1 mg/l [17-3.121(18)]	≤0.1 mg/l [17-3.121(18)]	≤0.1 mg/l [17-3.131(9)]		
NITRATE	≤10 mg/l [17-3.091(19)]						≤10 mg/L (P) [17-550.310(1)(a)]

Summary Table of Water Quality Standards 17-3 (12-28-88) and 17-550 (1-18-89)

	SURFACE WATER QUALITY CLASSIFICATIONS (17-3)						Drinking Water (17-550)
PARAMETER	POTABLE WATER SUPPLIES CLASS I	SHELLFISH PROPAGATION OR HARVESTING CLASS II	RECREATION, FISH & WILDLIFE CLASS III-FRESH	RECREATION, FISH & WILDLIFE CLASS III-MARINE	AGRICULTURAL WATER SUPPLIES CLASS IV	NAVIGATION UTILITY INDUSTRIAL CLASS V	
NUTRIENTS	limit as needed [17-3.061(3)(j)] cause no imbalance [17-3.091(20)]	limit as needed [17-3.061(3)(j)] cause no imbalance [17-3.111(16)]	limit as needed [17-3.061(3)(j)] cause no imbalance [17-3.121(19)]	limit as needed [17-3.061(3)(j)] cause no imbalance [17-3.121(19)]	limit as needed [17-3.061(3)(j)]	limit as needed [17-3.061(3)(j)]	
ODOR		≤24 threshold odor number at 60° C. [17-3.111(17)]				less than an amount which would interfere with use [17-3.141(4)]	≤3 threshold odor number (S) [17-550-320]
OILS	≤5 mg/L None visible [17-3.061(3)(k)]	≤5 mg/L None visible [17-3.061(3)(k)]	≤5 mg/L None visible [17-3.061(3)(k)]	≤5 mg/L None visible [17-3.061(3)(k)]	≤5 mg/L None visible [17-3.061(3)(k)]	≤10 mg/L complex-see rule [17-3.141(5)]	
PARATHION	≤0.04 µg/L [17-3.091(21)(o)]	≤0.04 µg/L [17-3.111(18)(m)]	≤0.04 µg/L [17-3.121(20)(m)]	≤0.04 µg/L [17-3.121(20)(m)]			
pH	≤NB ± 1 unit 6 min. 8.5 max complex-see rule [17-3.061(3)(l)]	≤NB ± 1 unit 6.5 min. 8.5 max complex-see rule [17-3.111(19)]	≤NB ± 1 unit 6 min. 8.5 max complex-see rule [17-3.121(21)]	≤NB ± 1 unit 6.5 min. 8.5 max complex-see rule [17-3.121(21)]	≤NB ± 1 unit 6 min. 8.5 max complex-see rule [17-3.061(3)(l)]	not <5 or >9.5 complex-see rule [17-3.141(6)]	6.5-8.5 at collecting point (S) [17-550.320]
PHENOLIC COMPOUNDS	1 µg/L complex-see rule [17-3.061(3)(m)]	1 µg/L complex-see rule [17-3.061(3)(m)]	1 µg/L complex-see rule [17-3.061(3)(m)]	1 µg/L complex-see rule [17-3.061(3)(m)]	1 µg/L complex-see rule [17-3.061(3)(m)]	≤0.05 mg/L [17-3.061(3)(m)]	
PHENOL	1 µg/L complex-see rule [17-3.061(3)(m)]	1 µg/L complex-see rule [17-3.061(3)(m)]	1 µg/L complex-see rule [17-3.061(3)(m)]	1 µg/L complex-see rule [17-3.061(3)(m)]	1 µg/L complex-see rule [17-3.061(3)(m)]	≤0.2 mg/L [17-3.141(7)]	
PHOSPHORUS (ELEMENTAL)		≤0.1 µg/L [17-3.111(20)]		≤0.1 µg/L [17-3.121(22)]			
PHTHALATE ESTERS	≤3 µg/L [17-3.091(22)]		≤3 µg/L [17-3.121(23)]				
POLYCHLORINATED BIPHENYLS	≤0.001 µg/L [17-3.091(23)]	≤0.001 µg/L [17-3.111(21)]	≤0.001 µg/L [17-3.121(24)]	≤0.001 µg/L [17-3.121(24)]			

Summary Table of Water Quality Standards 17-3 (12-28-88) and 17-550 (1-18-89)

	SURFACE WATER QUALITY CLASSIFICATIONS (17-3)						Drinking Water (17-550)
PARAMETER	POTABLE WATER SUPPLIES CLASS I	SHELLFISH PROPAGATION OR HARVESTING CLASS II	RECREATION, FISH & WILDLIFE CLASS III-FRESH	RECREATION, FISH & WILDLIFE CLASS III-MARINE	AGRICULTURAL WATER SUPPLIES CLASS IV	NAVIGATION UTILITY INDUSTRIAL CLASS V	
RADIOACTIVE SUBSTANCES	≤5 pCi/L radium <15 pCi/L gross alpha complex-see rule [17-3.061(3)(n)]	≤5 pCi/L radium ≤15 pCi/L gross alpha complex-see rule [17-3.061(3)(n)]	≤5 pCi/L radium ≤15 pCi/L gross alpha complex-see rule [17-3.061(3)(n)]	≤5 pCi/L radium ≤15 pCi/L gross alpha complex-see rule [17-3.061(3)(n)]	≤5 pCi/L radium ≤15 pCi/L gross alpha complex-see rule [17-3.061(3)(n)]	≤5 pCi/L radium ≤15 pCi/L gross alpha complex-see rule [17-3.061(3)(n)]	≤5 pCi/L combined radium-226 & radium-228 ≤15 pCi/L gross alpha see rule (P) [17-550.310(5)(a)]
SELENIUM	≤0.01 mg/l [17-3.091(24)]	≤0.025 mg/L [17-3.111(22)]	≤0.025 mg/L [17-3.121(25)]	≤0.025 mg/L [17-3.121(25)]			≤0.01 mg/L (P) [17-550.310(1)(a)]
SILVER	≤0.07 µg/L [17-3.091(25)]	≤0.05 µg/L [17-3.111(23)]	≤0.07 µg/L [17-3.121(26)]	≤0.05 µg/L [17-3.121(26)]			≤0.05 mg/L (S) [17-550.310(1)(a)]
SODIUM							≤160 mg/L (P) [17-550.310(1)(a)
SULFATE							≤250 mg/L (S) [17-550.320]
TOXIC SUBSTANCES	none [17-3.061(3)(p)]	none [17-3.061(3)(p)]	none [17-3.061(3)(p)]	none [17-3.061(3)(p)]	none [17-3.061(3)(p)]	none [17-3.061(3)(p)]	
TOTAL DISSOLVED GASES	≤110% of saturation value [17-3.091(26)]	≤110% of saturation value [17-3.111(24)]	≤110% of saturation value [17-3.121(27)]	≤110% of saturation value [17-3.121(27)]			
TOXAPHENE	≤0.005 µg/L [17-3.091(21)(p)]	≤0.005 µg/L [17-3.111(18)(n)]	≤0.005 µg/L [17-3.121(20)(n)]	≤0.005 µg/L [17-3.121(20)(n)]			≤0.005 mg/L (P) [17-550.310(2)(a)]
TRANSPARENCY	complex-see rule [17-3.091(27)]	complex-see rule [17-3.111(25)]	complex-see rule [17-3.121(28)]	complex-see rule [17-3.121(28)]			
TURBIDITY	≤29 NTU's above background [17-3.061(3)(r)]	≤29 NTU's above background [17-3.061(3)(r)]	≤29 NTU's above background [17-3.061(3)(r)]	≤29 NTU's above background [17-3.061(3)(r)]	≤29 NTU's above background [17-3.061(3)(r)]	≤29 NTU's above background [17-3.061(3)(r)]	≤1 unit (P) [17-550.310(3)(a)]
ZINC	≤0.03 mg/l [17-3.091(26)]	≤1 mg/l [17-3.061(3)(r)]	≤0.03 mg/l [17-3.121(29)]	≤1 mg/l [17-3.061(3)(r)]	≤1 mg/l [17-3.061(3)(r)]	≤1 mg/l [17-3.061(3)(r)]	≤5 mg/L (S) [17-550.320]