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

by Joe Hand

Watershed Assessment Section
Bureau of Watershed Management
Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, FL 32399

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Acknowledgments

(To be drafted)

Table of Contents

Introduction……………………………......4

Typical Water Quality Values, by Parameter…………………….....5

Alkalinity…………………………………6
Aluminum…………………………………7
Antimony……………………………........8
Arsenic………………………………….....9
Barium……………………………….......10
Beryllium………………………….............11
Biochemical Oxygen Demand……………….…...............12
Cadmium………………………………......13
Calcium……………………………….......14
Chemical Oxygen Demand..15
Chloride……………………………….......16
Chlorophyll……………………………….17
Chlorophyll corrected………………..... .18
Chlorophyll b……………………….........19
Chlorophyll c………………………….....20
Chromium III……………………….….....21
Cobalt, Total…………………….…………22
Color………………………………….......23
Conductance……………………….........24
Copper…………………………………….25
Dissolved Iron as FE……………………26
Dissolved Organic Carbon as C………27
Dissolved Oxygen……………………….28
Dissolved Solids…………………………29
Endosulfan………………………….........30
Fecal Coliform……………………………31
Fecal Streptococci…………………….32
Flow………………………………………33
Fluoride………………………………….34
Hardness…………………………….....35
Iron……………………………………….36
Lead………………………………………37
Light Attenuation Coefficient………...38
Magnesium as MG……………………39
Manganese……………………………..40
Mercury……………………………......41
Molybdenum, Total..............................42
Nickel...43
Nickel in Sediment...............................44
Nitrate...45
Nitrate Nitrite..46
Nitrite Nitrogen as N…………………...47
Nitrogen Ammonia as N.......................48
Nitrogen Inorganic as N………………49
Nitrogen Kjeldahl as N…………………50
Nitrogen Organic as N…………………51
Nitrogen Total as N……………………52
Oil/Grease……………………………….53
Orthophosphate as PO4………………54
(Dissolved) Oxygen Percent Saturation……………………………55
pH…………………………………………56
Pheophytin a……………………………57
Phosphorus in Total Orthophosphate as P……….58
Phosphorus Total as P………………..59
Phosphorus, Dissolved Organic as P…………………………60
Phosphorus, Dissolved Orthophosphate as P……………...61
Potassium as K...............................62
Salinity..63
Secchi Depth………………………..64
Selenium……………………….........65
Silver..66
Sodium as NA................................67
Stream Velocity……………………..68
Sulfate as SO4……………………...69
Temperature (C.º)………………......70
Thallium…………………………......71
Tin……………………………….........72
Total Coliform…………………..…..…73
Total Organic Carbon as C…........74
Total Residue…………………….......75
Total Residue Filtrable Dried……...76
Total Residue Nonfiltrable…….......77
Total Suspended Solids……….......78
Turbidity……………………………...79
Unionized Ammonia……………… .80
Vanadium, Total……………….........81
Zinc……………………………………82

Appendix A…………………………83
Table 1: STORET Water Quality Parameter Codes................84

Table 2: Summary of Florida Water Quality Criteria, Section 62-302.530, F.A.C...............85

Sources……………………………..100

Introduction

by Joe Hand

This report presents statewide distributions for typical values of the most commonly collected surface water quality parameters in Florida. The data used in these analyses were obtained from the water quality database for the state; the database currently includes records for over 27 million individual observations from over 100,000 stations on a variety of water quality parameters and ancillary information. The majority of these data came from water quality monitoring stations in Florida's major rivers and streams, lakes, estuaries, and coastal areas. The data were placed in STORET, the U.S. Environmental Protection Agency's STOrage and RETrieval database.

For this report, the 10 most recent years of data (which years, specifically?) were extracted from Florida STORET and analyzed to construct distributions for 78 different water quality parameters, including nutrients, bacteria, oxygen (and oxygen-demanding substances), measures of water clarity, metals, and pesticides. All stations with current waterbody assignments (what does this mean?) were included in these analyses, after removing only those stations known to be nonambient sites (what are these?). For each water quality parameter, annual medians were first calculated for individual monitoring stations, and then, for each year, the annual medians for individual stations were used to calculate an overall median for the 10 years of data, by waterbody type.

This approach dampens any potential bias caused by the inclusion of outlier values, while still incorporating a fairly representative sample of data from as many stations as possible, and thereby also maximizing the spatial coverage of the analysis. A percentile distribution is presented for each combination of water quality parameter and waterbody type, along with values for the corresponding deciles (with the 50th percentile representing the median station value for each specific waterbody type, among all the water quality monitoring stations in the state).

The current approach has several limitations. First, the model used did not control for differences in measured values for water quality parameters that might have been caused by the state's geographic north-south gradient, which for some parameters may be substantial. Second, it did not control for any differences in measured values for water quality parameters that might have been introduced by the use of different analytic techniques (some STORET water quality constituents may validly be measured by several different analytic techniques: for example, Winkler versus probe measurements for dissolved oxygen, laboratory versus field measurements for pH, and membrane filter versus most probable number [MPN] counts for fecal coliform bacteria). Despite these limitations, the overall distribution of data presented in this report should nonetheless present an informative overview of typical values for individual surface water quality parameters in Florida.

Typical Water Quality Values, by Parameter

Alkalinity (ALK)
Milligrams per liter (mg/L)

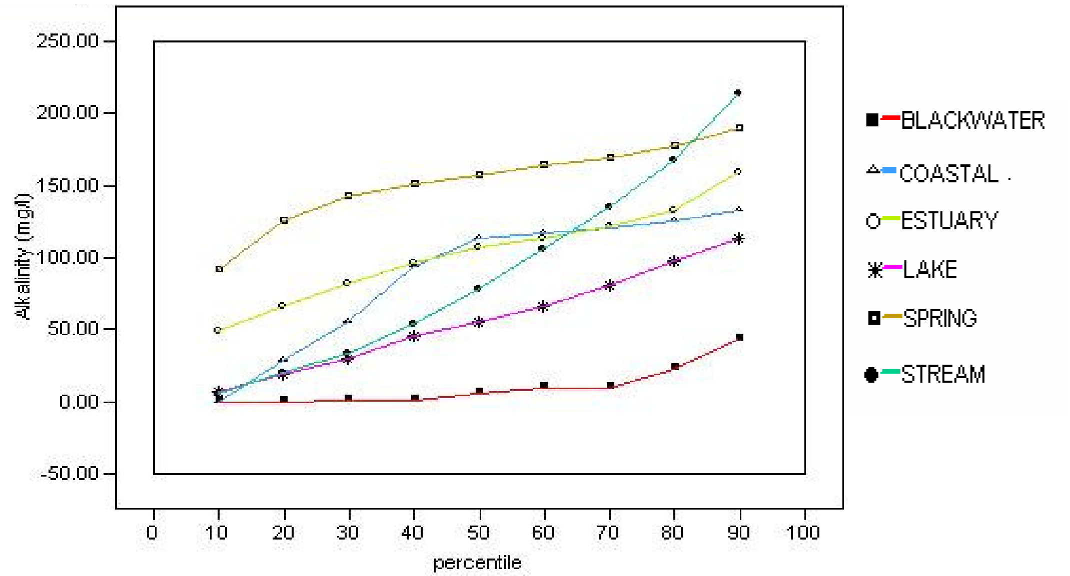
Alkalinity is a measure of water's capacity to neutralize acids (hat is, to increase pH levels) and provide buffering. As they dissolve, compounds such as calcium carbonate, magnesium carbonate, bicarbonates, phosphates, and hydroxides in rocks and minerals naturally contribute to water's buffering capacity. Buffering agents used in municipal water treatment plants and industrial facilities also decrease the corrosive character of certain effluents by increasing alkalinity.

The buffering effect of alkalinity exerts a major influence on pH, and pH directly affects aquatic organisms and the toxic characteristics of certain pollutants that these organisms may encounter. Alkalinity also protects aquatic life against dramatic changes in pH; these changes are difficult for living organisms to adapt to and can severely stress and even kill sensitive species. Thus it is crucial that surface waters exhibit a minimal level of alkalinity to restrict dramatic pH swings.

Florida's criterion for Class III surface waters specifies that alkalinity shall not be depressed below 20 mg CaCO3/L. Class III waters are designated for recreation, propagation, and the maintenance of a healthy, well-balanced population of fish and wildlife.

Source: Florida Department of Environmental Protection (FDEP); Florida LakeWatch

Percentile distribution of water quality parameters by waterbody type



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.30	0.00	50.17	7.00	91.80	6.00
20	0.80	29.19	66.31	20.00	126.00	20.80
30	1.00	55.44	83.05	30.60	143.00	34.40
40	2.00	94.40	97.00	46.00	152.00	54.70
50	6.00	114.00	108.00	56.00	158.00	79.10
60	10.00	118.00	114.11	66.40	165.00	107.00
70	10.00	121.00	121.80	81.20	170.00	135.40
80	23.00	126.00	133.00	98.18	178.00	168.60
90	44.00	133.00	160.00	114.00	190.00	213.80

Aluminum (AL)

Micrograms per liter (µg/L)

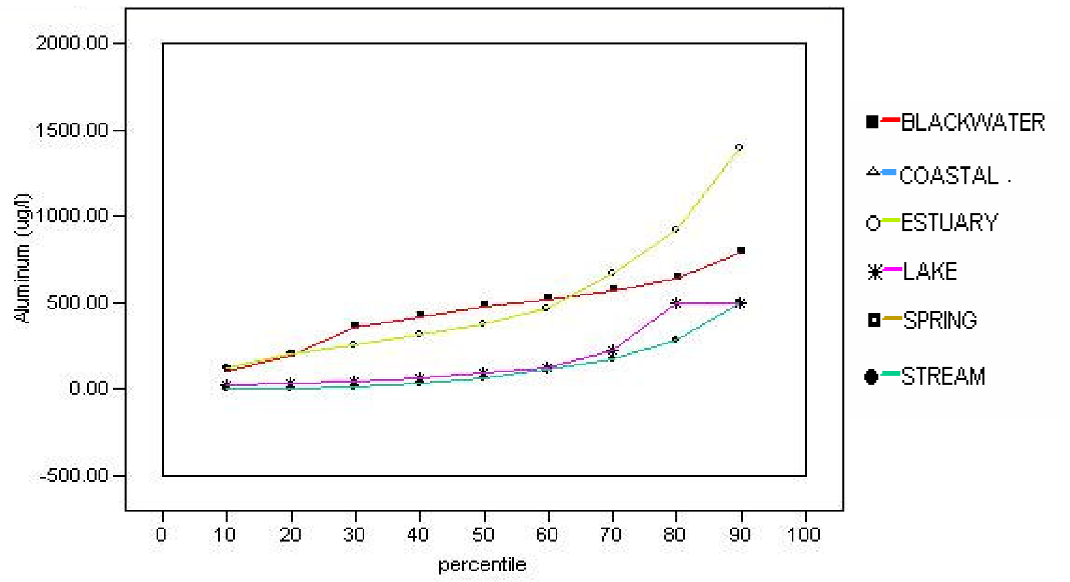
Aluminum is the most abundant metallic element in the earth's crust. It occurs in combination with silicon and oxygen to form feldspars, micas, and clay minerals, the most important being bauxite and corundum. The average abundance of aluminum in the earth's crust is about 8.1 percent; in soils it varies between 0.9 and 6.5 percent, and in streams about 400 mg/L.

In natural waters, pH and very finely suspended mineral particles control the occurrence of aluminum: for a pH of less than 4, the cation Al^{3+} predominates; above neutral pH, the predominant dissolved form of aluminum is $Al(OH)_4^-$.

Aluminum potassium sulfate (alum) is used in water treatment processes to flocculate (aggregate) suspended particles, but may leave aluminum residue in the finished water. Aluminum has not been determined to be essential for plants and animals.

Concentrations exceeding 1.5 milligrams per liter (mg/L) are toxic in the marine environment; levels below 200 mg/L pose a minimal risk. The U.S. Environmental Protection Agency's (EPA) secondary drinking water standard for aluminum is 0.05 to .2 mg/L.

Source: Agency for Toxic Substances and Disease Registry (ATSDR)



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	105.00	.	130.00	25.00	.	5.00
20	205.23	.	211.00	35.23	.	8.00
30	363.50	.	260.00	49.50	.	20.00
40	427.00	.	320.00	69.10	.	44.00
50	486.00	.	382.50	95.80	.	71.00
60	520.00	.	471.00	128.65	.	116.00
70	570.00	.	672.00	226.43	.	181.00
80	643.00	.	927.00	500.00	.	290.00
90	793.00	.	1400.00	500.00	.	500.00

Antimony (SB)

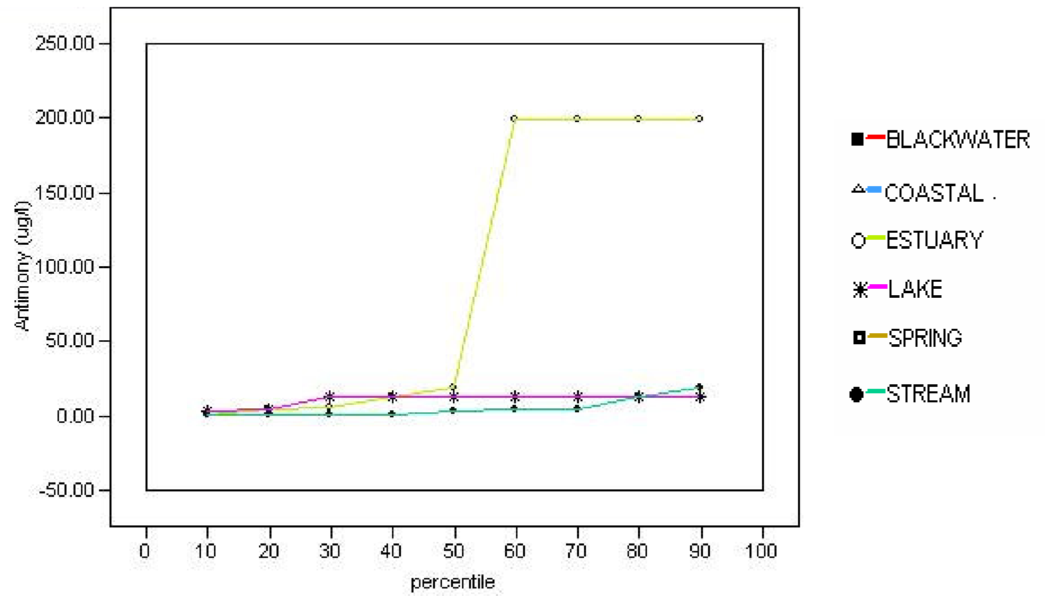
Micrograms per liter (µg/L)

Antimony, a silvery-white metal, is found in the earth's crust. Antimony ores are mined and then mixed with other metals to form antimony alloys, or combined with oxygen to form antimony oxide. Although little antimony is currently mined in the United States, it is imported for processing, and some companies produce antimony as a by-product of smelting lead and other metals. Antimony is used in batteries, solder, sheet and pipe metal, bearings, castings, and pewter. Antimony oxide is used as a flame retardant in textiles and plastics. It is also used in paints, ceramics, and fireworks, and as enamels for plastics, metal, and glass.

In the air, antimony is attached to very small particles that may stay in the air for many days. Most antimony ends up in soil, where it attaches strongly to particles that contain iron, manganese, or aluminum. Antimony is found at low levels in some rivers, lakes, and streams.

High levels of the metal can be toxic to humans and animals. The EPA allows 0.006 parts per million (ppm) of antimony in drinking water.

Source: ATSDR



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	.	.	2.00	4.00	.	1.00
20	.	.	5.00	5.00	.	1.40
30	.	.	6.20	13.00	.	1.60
40	.	.	13.00	13.00	.	2.00
50	.	.	20.00	13.00	.	3.85
60	.	.	200.00	13.00	.	5.00
70	.	.	200.00	13.00	.	5.00
80	.	.	200.00	13.00	.	13.00
90	.	.	200.00	13.00	.	20.00

Arsenic (AS)

Micrograms per liter (µg/L)

Arsenic, a naturally occurring element, is widely distributed in the earth's crust. In the environment, arsenic is combined with oxygen, chlorine, and sulfur to form inorganic arsenic compounds, which are mainly used to preserve wood.

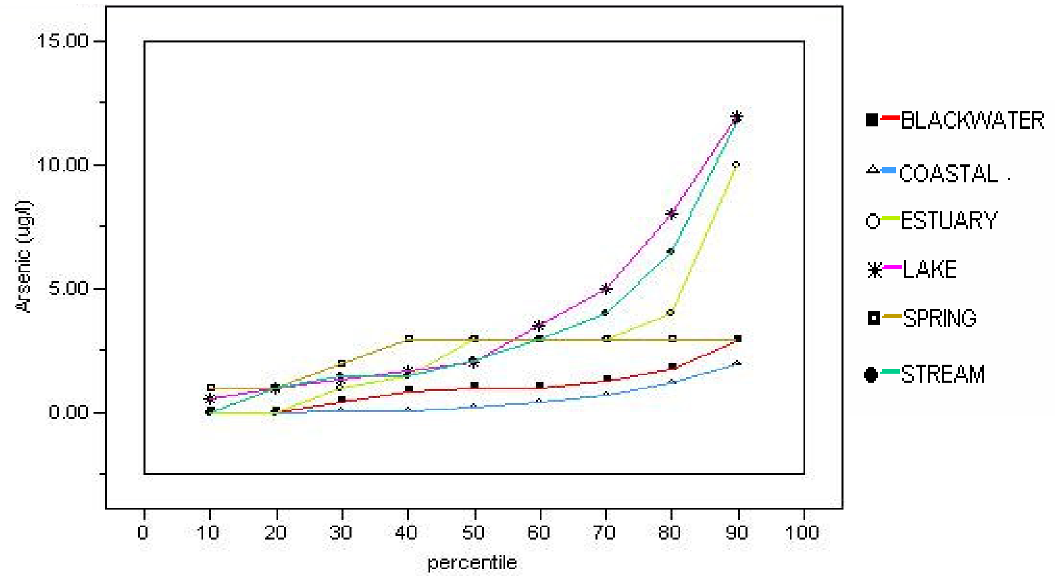
Arsenic in animals and plants combines with carbon and hydrogen to form organic arsenic compounds. These are used as pesticides, primarily on cotton plants. Although organic arsenic compounds are less toxic than inorganic compounds, exposure to high levels of some organic arsenic compounds may cause similar effects.

Arsenic cannot be destroyed in the environment. It can only change its form. Arsenic in air settles to the ground or is washed out of the air by rain. Many arsenic compounds are water soluble. Fish and shellfish can accumulate arsenic, but the arsenic in fish is mostly in a form that is not harmful.

The EPA has set limits on the amount of arsenic that industrial sources can release to the environment and has restricted or canceled many uses of arsenic in pesticides. Currently, the EPA has set a limit of 0.05 ppm for arsenic in drinking water.

Source: ATSDR

Percentile distribution of water quality parameters by waterbody type



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.00	0.00	0.00	0.56	1.00	0.00
20	0.01	0.00	0.00	1.00	1.00	1.00
30	0.45	0.10	1.00	1.38	2.00	1.50
40	0.88	0.10	1.50	1.67	3.00	1.50
50	1.00	0.20	3.00	2.03	3.00	2.10
60	1.00	0.40	3.00	3.50	3.00	3.00
70	1.24	0.70	3.00	5.00	3.00	4.00
80	1.74	1.20	4.00	8.07	3.00	6.50
90	2.90	2.00	10.00	12.00	3.00	11.80

Barium (BA)

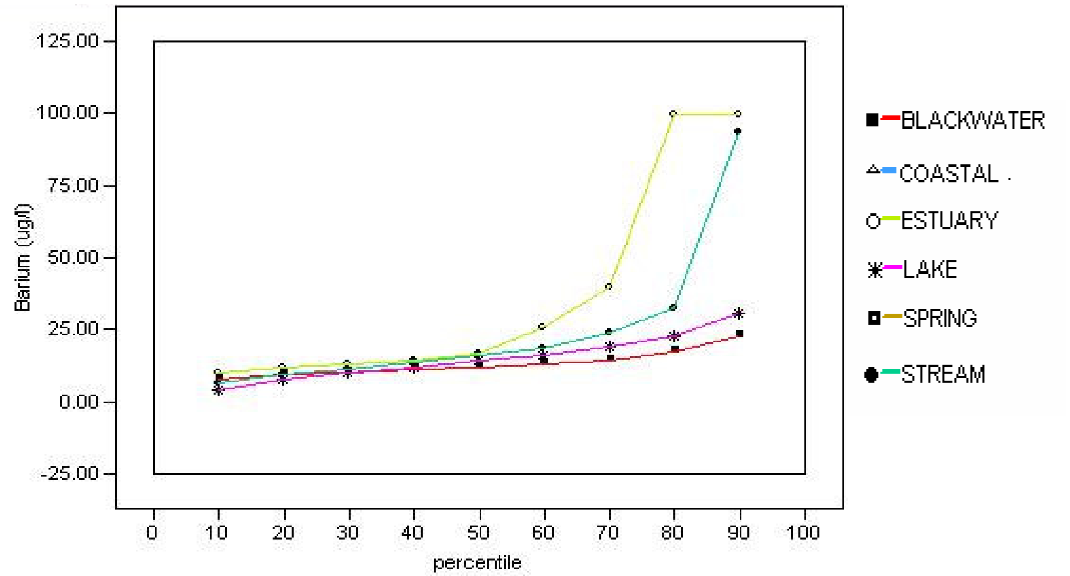
Micrograms per liter (µg/L)

Barium, a silvery-white metal, is found in nature combined with other chemicals such as sulfur or carbon and oxygen. Barium compounds can also be produced by industry. The oil and gas industries use barium compounds to make drilling muds. They are also used to manufacture paint, bricks, tiles, glass, and rubber. Doctors use a barium compound (barium sulfate) to perform medical tests and to take barium x-rays of the digestive system.

Barium is released into the air during the mining, refining, and production of barium compounds, and from the burning of coal and oil. Some barium compounds dissolve easily in water and are found in lakes, rivers, and streams. Barium is found in most soils and foods at low levels.

Fish and aquatic organisms accumulate barium. The health effects of the different barium compounds depend on how well the compound dissolves in water. The EPA currently allows 2 ppm of barium in drinking water.

Source: ATSDR



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	8.11	.	10.46	4.57	.	7.00
20	9.65	.	12.00	7.94	.	9.61
30	10.50	.	13.50	10.14	.	11.60
40	11.30	.	14.91	12.20	.	14.00
50	12.00	.	16.94	14.80	.	16.15
60	13.64	.	26.32	16.70	.	19.10
70	14.90	.	40.30	19.44	.	24.00
80	17.70	.	100.00	23.00	.	32.69
90	22.82	.	100.00	30.90	.	94.00

Beryllium (BE)

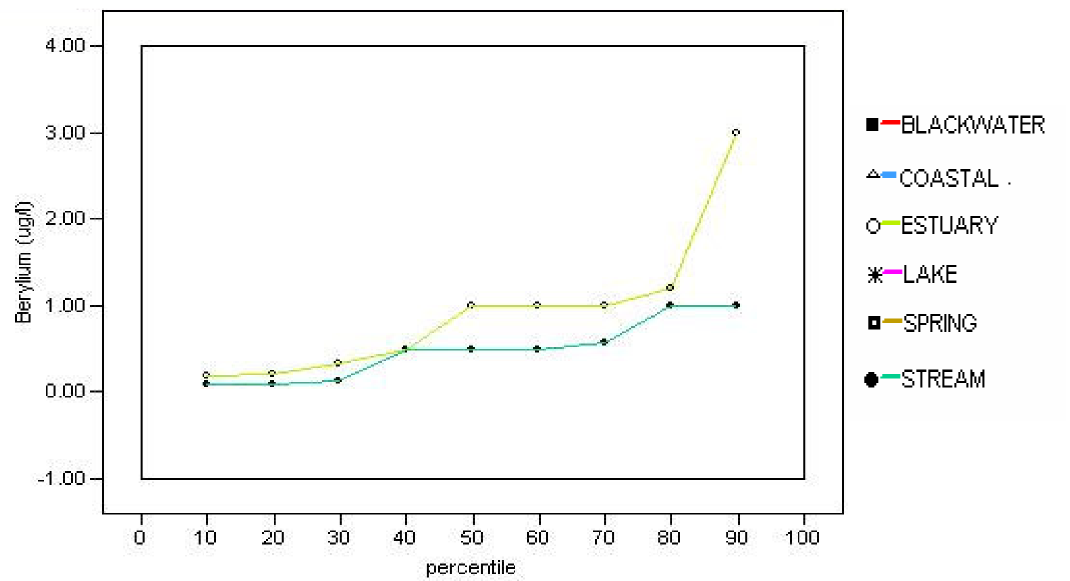
Micrograms per liter (µg/L)

Beryllium, a hard, grayish metal, is naturally found in mineral rocks, coal, soil, and volcanic dust. Beryllium compounds are commercially mined, and the beryllium is purified for use in nuclear weapons and reactors, aircraft and space vehicle structures, instruments, x-ray machines, and mirrors. Beryllium ores are used to make specialty ceramics for electrical and high-technology applications. Beryllium alloys are used in automobiles, computers, sports equipment (golf clubs and bicycle frames), and dental bridges.

Beryllium dust enters the air from burning coal and oil, and eventually settles over the land and water. It also enters water from the erosion of rocks and soils, fossil fuel combustion, and industrial waste. Some beryllium compounds dissolve in water, but most stick to particles and settle to the bottom. Most beryllium in soil does not dissolve in water and remains bound to soil.

Beryllium does not accumulate in the food chain. The EPA restricts the amount of beryllium that industries may release into the air to 0.01 microgram per cubic meter (µg/m³), averaged over a thirty-day period.

Source: ATSDR



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	.	.	0.20	.	.	0.09
20	.	.	0.21	.	.	0.09
30	.	.	0.35	.	.	0.14
40	.	.	0.50	.	.	0.50
50	.	.	1.00	.	.	0.50
60	.	.	1.00	.	.	0.50
70	.	.	1.00	.	.	0.59
80	.	.	1.20	.	.	1.00
90	.	.	3.00	.	.	1.00

Biochemical Oxygen Demand (BOD), and 5-Day BOD (BOD5)

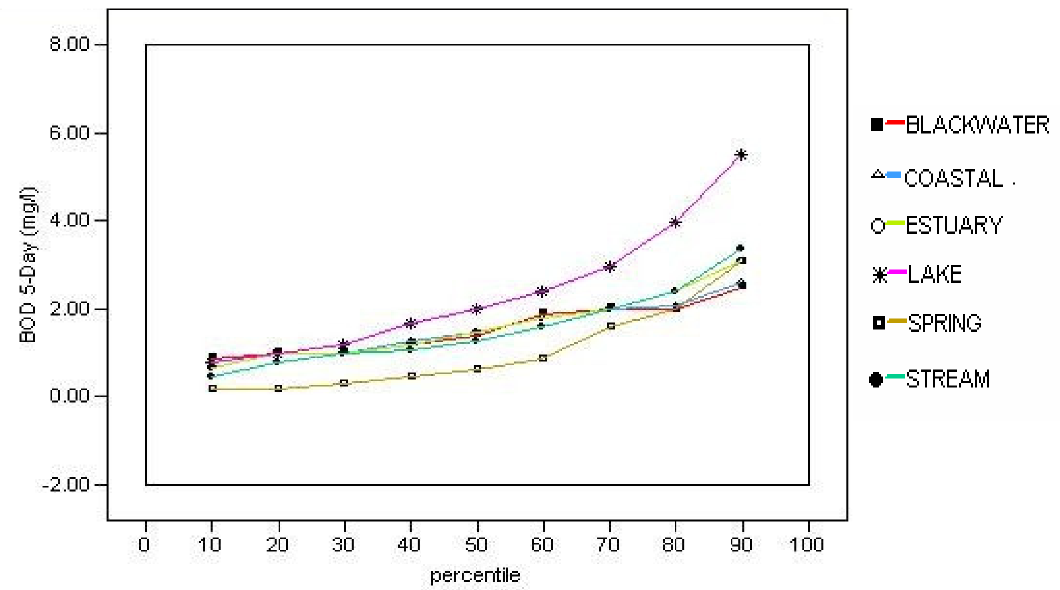
Milligrams per liter (mg/L)

Biochemical oxygen demand (BOD) is a measure of the quantity of dissolved oxygen (DO) required by microorganisms to decompose organic matter in a water sample over a specified time, at a specified temperature, and under specified conditions. BOD5 quantifies the amount of oxygen consumed by microorganisms present in a water sample over five days at 20º Celsius.

High BOD may be caused by high levels of organic pollution, usually from poorly treated wastewater or high levels of nitrates that trigger plant growth; both of these may result in higher quantities of organic materials in the water column. When such matter decays, the microbial activity consumes oxygen. A high BOD may indicate a trend toward DO depletion, with potential implications for a waterbody's biological diversity.

BOD was initially designed as, and is one of, the primary measures used to determine engineering criteria for municipal and industrial plants that discharge to surface waters. It is also useful in estimating the assimilative capacity of a receiving body of water.

Source: EPA; University of Georgia Cooperative Extension Service; World Resources Institute



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.90	0.70	0.70	0.80	0.20	0.50
20	1.00	1.00	1.00	1.00	0.20	0.80
30	1.00	1.00	1.00	1.20	0.30	1.00
40	1.20	1.30	1.20	1.70	0.50	1.10
50	1.40	1.50	1.50	2.00	0.64	1.30
60	1.90	1.80	1.80	2.40	0.90	1.60
70	2.00	2.00	2.00	3.00	1.60	2.00
80	2.00	2.10	2.40	4.00	2.00	2.40
90	2.50	2.60	3.10	5.50	3.10	3.40

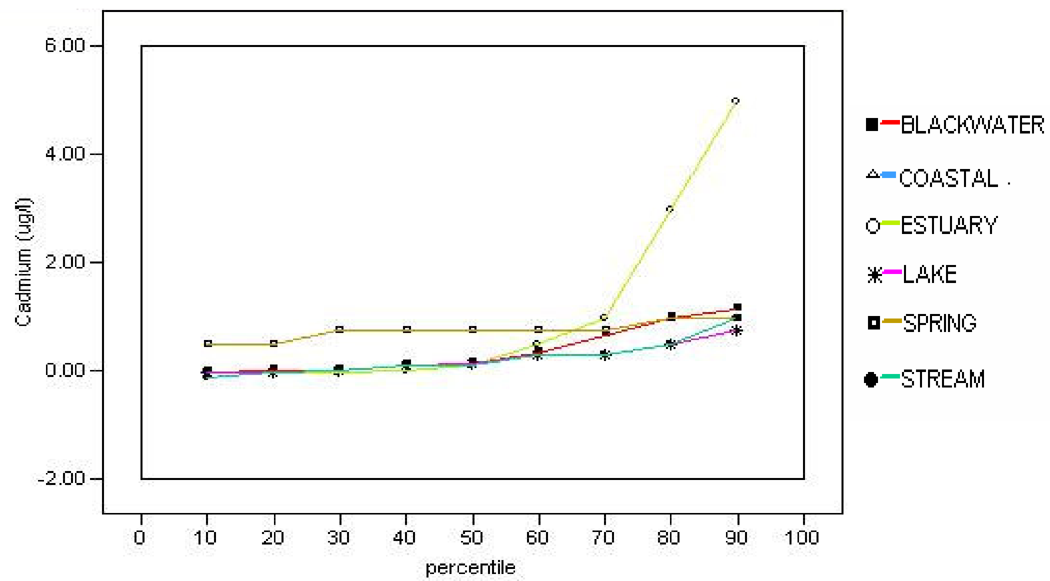
Cadmium (CD)

Micrograms per liter (µg/L)

Cadmium, a naturally occurring heavy metal, is usually found as a mineral combined with other elements such as oxygen (cadmium oxide), chlorine (cadmium chloride), or sulfur (cadmium sulfate, cadmium sulfide). All soils and rocks, including coal and chemical fertilizers produced from phosphate ores, contain some cadmium. Cadmium is also a by-product of smelting and refining zinc and lead ores. It is used mainly for its anticorrosive properties in steel electroplating, in its sulfide form for manufacturing paint pigments, and in the manufacture of batteries and other electrical components.

Cadmium enters the air through local smelting operations; it enters the soil from local mining operations and from the use of chemical fertilizers; and it enters the water through agricultural runoff and/or industrial wastewater discharges. Once in the water, cadmium is rapidly absorbed by suspended particulates that eventually settle into sediments. From there, it may enter the aquatic food chain, where it bioconcentrates, primarily in plants, crustaceans, and mollusks. The EPA has set a limit of 5 parts per billion (ppb) of cadmium in drinking water.

Source: ATSDR



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.00	.	0.00	-0.03	0.50	-0.10
20	0.01	.	0.00	0.00	0.50	0.00
30	0.02	.	0.00	0.01	0.75	0.01
40	0.10	.	0.01	0.10	0.75	0.10
50	0.14	.	0.10	0.14	0.75	0.10
60	0.34	.	0.50	0.29	0.75	0.30
70	0.67	.	1.00	0.30	0.75	0.30
80	1.00	.	3.00	0.50	1.00	0.50
90	1.13	.	5.00	0.77	1.00	1.00

Calcium (CA)

Milligrams per liter (mg/L)

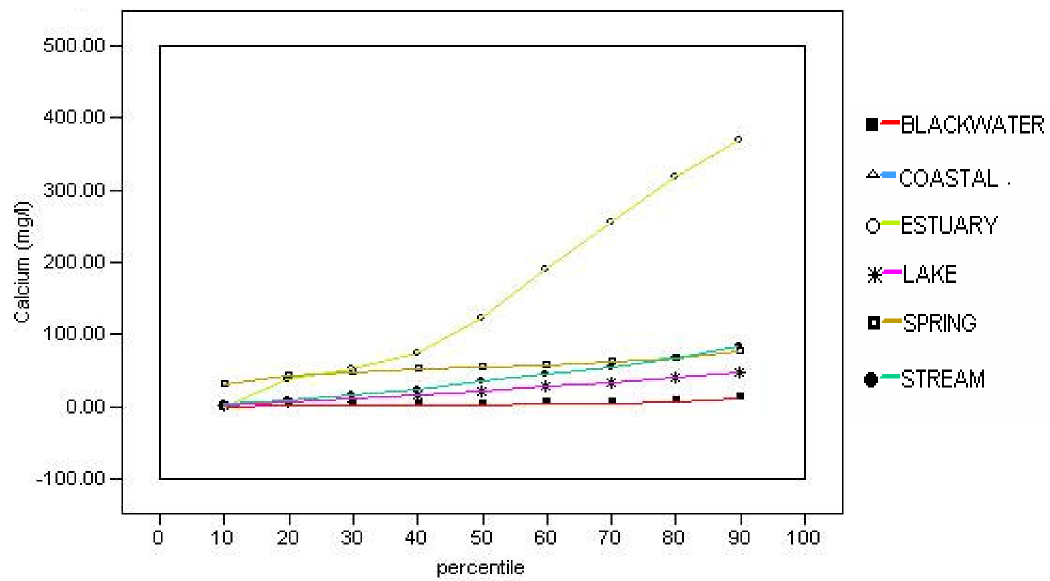
Calcium, a mineral, dissolves easily in water and is one of the most abundant substances in surface water and ground water. Typical calcium concentrations in fresh waters worldwide are less than 15 mg/L, but waters close to calcium-rich soils and carbonate rocks often have calcium concentrations exceeding 30 mg/L.

Calcium enters the aquatic environment primarily through the weathering of rocks such as limestone, which is composed largely of calcium compounds. Calcium may also be deposited in waterbodies as a result of human activities, often from the extensive use of calcium-containing chemicals in agriculture.

Calcium influences the growth of freshwater plants and animals. It is a necessary structural component of plant tissues, animal bones, and animal shells. Calcium is involved in may chemical cycles that occur in waterbodies, often in rather complex ways.

Source: Florida LakeWatch

Percentile distribution of water quality parameters by waterbody type



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	1.30	.	0.00	4.00	31.00	5.20
20	1.70	.	38.00	8.20	45.00	10.60
30	2.20	.	53.06	11.90	50.00	16.50
40	2.60	.	75.00	16.20	52.80	25.66
50	3.30	.	124.30	22.30	55.70	36.00
60	4.10	.	192.25	29.00	59.00	45.50
70	5.40	.	257.00	35.00	62.70	55.00
80	7.70	.	320.00	40.40	68.50	68.00
90	12.90	.	370.00	49.60	77.80	85.90

Chemical Oxygen Demand (COD), .25N K2CR207

Milligrams per liter (mg/L)

Chemical oxygen demand (COD) is the amount of oxygen consumed by the oxidation of organic and inorganic matter in a water sample. It is a laboratory test, carried out under specific conditions. The test uses a chemical oxidant to measure indirectly the amount of organic pollution in water. This pollution can occur naturally or from human activities. Because COD does not differentiate between stable and unstable organic matter, it does not always correlate with biochemical oxygen demand (BOD).

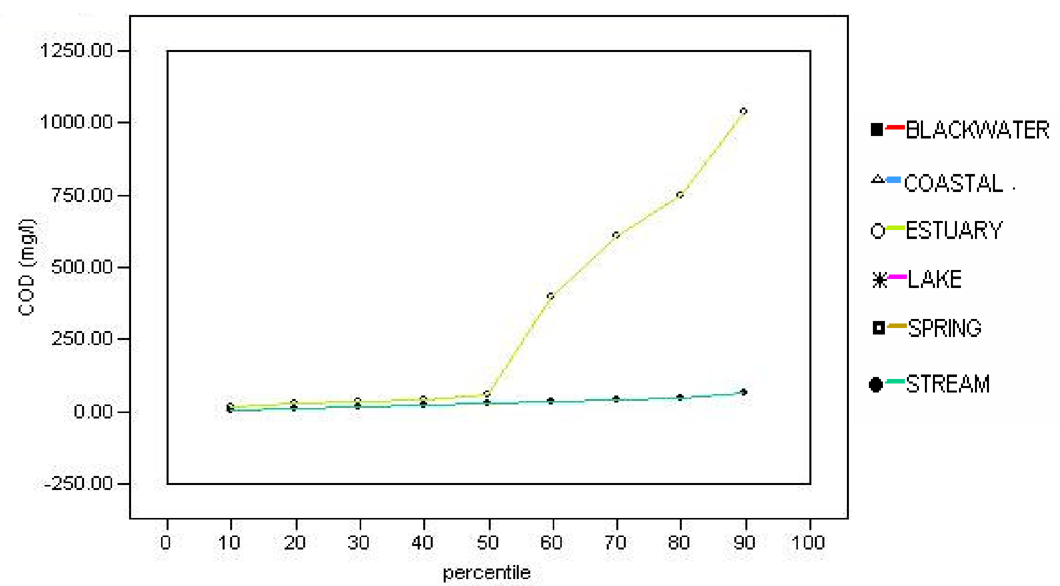
To measure COD, a strong oxidizing agent together with acid and heat are used to oxidize all carbon compounds in a water sample. The analysis includes nonbiodegradable and slowly degrading (recalcitrant) compounds, which are not detected by the test for BOD. The actual measurement involves a determination of the amount of oxidizing agent (typically, potassium dichromate) that is reduced during the reaction.

(Add text explaining .25N K2CR207?)

Source: North American Lake Management Society (NALMS); University of Georgia Cooperative Extension Service; World Resources Institute

Percentile distribution of water quality parameters by waterbody type

COD



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	.	.	21.00	.	.	7.00
20	.	.	31.00	.	.	11.00
30	.	.	39.00	.	.	20.00
40	.	.	45.00	.	.	28.00
50	.	.	63.50	.	.	34.00
60	.	.	400.00	.	.	40.00
70	.	.	612.00	.	.	46.00
80	.	.	750.00	.	.	52.00
90	.	.	1040.00	.	.	66.00

Chloride (CHLOR)

Milligrams per liter (mg/L)

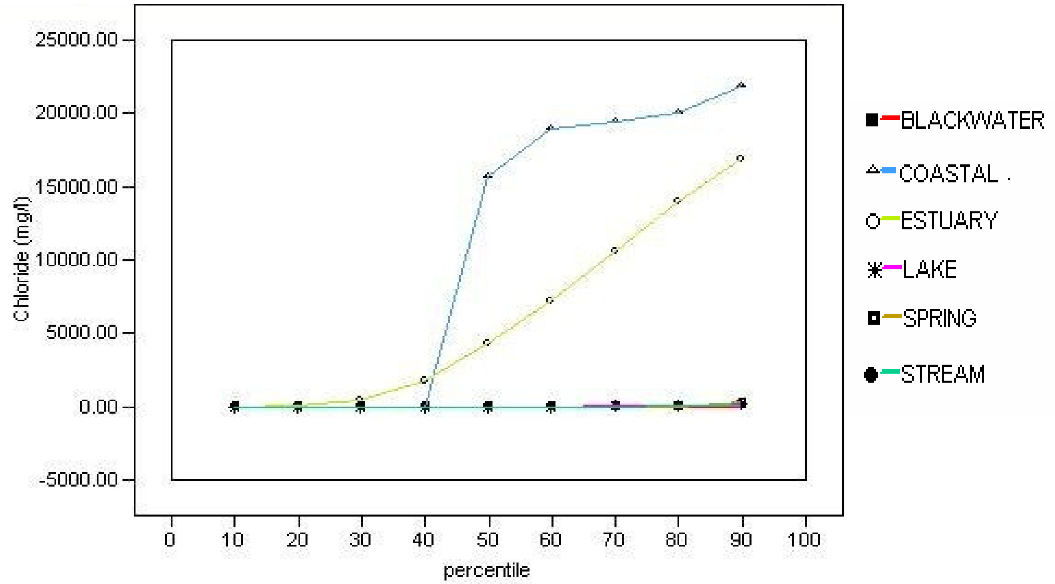
Chloride, a substance found in all the world's waters, is an ionized form of the element chlorine. Salts are the primary sources of chloride in water. Chloride compounds are used extensively in industrial operations and agriculture. For example, the potash in fertilizer is potassium chloride. Sodium chloride, or common table salt, is a necessary part of human and animal diets.

Climate has a major influence on chloride levels in waterbodies. The activities of people and animals can also affect chloride concentrations in surface waters, since chloride is found in all animal and human wastes. Home water-softening systems and fertilizers also are potential sources.

Water has a strong salty taste if chloride concentrations exceed 250 mg/L. Although the chlorides are not dangerous themselves, they signal possible contamination from human or animal wastes that can contain bacteria and other harmful substances. For this reason, it is prudent to investigate where the chlorides are coming from when high concentrations are detected in an inland waterbody. In addition, the chloride concentration of water can affect plants and wildlife.

Source: Florida LakeWatch

Percentile distribution of water quality parameters by waterbody type



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	5.00	0.00	38.70	13.00	3.50	3.50
20	6.15	15.46	132.50	18.00	4.70	8.50
30	7.20	23.01	505.00	24.80	5.20	14.00
40	8.00	40.41	1881.04	37.20	6.00	21.00
50	9.00	15800.00	4400.00	56.30	7.00	30.30
60	9.60	18975.00	7325.00	76.60	8.50	45.00
70	10.80	19500.00	10630.00	100.30	10.80	69.00
80	12.00	20075.00	14000.00	160.94	18.80	106.10
90	15.70	21955.00	17000.00	243.00	420.00	195.00

Chlorophyll a (CHLA)

Micrograms per liter (μg/L)

Chlorophyll, a green pigment found in plants, is an essential component in photosynthesis, or the process of converting light energy into chemical energy. The predominant form of chlorophyll is chlorophyll a, a yellow-green pigment. Other pigments include chlorophylls b, c, and d, xanthophylls, and carotenes.

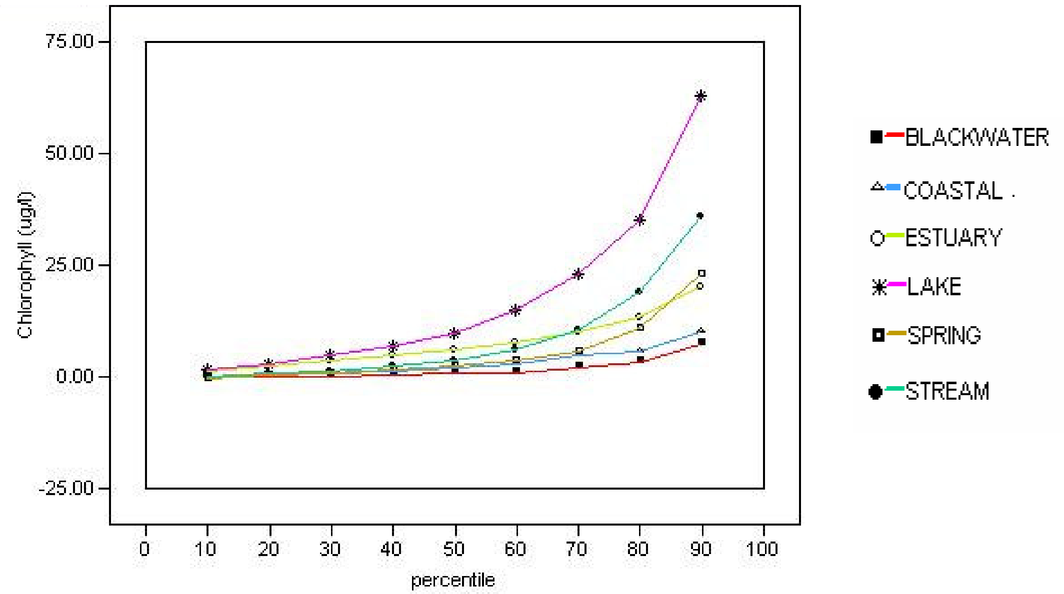
The amount of chlorophyll a in a water sample is most often used to estimate the amount of algal biomass in the water column. Chlorophyll a measurements are also used to estimate the trophic state of a waterbody, particularly lentic (still) waters. Defined as the degree of biological productivity of a waterbody, trophic state generally consists of the amount of algae, aquatic macrophytes, fish, and wildlife that a waterbody can produce and sustain.

Chlorophyll a values ranging from 0 to 14 mg/L indicate oligotrophic conditions, 15 to 25 mg/L represent mesotrophic conditions, 26 to 40 mg/L indicate eutrophic conditions, and above 40 mg/L indicate hypereutrophic conditions. These designations are useful only as a general guide, except when used in conjunction with other biological and water chemistry data.

Source: Florida LakeWatch

Percentile distribution of water quality parameters by waterbody type

CHLA



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.01	0.40	1.50	2.00	0.00	0.40
20	0.18	0.80	2.70	3.00	0.47	1.00
30	0.32	1.00	3.80	5.00	1.00	1.60
40	0.54	1.40	5.00	7.00	2.00	2.55
50	0.90	2.10	6.13	10.00	2.80	4.01
60	1.14	3.20	7.84	15.00	4.00	6.07
70	2.09	5.00	10.10	23.00	6.00	10.70
80	3.30	5.90	13.40	35.30	11.00	19.34
90	7.35	10.10	20.20	63.00	23.00	36.09

Chlorophyll Corrected (CHLAC)

Micrograms per liter (µg/L)

Corrected chlorophyll refers to the acidification method used to correct for the presence of pheophytin. Pheophytin, a natural degradation product of chlorophyll, has an absorption peak in the same spectral region as chlorophyll a. It may be necessary to make a correction when the pheophytin concentration in a water sample is significantly high.

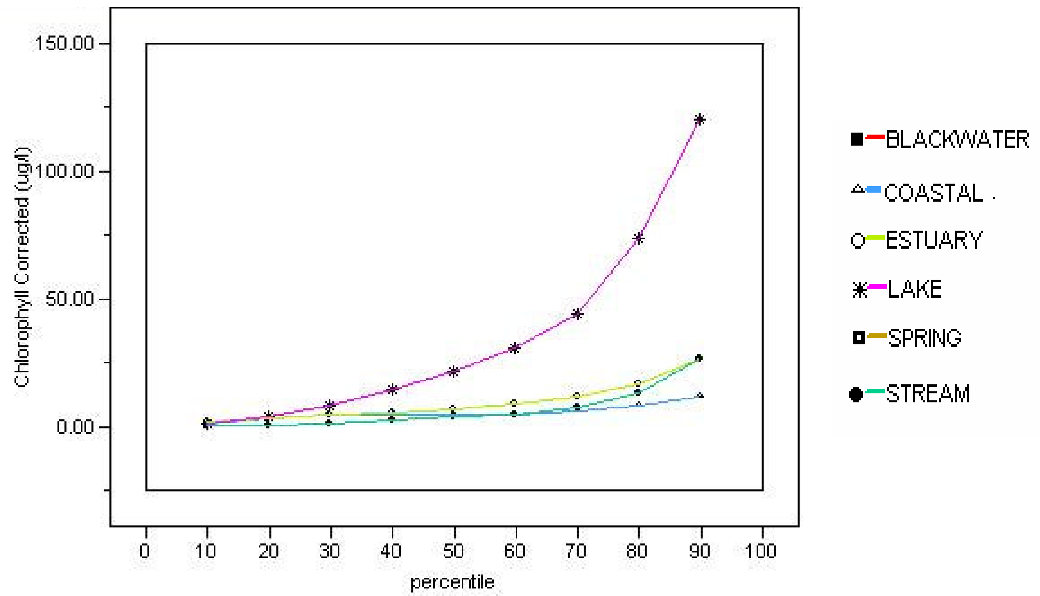
Algal cells are concentrated by filtering a known volume of water through a membrane filter. The pigments are extracted from the concentrated algal sample, and the chlorophyll a concentration is determined spectrophotometrically by measuring the absorbance (optical density) of the extract at various wavelengths. The resulting measurements are then applied to a standard equation.

Uncorrected chlorophyll a refers to the method without the pheophytin correction (the trichromatic method).

Source: EPA

Percentile distribution of water quality parameters by waterbody type

CHLAC



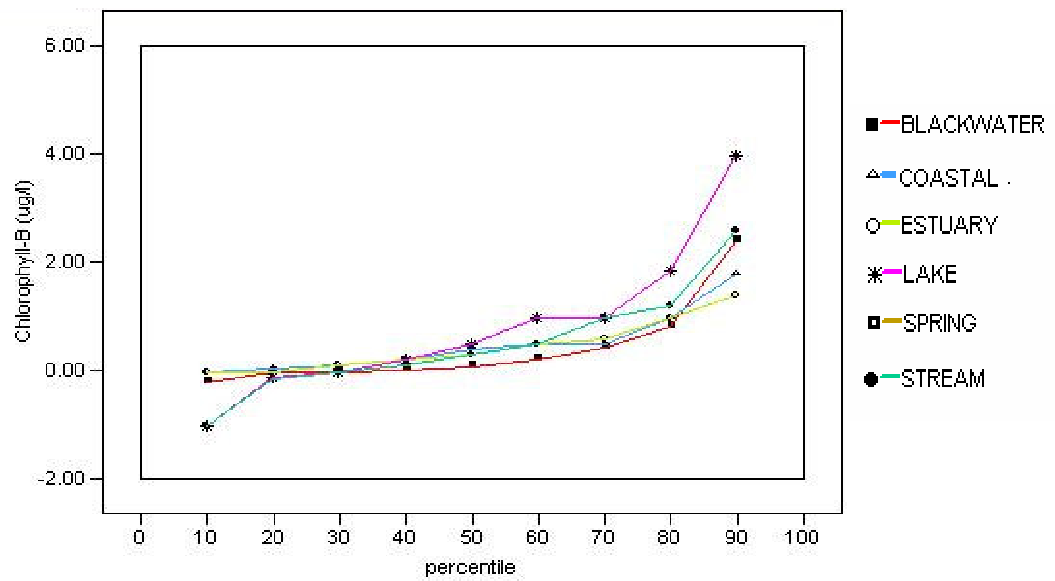
Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	.	1.60	1.90	1.80	.	0.70
20	.	3.60	3.32	4.34	.	1.00
30	.	5.00	4.80	8.57	.	1.76
40	.	5.00	5.60	14.80	.	2.80
50	.	5.00	7.20	21.60	.	4.22
60	.	5.30	9.30	31.00	.	5.00
70	.	6.73	12.11	44.70	.	7.63
80	.	8.52	16.81	74.00	.	13.40
90	.	11.80	26.70	121.00	.	26.78

Chlorophyll b (CHLB)

Micrograms per liter (µg/L)

Chlorophyll b, a type of blue-green plant pigment, has different photosynthetic and bioluminescent characteristics than other chlorophyll compounds, such as chlorophyll a, chlorophyll c, xanthophylls, and carotenes. While chlorophyll a is the most common measurement used, the analysis of the entire group of photoactive pigments present in a water sample provides a method for distinguishing between algal biomass and other organic constituents, and thus presents a more complete picture of the overall algal community structure.

Source: FDEP

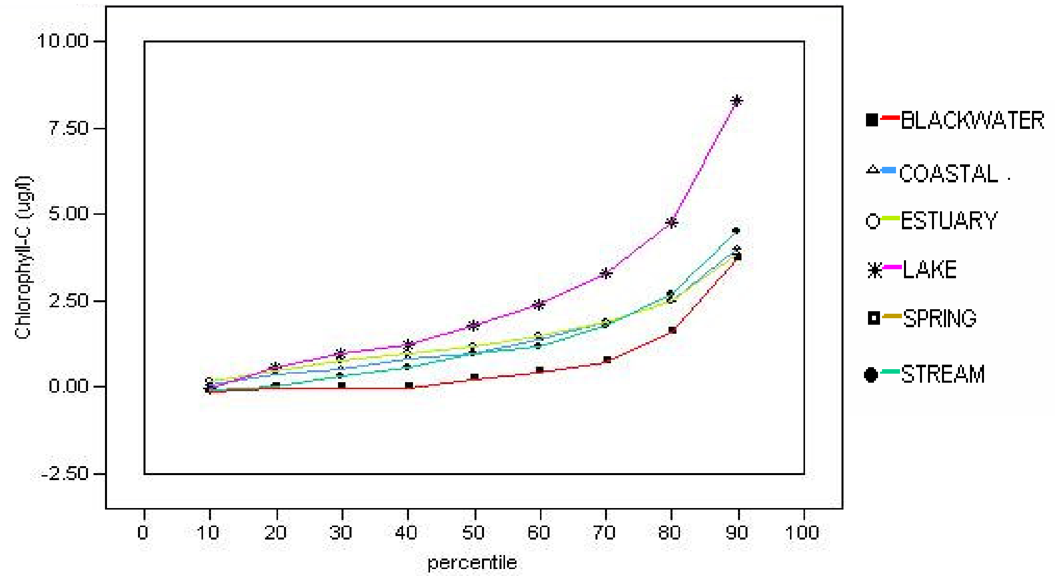


Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	-0.20	0.00	0.00	-1.00	.	-1.00
20	0.00	0.06	0.00	-0.11	.	-0.16
30	0.00	0.10	0.10	0.00	.	0.00
40	0.01	0.21	0.20	0.20	.	0.10
50	0.10	0.40	0.31	0.50	.	0.30
60	0.20	0.50	0.50	1.00	.	0.50
70	0.42	0.50	0.60	1.00	.	1.00
80	0.83	1.00	1.00	1.84	.	1.20
90	2.41	1.80	1.40	4.00	.	2.60

Chlorophyll c (CHLC)
Micrograms per liter (µg/L)

Chlorophyll c, a type of plant pigment, has different photosynthetic and bioluminescent characteristics than chlorophyll a, chlorophyll b, xanthophylls, and carotenes. While chlorophyll a is the most common measurement used, the analysis of the entire group of photoactive pigments present in a water sample provides a method for distinguishing between algal biomass and other organic constituents, and thus presents a more complete picture of the overall algal community structure.

Source: FDEP



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	-0.10	0.10	0.20	0.01	.	-0.04
20	0.00	0.40	0.50	0.60	.	0.05
30	0.01	0.55	0.78	1.00	.	0.33
40	0.02	0.86	1.00	1.26	.	0.60
50	0.23	1.00	1.20	1.80	.	1.00
60	0.44	1.40	1.50	2.41	.	1.20
70	0.77	1.90	1.93	3.30	.	1.80
80	1.60	2.50	2.50	4.77	.	2.70
90	3.70	4.01	3.90	8.30	.	4.54

Chromium III (CR3)

Micrograms per liter (µg/L)

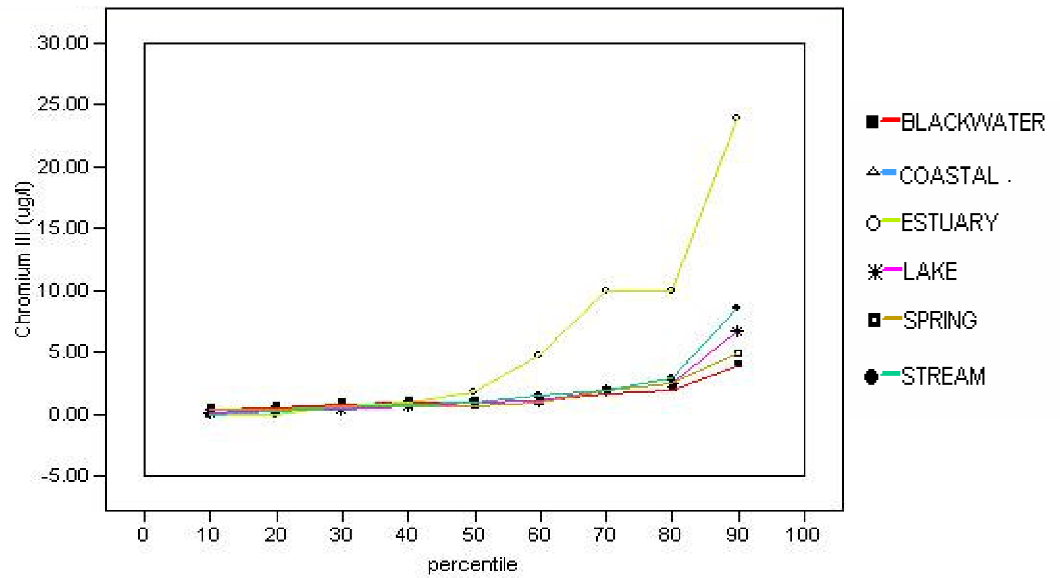
Chromium, a naturally occurring element, is found in rocks, animals, plants, soil, and volcanic dust and gases. Chromium III is one of the most common forms of chromium in the environment. An essential nutrient, it is used in chrome plating, dyes and pigments, leather tanning, and wood preserving.

Chromium enters the air, water, and soil mostly in the chromium III and chromium VI forms. The latter is produced by industrial processes. In air, chromium compounds are present mostly as fine dust particles that eventually settle over land and water. Chromium can strongly attach to soil, and only a small amount can dissolve in water and move deeper in the soil to underground water supplies.

Fish do not accumulate much chromium in their bodies from water. The EPA has set a limit of 100 µg/L of chromium III in drinking water.

Source: ATSDR

Percentile distribution of water quality parameters by waterbody type



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.40	.	0.00	0.10	0.50	0.00
20	0.60	.	0.00	0.40	0.50	0.25
30	0.84	.	0.75	0.50	0.70	0.57
40	1.00	.	1.00	0.72	0.70	0.90
50	1.00	.	1.90	1.00	0.70	1.00
60	1.20	.	4.85	1.10	1.00	1.60
70	1.69	.	10.00	2.00	2.00	2.00
80	2.00	.	10.00	2.50	2.50	3.00
90	3.91	.	24.00	6.80	5.00	8.57

Cobalt, Total (CO)

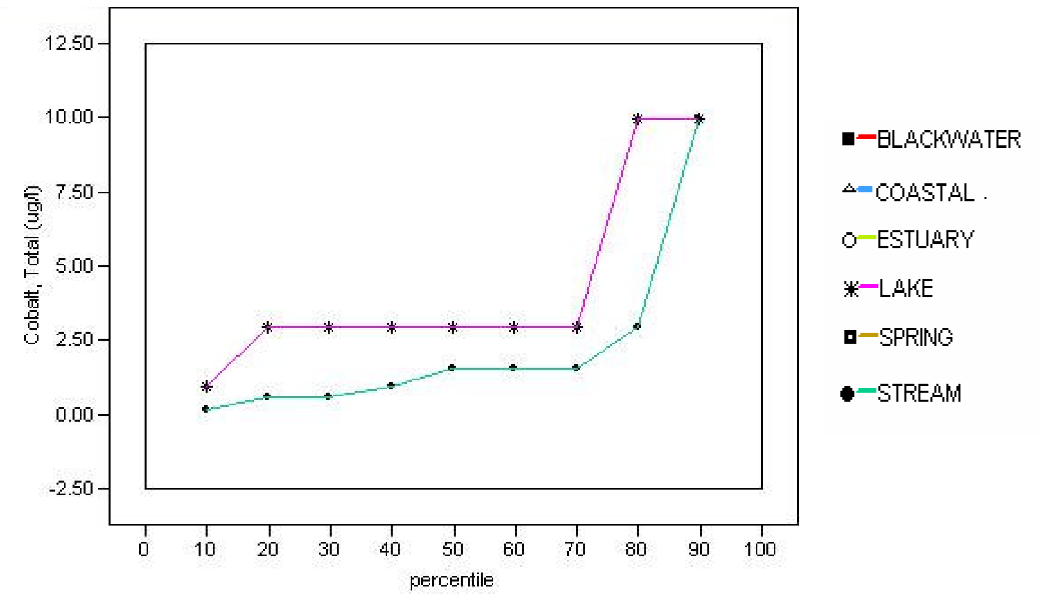
Micrograms per liter (µg/L)

Cobalt is a naturally occurring element found in rocks, soil, water, plants, and animals. Nonradioactive (stable) cobalt is used to produce alloys for manufacturing aircraft engines, magnets, grinding and cutting tools, and artificial joints. Cobalt compounds are also used to color glass, ceramics, and paints, and as a drier for porcelain enamel and paints.

The two most commercially important radioactive cobalt isotopes are cobalt 60 (60Co) and cobalt 57 (57Co). 60Co is used as a source of gamma rays for sterilizing medical equipment and consumer products, carrying out radiation therapy for cancer patients, manufacturing plastics, and irradiating food. 57Co is used in medical and scientific research. Radioactive decay is the only way of decreasing the amount of radioactive cobalt in the environment. It takes about 5.7 years for half of 60Co to give off its radiation, and about 272 days for 57Co; this period is called the half-life.

Cobalt enters the environment from natural sources, the burning of coal or oil, or the production of cobalt alloys. In the air it is associated with particles that settle to the ground in a few days Cobalt released into water or soil sticks to particles. Some cobalt compounds may dissolve in water. Cobalt cannot be destroyed in the environment; it can only change its form or become attached or separated from particles.

Source: ATSDR



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	.	.	.	1.00	.	0.20
20	.	.	.	3.00	.	0.60
30	.	.	.	3.00	.	0.60
40	.	.	.	3.00	.	1.00
50	.	.	.	3.00	.	1.60
60	.	.	.	3.00	.	1.60
70	.	.	.	3.00	.	1.60
80	.	.	.	10.00	.	3.00
90	.	.	.	10.00	.	10.00

Color (COLOR)

Platinum cobalt units (PCUs)

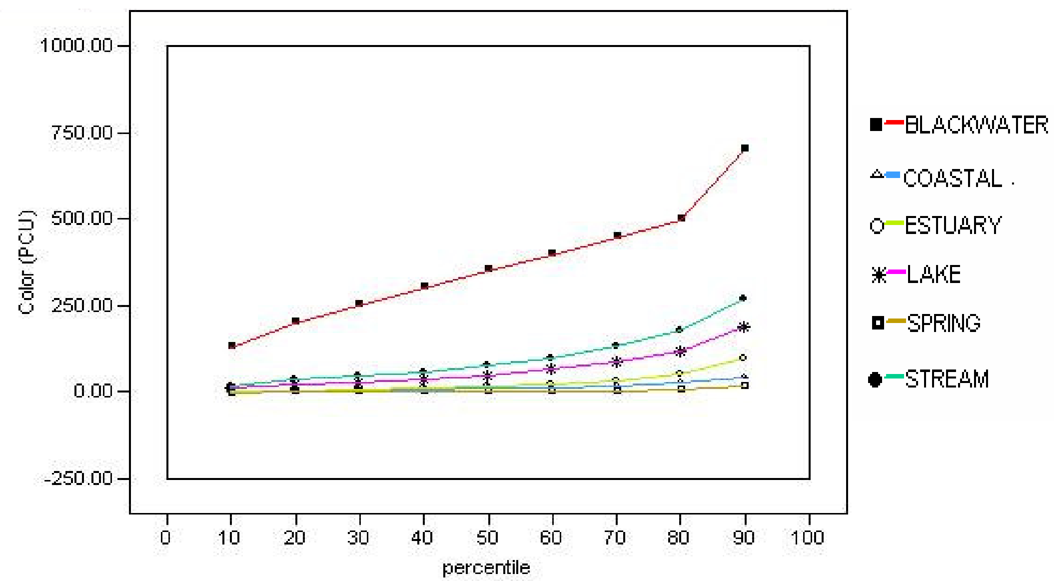
Dissolved organic materials from decaying plants and leaves, as well as dissolved minerals, can give water a reddish-brown color that resembles tea. Color may also be introduced through industrial discharges, such as those from pulp and paper mills.

Color in waterbodies has two components: (1) "apparent" color is the color of a water sample that has not had the particulates filtered out of the water; and (2) "true" color is the color of a water sample after all particulates have been filtered out.

Scientists most commonly use the measurement of true color. To measure true color, a filtered water sample is color matched to one of known value from a spectrum of standard colors. Each standard color has been assigned a number on a scale of PCUs. On the PCU scale, higher values of true color represent water that is more darkly colored.

The presence of color can reduce both the quantity and quality of light penetration into the water column, affecting the depth of colonization and the types of aquatic plants and animals that are present. In some waterbodies, color is the "limiting" environmental factor (that is, it controls certain biological and ecological processes).

Source: Florida LakeWatch



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	130.00	5.00	5.00	15.00	1.00	21.00
20	200.00	5.00	7.00	25.00	5.00	39.00
30	250.00	9.00	10.00	32.00	5.00	50.00
40	300.00	10.00	14.00	41.00	5.00	60.00
50	350.00	14.00	20.00	51.00	5.00	80.00
60	400.00	16.00	25.00	70.00	5.00	100.00
70	450.00	20.00	36.00	90.00	5.00	135.00
80	500.00	30.00	55.00	120.00	10.00	180.00
90	700.00	44.00	100.00	190.00	20.00	270.00

Conductance (COND)

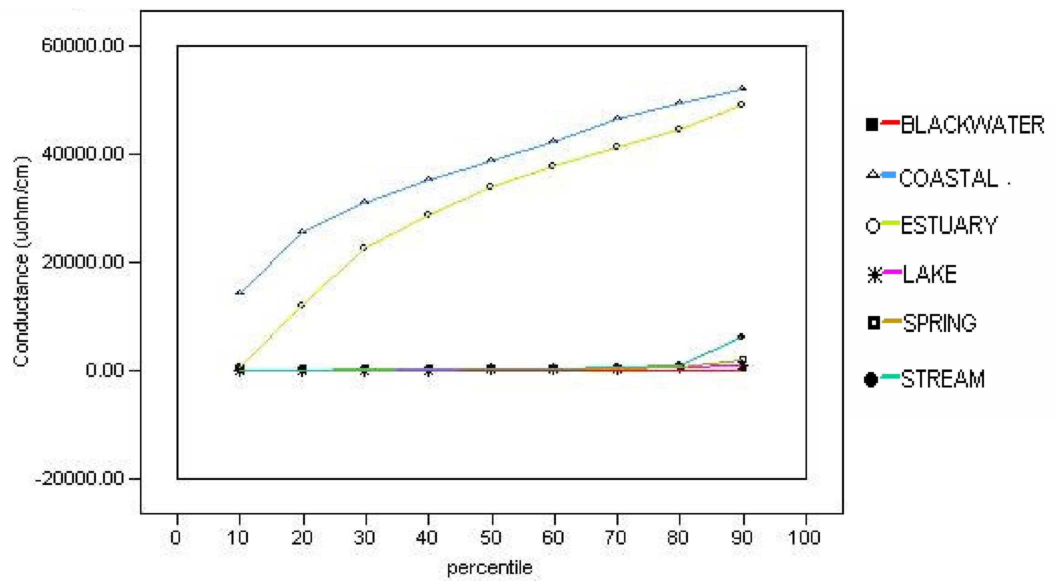
Microohms per centimeter (υmhos/cm)

Conductance (also called specific conductance) measures the capacity of water to conduct an electric current and indirectly measures the concentration of ionized substances in water. Conductivity can be used to differentiate among various water sources, such as ground water, agricultural runoff, and municipal wastewater. Because it detects contamination from animal and human wastes, which contain salts, it can be used to detect septic tank seepage along shorelines. It can also be used to detect saltwater intrusion.

Conductance increases when more of any salt, including the most common one, sodium chloride, is dissolved in water. Higher values represent better conductance. In general, waters with more salts are more biologically productive, except where there are limiting nutrients or other environmental factorsd. Changes in conductivity beyond natural background variability can harm aquatic life.

Florida's current water quality criterion for Class III fresh waters allows a 50 percent increase in conductance, or 1,275 umhos/cm, whichever is greater. It is intended to preserve natural background conditions and protect aquatic organisms from stressful ion concentrations.

Source: FDEP; Florida LakeWatch



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	49.00	14440.00	778.00	90.00	259.00	107.00
20	55.00	25500.00	12000.00	147.00	301.00	192.00
30	60.00	31000.00	22600.00	203.00	332.00	288.00
40	65.00	35300.00	29000.00	270.00	349.00	374.00
50	71.00	39000.00	33900.00	385.00	374.00	475.00
60	79.00	42300.00	37900.00	489.00	411.00	593.00
70	90.00	46570.00	41500.00	599.00	439.00	759.00
80	109.50	49470.00	44800.00	796.00	680.00	1140.00
90	147.00	52100.00	49200.00	1000.00	2040.00	6400.00

Copper (CU)

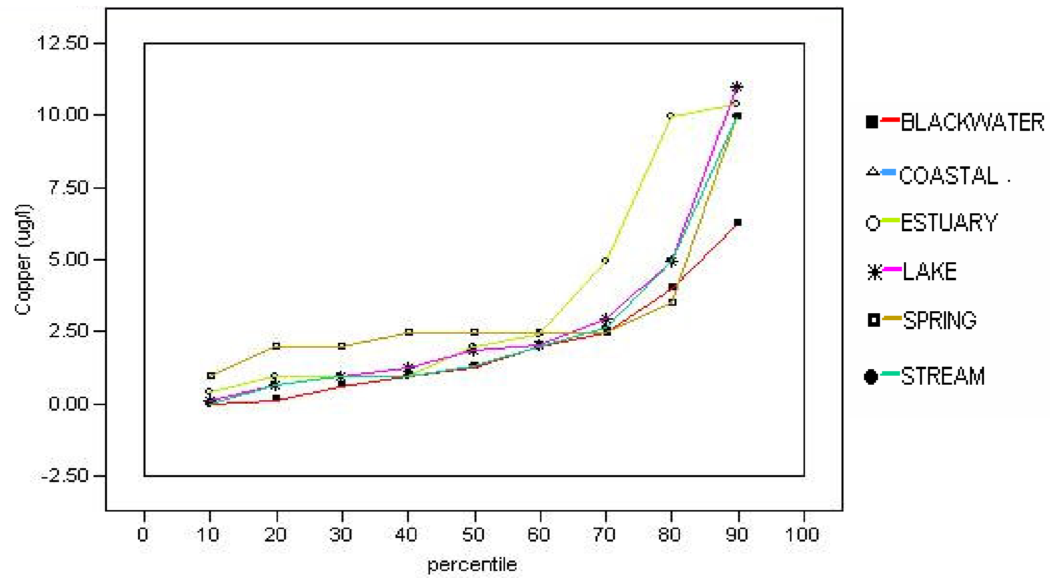
Micrograms per liter (µg/L)

Copper, a reddish metal, occurs naturally in rocks, soil, water, and air, as well as in plants and animals. Metallic copper is used in the U.S. penny, electrical wiring, and some water pipes. It is found in alloys such as brass and bronze, and in other compounds forming salts. Copper salts occur naturally, but are also manufactured. The most common of these is copper sulfate. Copper compounds are commonly used in agriculture to treat plant diseases such as mildew, for water treatment, and as preservatives for wood, leather, and fabrics.

Copper enters the environment from the mining of copper and other metals, factories that make or use copper, domestic wastewater, the burning of fossil fuels and wastes, wood and phosphate fertilizer production, and natural sources such as windblown dust. Particles emitted from smelters and ore-processing plants are carried back to the ground by gravity, or in rain or snow. Copper in soil strongly attaches to organic material and minerals. Copper that dissolves in water rapidly binds to particles suspended in the water. It does not typically enter ground water.

Copper does not break down in the environment. The EPA has determined that drinking water should not contain more than 1.3 mg/L of copper.

Source: ATSDR



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.00	.	0.44	0.16	1.00	0.00
20	0.15	.	1.00	0.70	2.00	0.68
30	0.62	.	1.00	1.00	2.00	1.00
40	1.00	.	1.00	1.27	2.50	1.00
50	1.28	.	2.00	1.91	2.50	1.37
60	2.00	.	2.40	2.06	2.50	2.00
70	2.50	.	5.00	3.00	2.50	2.65
80	4.00	.	10.00	5.00	3.50	5.00
90	6.22	.	10.40	11.00	10.00	10.00

Dissolved Iron as FE (FED)

Micrograms per liter (µg/L)

When iron enters surface waters, oxygen is consumed through both chemical reactions (reduction) and biological processes (iron-reducing bacteria).

The EPA uses dissolved iron as a surrogate for dissolved oxygen (DO), since attaining the water quality criteria for dissolved iron also should result in the attainment of DO water quality criteria.

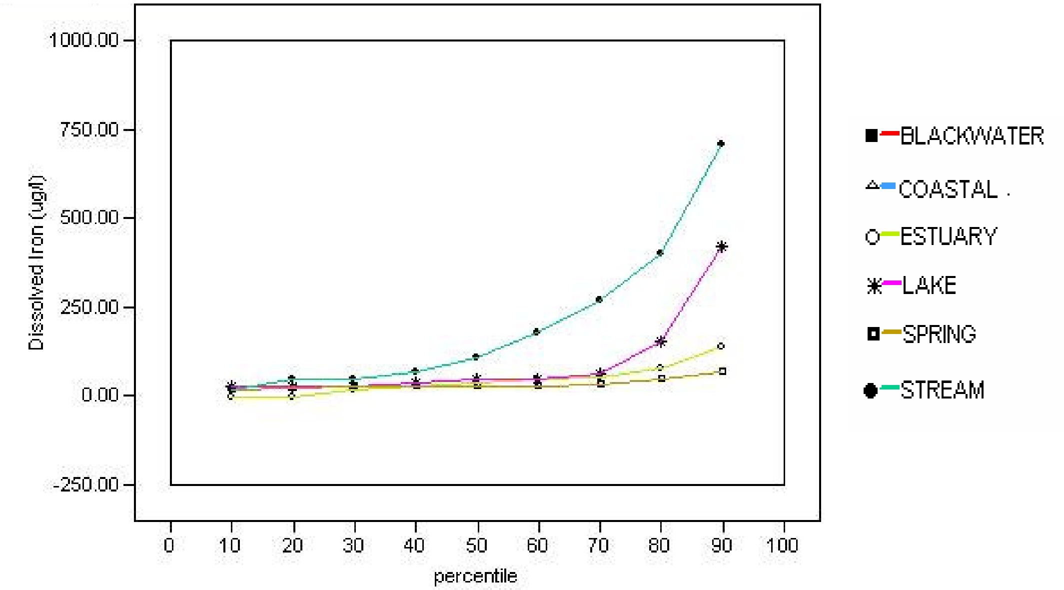
The highest concentrations of iron are found in Florida's highly colored waterbodies, because iron combines readily with organic molecules such as those in tea-colored water, probably causing these waterbodies to become iron enriched.

Although iron is not considered a known threat to human health, it may be toxic to invertebrates and fish.

Source: EPA; Florida LakeWatch

Percentile distribution of water quality parameters by waterbody type

FED



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	.	.	0.00	30.00	20.00	20.00
20	.	.	0.00	30.00	25.00	50.00
30	.	.	20.00	30.00	30.00	50.00
40	.	.	30.00	40.00	30.00	70.00
50	.	.	39.00	50.00	30.00	110.00
60	.	.	50.00	50.00	30.00	180.00
70	.	.	57.00	67.00	36.00	273.00
80	.	.	80.00	157.00	50.00	402.00
90	.	.	140.00	424.00	70.00	710.00

Dissolved Organic Carbon as C (DOC)

Milligrams per liter (mg/L)

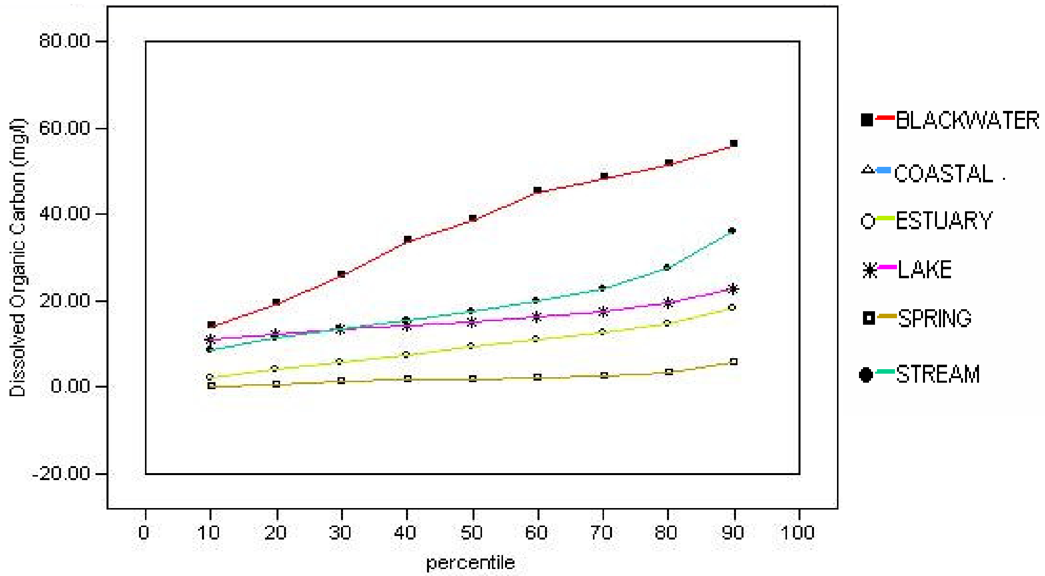
In aquatic environments such as bogs and wetlands, the organic acids from soils, sediments, and decaying vegetation and aquatic organisms dissolve, giving the water a tea-colored appearance.

To determine the amount of DOC in a water sample, the inorganic carbon is removed using a very fine filter. The remaining organic carbon is converted into carbon dioxide (CO_2) through heat or oxidation, and an infrared analysis determines how much DOC is present.

Not only is DOC an important component of the global carbon cycle and a primary food source in the aquatic food web, it also affects the mobility and transport of trace metals and may affect light attenuation in streams.

Environmental shifts can lead to changes in DOC. In addition, DOC is correlated with the presence of fecal coliform bacteria such as Escherichia coli (E. coli) and disease-bearing organisms such as Vibrio and Clostridium species.

Sources: EPA; National Institutes of Health (NIH); Elizabeth Boyer, Syracuse University



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	13.97	.	2.50	11.09	0.30	8.81
20	19.40	.	4.40	12.60	0.60	11.84
30	25.90	.	5.97	13.50	1.60	13.84
40	34.00	.	7.80	14.33	1.90	15.70
50	38.60	.	9.64	15.30	2.05	17.70
60	45.00	.	11.30	16.40	2.30	20.00
70	48.40	.	12.87	17.80	2.70	22.99
80	51.70	.	14.80	19.75	3.60	27.60
90	56.00	.	18.40	22.90	6.10	36.30

Dissolved Oxygen (DO)

Milligrams per liter (mg/L)

Dissolved oxygen (DO), which is the amount of free (not chemically combined) oxygen dissolved in water or wastewater, is an essential component in the aquatic environment. The most important and commonly used measurement of water quality, it indicates a waterbody's state of health—that is, the ability to support desirable aquatic life. A vast array of aquatic organisms depends on the presence of adequate levels of DO for survival.

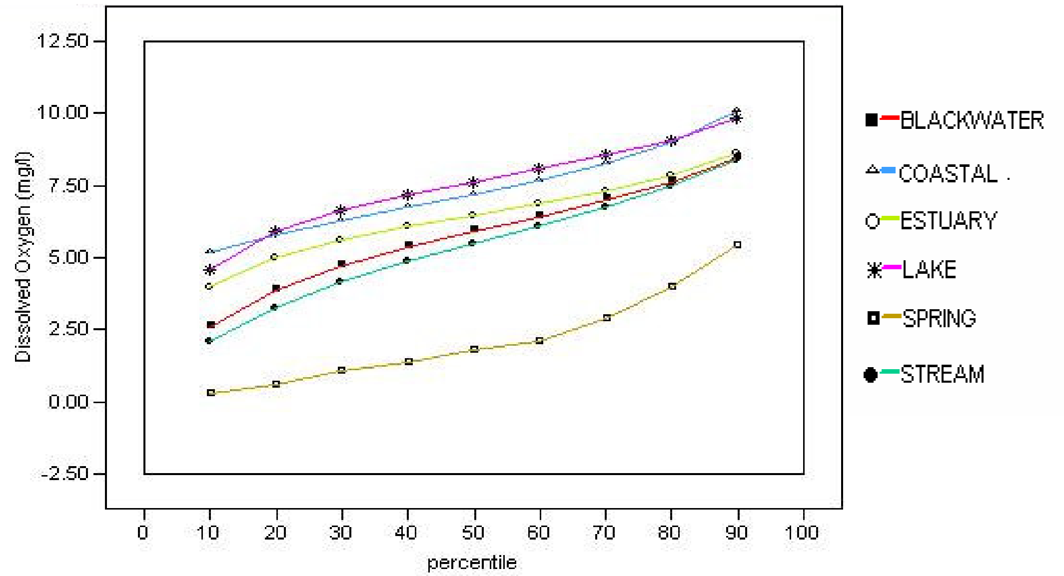
Generally, waters with DO concentrations of 5.0 mg/L or higher can support a well-balanced, healthy biological community. However, some species cannot tolerate even slight depletion, and when DO concentrations fall below natural levels, the result is often a complete alteration of the community structure. The consequences of these changes often have both ecological and economic significance.

Some systems with "good" water quality exhibit naturally low DO concentrations (e.g., swamps). Also, daytime and mean measurements of DO have limited significance, since nocturnal respiration and other episodic instances of low oxygen can significantly affect aquatic life. Diurnal DO studies are important to understanding the oxygen cycle in a particular waterbody.

Source: NALMS

Percentile distribution of water quality parameters by waterbody type

DO



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	2.60	5.20	4.00	4.60	0.30	2.10
20	3.90	5.83	5.01	5.93	0.60	3.30
30	4.70	6.30	5.62	6.69	1.10	4.20
40	5.40	6.79	6.10	7.20	1.40	4.90
50	5.95	7.20	6.50	7.66	1.80	5.53
60	6.40	7.70	6.90	8.10	2.10	6.14
70	7.00	8.30	7.31	8.58	2.90	6.80
80	7.62	9.00	7.88	9.10	4.00	7.50
90	8.50	10.10	8.67	9.87	5.44	8.40

Dissolved Solids (DISS)

Milligrams per liter (mg/L)

Dissolved solids are the total of all dissolved mineral or chemical compounds in water. They include calcium, magnesium, sodium, potassium, hydrogen, and phosphorus. These solids form the residue that remains after evaporation and drying. Excessive dissolved solids make water unfit to drink or use in industrial processes. The dissolved solids concentration in water is commonly classified as follows: fresh, 0 to 1,000 mg/L; slightly saline, 1,000 to 3,000 mg/L; moderately saline, 3,000 to 10,000 mg/L; very saline, 10,000 to 35,000 mg/L; and briny, more than 35,000 mg/L.

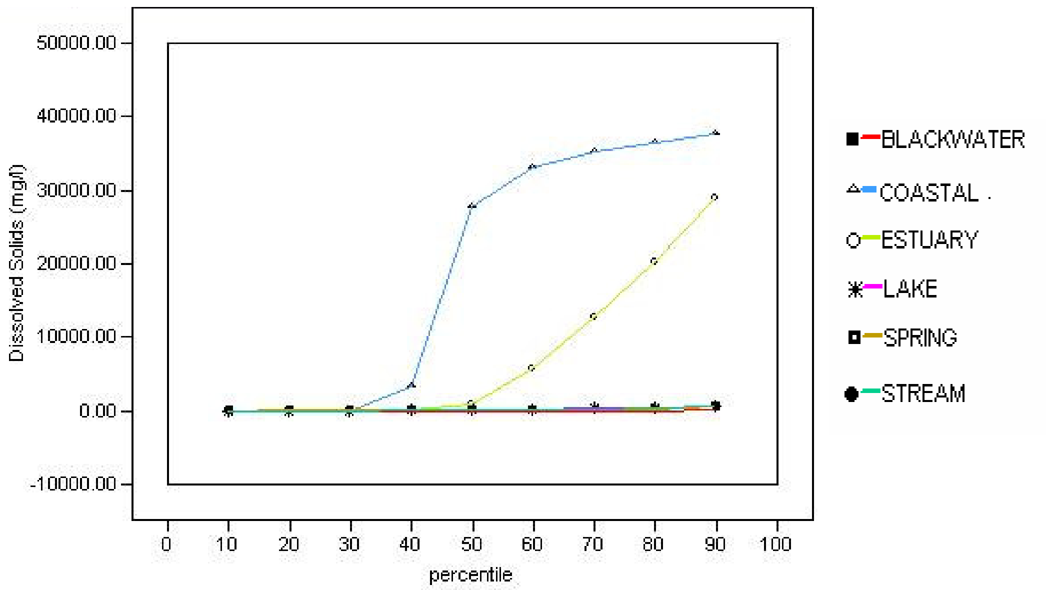
The greater the land area of a watershed, the higher the level of dissolved solids in surface waters. Each region's waterbodies have characteristic normal levels of dissolved solids. Changes in these levels can affect stream life and indicate a disruption in the watershed. The amounts of dissolved solids are affected by factors such as low-flow periods—for example, when a waterway is dominated by groundwater inputs—increased runoff, and industrial discharges.

The level of dissolved solids helps to regulate osmosis, or the flow of water in and out of an organism's cells. Abnormally high or low levels of dissolved solids disturb the osmotic balance of native species.

Source: U.S. Geological Survey (USGS); NALMS

Percentile distribution of water quality parameters by waterbody type

DISS



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	72.00	0.00	3.50	46.00	112.00	72.00
20	88.00	7.00	6.00	99.00	170.00	112.00
30	98.00	22.00	11.00	133.00	192.00	142.00
40	107.00	3526.00	309.00	188.00	211.00	176.00
50	114.00	27774.00	1100.00	260.00	230.00	214.00
60	121.00	33300.00	5960.00	336.00	254.00	266.00
70	131.00	35300.00	12900.00	431.00	276.00	343.00
80	147.00	36500.00	20400.00	536.00	311.00	472.00
90	170.00	37800.00	29100.00	733.00	759.00	712.00

Endosulfan (ENDO)
Micrograms per liter (µg/L)

Endosulfan, a pesticide, does not occur naturally in the environment. It is used to control insects on food and nonfood crops and also as a wood preservative.

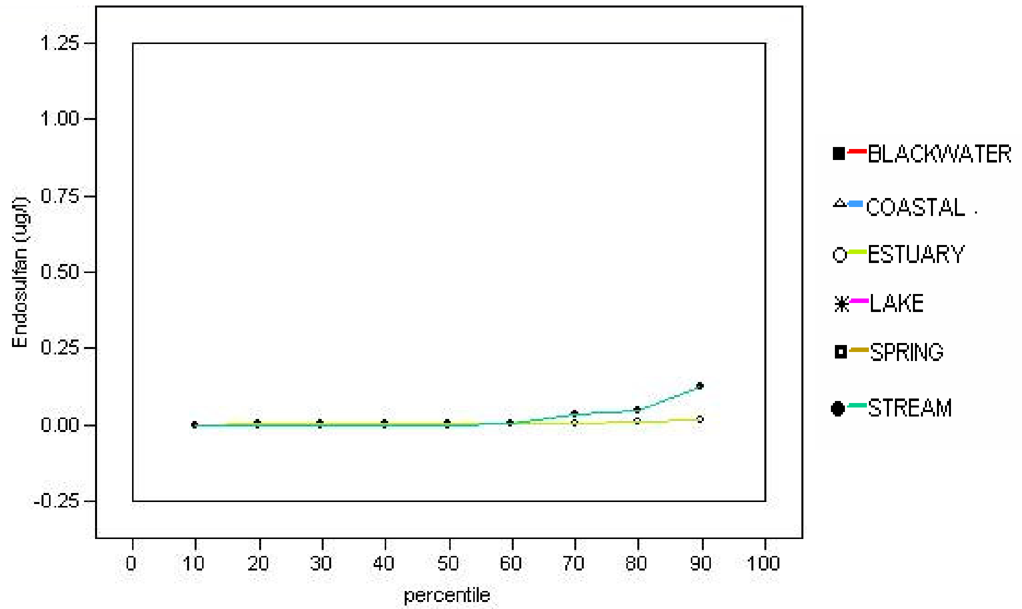
Endosulfan enters the air, water, and soil during its manufacture and use. It is often sprayed onto crops, and the spray may travel long distances before it lands on crops, soil, or water. Endosulfan on crops usually breaks down in a few weeks, but the chemical sticks to soil particles and may take years to break down completely.

Endosulfan does not dissolve easily in water. In surface water, it is attached to soil particles floating in water or attached to soil at the bottom. The pesticide can build up in the bodies of animals that live in endosulfan-contaminated water. The EPA recommends that the amount of endosulfan in rivers, lakes, and streams should not be more than 74 ppb.

Source: ATSDR

Percentile distribution of water quality parameters by waterbody type

ENDO



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	.	.	0.00	.	.	0.00
20	.	.	0.01	.	.	0.00
30	.	.	0.01	.	.	0.00
40	.	.	0.01	.	.	0.00
50	.	.	0.01	.	.	0.00
60	.	.	0.01	.	.	0.01
70	.	.	0.01	.	.	0.04
80	.	.	0.01	.	.	0.05
90	.	.	0.02	.	.	0.13

Fecal Coliform (FCOLI)
Per 100 milliliters (/100ml)

Coliform is a group of bacteria normally present in large numbers in the intestinal tracts of humans and other warm-blooded animals. The predominant species in the fecal coliform group is E. coli, a species whose presence indicates fecal coliform pollution (and possibly the presence of enteric pathogens, or microorganisms and parasites that can cause illness in humans and animals).

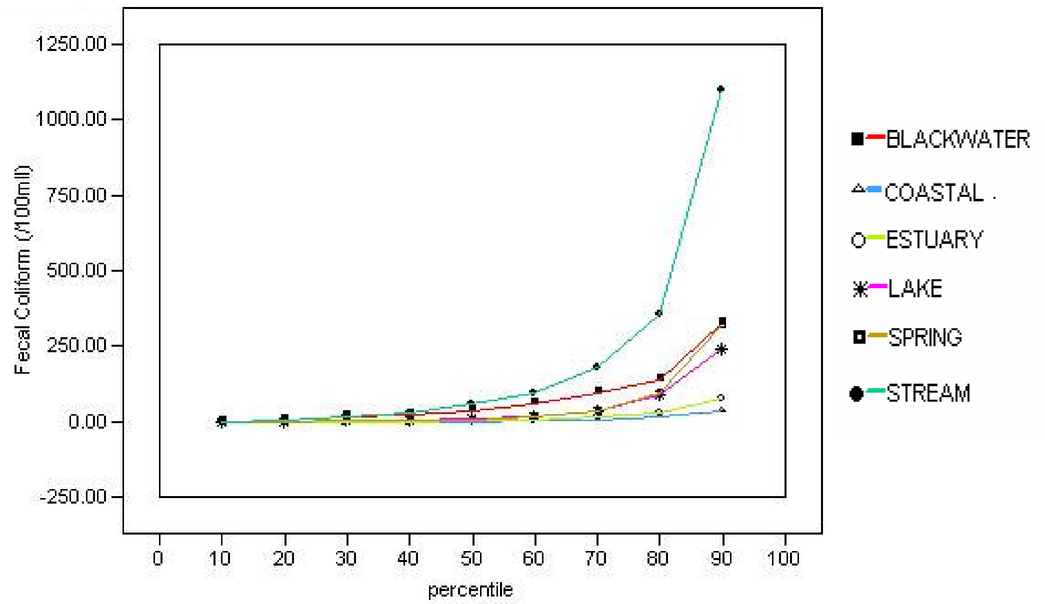
The presence of large numbers of fecal coliform colonies may indicate seepage from faulty septic tanks, contamination from domestic sewage, or runoff from agricultural operations.

The fecal coliform most probable number (MPN) procedure is used to determine the presence of fecal coliform bacteria in the water column. The information gained from this test method is generally used in conjunction with the fecal streptococci procedure and the total coliform procedure. The ratios of fecal coliform to fecal streptococci concentrations in a water sample can be used to distinguish whether pollution comes from human or animal waste.

Source: University of California at Davis; NALMS

Percentile distribution of water quality parameters by waterbody type

FCOLI



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	4.00	1.00	1.00	2.00	1.00	2.00
20	10.00	1.00	1.00	2.00	2.00	10.00
30	17.00	1.00	1.00	5.00	5.00	20.00
40	26.00	2.00	2.00	8.00	10.00	33.00
50	40.00	3.00	5.00	14.00	10.00	60.00
60	64.00	5.00	8.00	20.00	20.00	100.00
70	100.00	10.00	17.00	40.00	40.00	180.00
80	140.00	20.00	33.00	90.00	100.00	360.00
90	330.00	40.00	80.00	240.00	320.00	1100.00

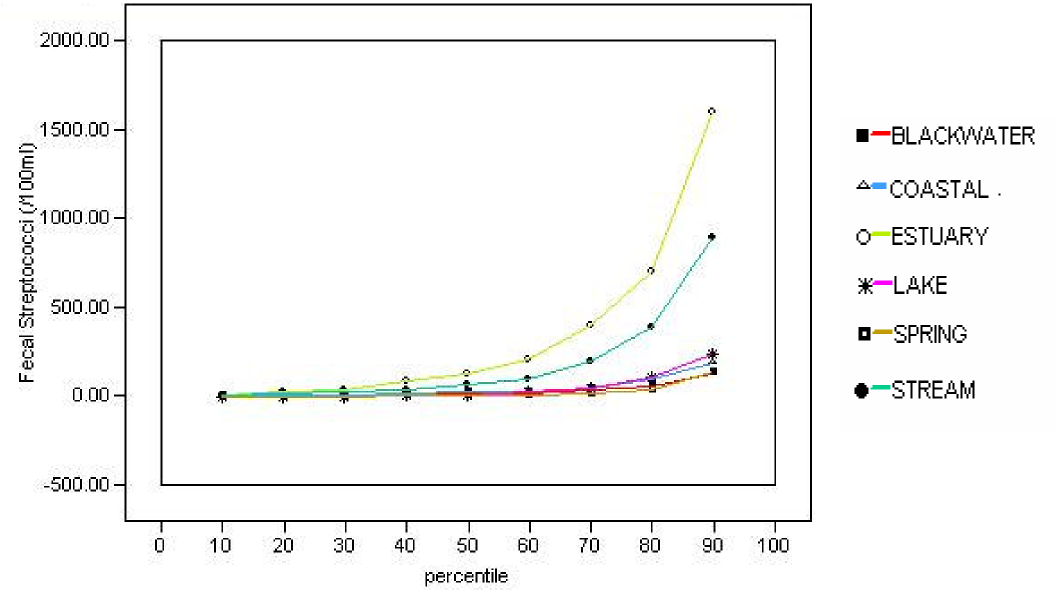
Fecal Streptococci (FSTRP)

Per 100 milliliters (/100ml)

Streptococci are a group of bacteria normally present in large numbers in the intestinal tracts of warm-blooded animals other than humans. Test results for the presence of fecal streptococci in freshwater samples are reliable; the values from samples taken in estuarine environments, however, may be inflated because of the presence of a naturally occurring streptococcal organism.

The fecal streptococci most probable number (MPN) procedure is used to determine the presence of fecal streptococci bacteria in the water column. The information gained from this test method is generally used in conjunction with the fecal coliform procedure and the total coliform procedure. The ratios of fecal coliform to fecal streptococci concentrations in a water sample can be used to distinguish whether pollution comes from human or animal waste.

Source: University of California at Davis; NALMS



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	2.00	2.00	9.00	2.00	1.00	8.00
20	4.00	5.00	26.00	2.00	2.00	18.00
30	7.00	10.00	44.00	2.00	3.00	28.00
40	10.00	20.00	87.00	6.00	5.00	40.00
50	15.00	27.00	130.00	12.00	8.00	68.00
60	23.00	33.00	210.00	25.00	13.00	102.00
70	35.00	49.00	400.00	51.00	24.00	200.00
80	60.00	95.00	700.00	110.00	44.00	390.00
90	130.00	190.00	1600.00	240.00	140.00	900.00

Flow (FLOW)

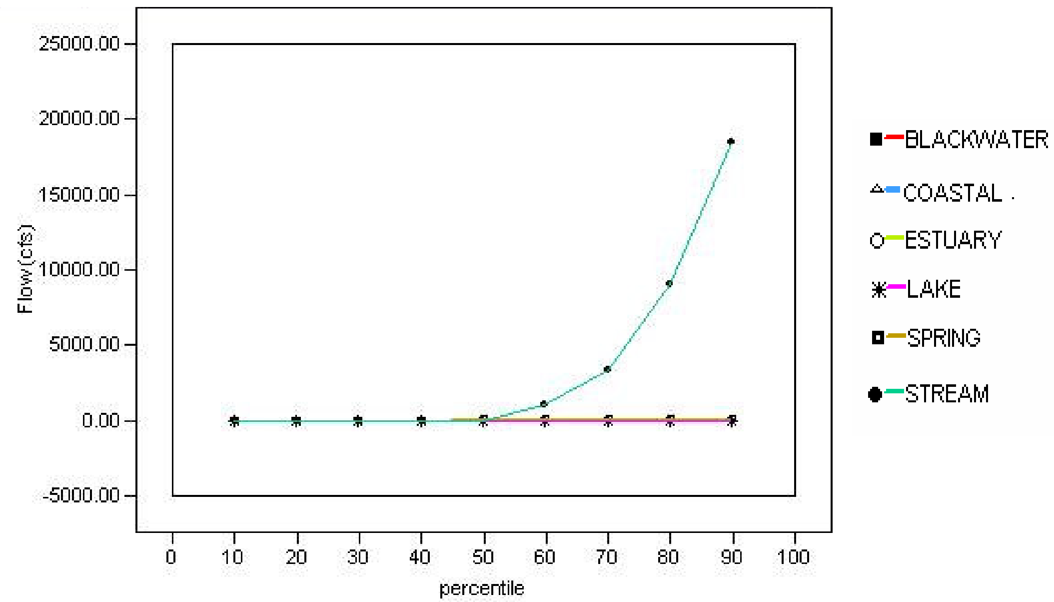
Cubic feet per second (cfs)

Stream flow is the amount of water that moves past a fixed point during a given period. It may consist of a single measurement at one place at one time, repeated measurements at one location, or patterns of flow over time (a flow regime). Flow affects many aspects of aquatic systems, including the amount of aquatic habitat present, numbers and types of organisms, levels of dissolved oxygen, water temperature, distribution of pollutants, degree of erosion, and sediment movement.

There are a number of approaches to measuring flow, such as direct measurement, calculation from separate measurements of water velocity and a cross-sectional area, and tracer studies. Continuous flow monitoring using an automated station is used to characterize hydrographs and flow regimes.

Many natural factors affect flow, such as the amount and timing of rainfall in the watershed; watershed size, topography, geology, and soil characteristics; the shape and size of the stream channel and adjacent floodplain; and the amount and type of vegetation growing in the watershed. Human factors include dams and diversions, impervious surfaces, and channel and floodplain alterations.

Source: California Environmental Protection Agency



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	.	0.30	0.20	3.90	12.30	0.33
20	.	0.50	0.37	8.30	28.00	2.30
30	.	0.70	0.77	12.30	41.35	5.90
40	.	0.90	1.30	15.70	53.00	16.01
50	.	1.17	2.30	19.60	81.00	53.00
60	.	1.55	3.50	23.80	106.00	1050.00
70	.	2.10	5.10	28.90	134.00	3450.00
80	.	3.00	7.50	35.70	151.00	9144.00
90	.	4.80	12.90	46.20	179.98	18500.00

Fluoride (F)

Milligrams per liter (mg/L)

Fluoride is a naturally occurring element found in water. Fluoride compounds are used in making steel, chemicals, ceramics, lubricants, dyes, plastics, and pesticides. At concentrations of about 1.0 mg/L in drinking water, fluoride is effective in preventing tooth decay. It is also often added to dental products such as toothpaste and mouth rinses, to prevent cavities. 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.

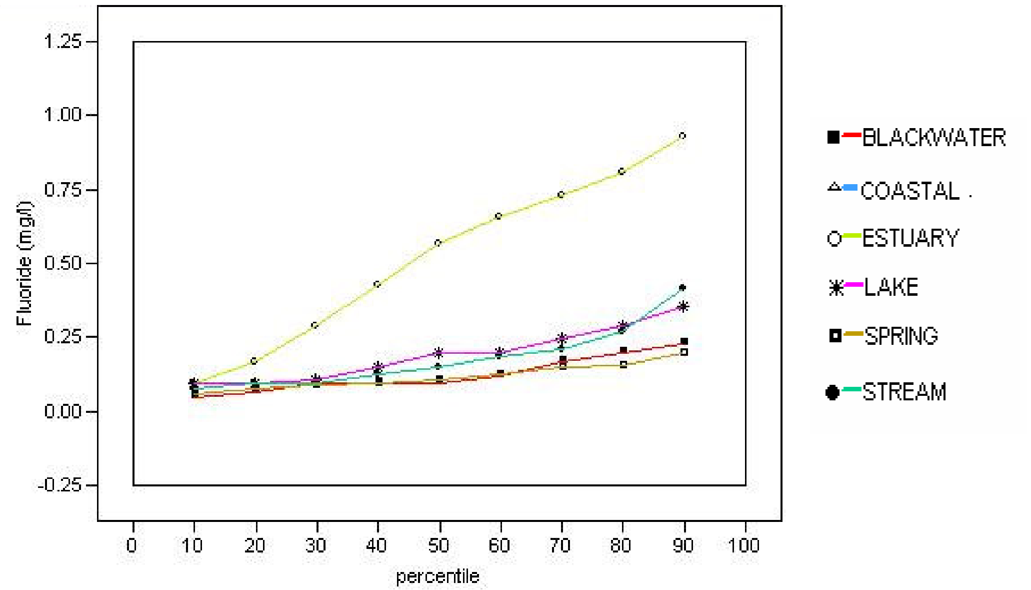
If released to the air from volcanoes and industry, fluorides are carried by wind and rain to nearby water, soil, and food sources. Fluorides in water and soil form strong associations with sediment or soil particles. Fluorides bioaccumulate in plants and animals. In animals, the fluoride accumulates mainly in the bones or shell, rather than in edible meat.

Because fluorides are found naturally in the environment, we cannot avoid being exposed to them. The EPA has set a maximum amount of fluoride allowable in drinking water of 4.0 mg/L.

Source: ATSDR

Percentile distribution of water quality parameters by waterbody type

F



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.05	.	0.10	0.10	0.06	0.08
20	0.07	.	0.17	0.10	0.08	0.10
30	0.10	.	0.29	0.11	0.09	0.10
40	0.10	.	0.43	0.15	0.10	0.13
50	0.10	.	0.57	0.20	0.11	0.15
60	0.12	.	0.66	0.20	0.13	0.19
70	0.17	.	0.73	0.25	0.15	0.21
80	0.20	.	0.81	0.29	0.16	0.27
90	0.23	.	0.93	0.36	0.20	0.42

Hardness (HARD)
Milligrams per liter (mg/L)

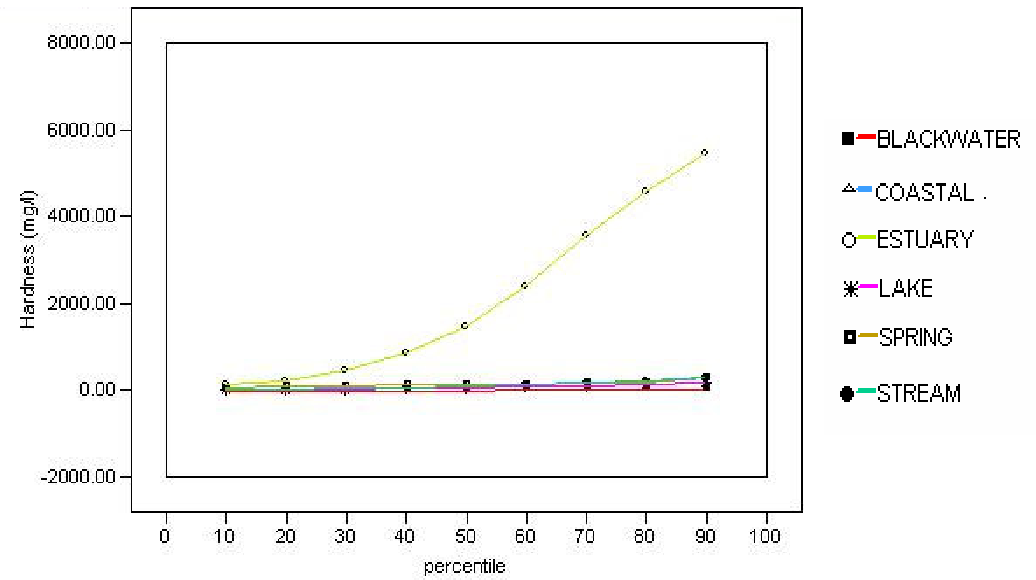
The amount of dissolved calcium and magnesium in water determines its hardness. Metallic cations (positively charged ions) other than the alkali metals also cause hardness.

Water hardness varies throughout the United States. In Florida, the water is relatively hard, and you may notice that it is difficult to produce soapy lather when washing your hands or clothes. Hard water forms a scale in boilers, water heaters, and pipes. Industries may have to invest in water-softening devices, as hard water can damage equipment. Hard water can even shorten the life of fabrics and clothes.

Water with a hardness of 60 mg/L or less is considered soft; 61 to 120 mg/L, moderately hard; 121 to 180 mg/L, hard; and more than 180 mg/L, very hard.

Source: USGS

Percentile distribution of water quality parameters by waterbody type



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	5.90	.	151.37	21.35	62.24	24.45
20	8.04	.	240.00	34.84	116.97	41.80
30	9.94	.	485.50	44.90	136.91	61.13
40	12.33	.	876.50	58.00	154.87	93.96
50	15.24	.	1500.00	78.90	164.86	130.97
60	18.64	.	2420.00	110.00	173.65	165.00
70	24.00	.	3571.50	136.65	184.57	201.00
80	34.89	.	4600.50	158.00	202.71	237.07
90	56.40	.	5479.00	198.81	322.08	318.44

Iron (FE)

Micrograms per liter (µg/L)

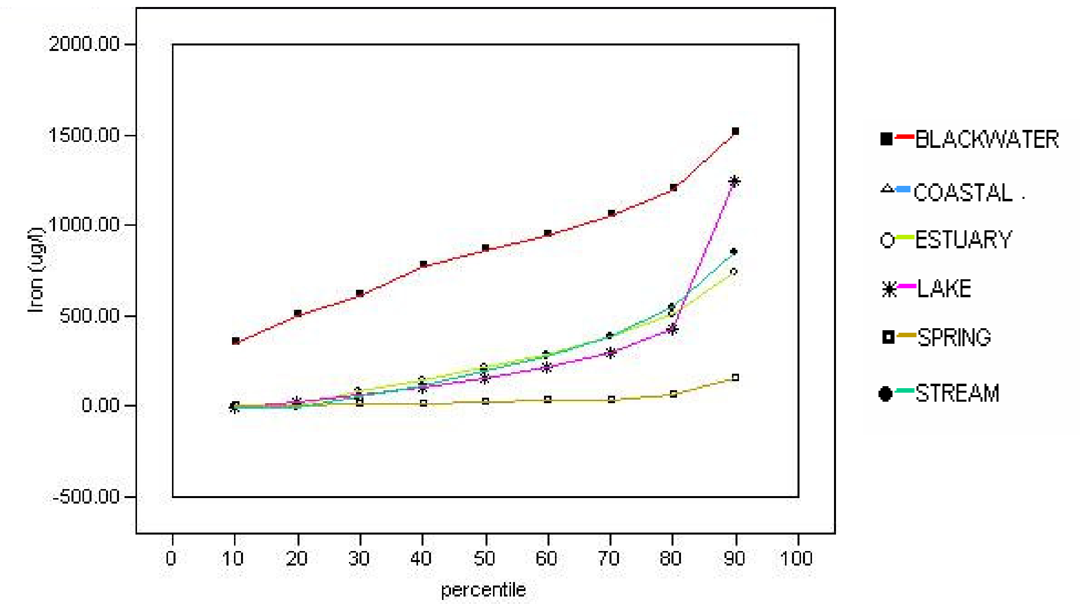
Iron, a common element found in soils, is an essential nutrient for aquatic plants and algae. It also performs an important function in aquatic systems because the presence of iron influences whether phosphorus is in a form that can be used by plants and algae.

Iron-rich waters can be aerated to reduce phosphorus concentrations, in order to limit nuisance aquatic plant and algal growth. An understanding of the role iron plays in the phosphorus cycle is a particularly important management tool in waterbodies where the primary supply of phosphorus comes from bottom sediments. In this situation, iron manipulation is one of only a few management strategies that have the potential to limit phosphorus availability effectively.

The highest concentrations of iron are found in Florida's highly colored waterbodies, because iron combines readily with organic molecules such as those in tea-colored water, probably causing these waterbodies to become iron enriched.

Although iron is not considered a known threat to human health, it may be toxic to invertebrates and fish.

Source: Florida LakeWatch



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	356.00	.	0.00	0.36	5.00	0.18
20	501.00	.	12.85	30.00	10.00	0.72
30	612.00	.	90.00	69.00	19.00	57.00
40	774.00	.	154.70	110.00	21.00	121.83
50	864.91	.	225.00	158.00	25.49	200.00
60	951.00	.	295.21	218.00	35.00	285.02
70	1060.00	.	395.10	302.00	38.20	391.00
80	1200.00	.	517.69	437.24	67.00	551.00
90	1510.00	.	748.24	1246.85	160.00	860.18

Lead (PB)

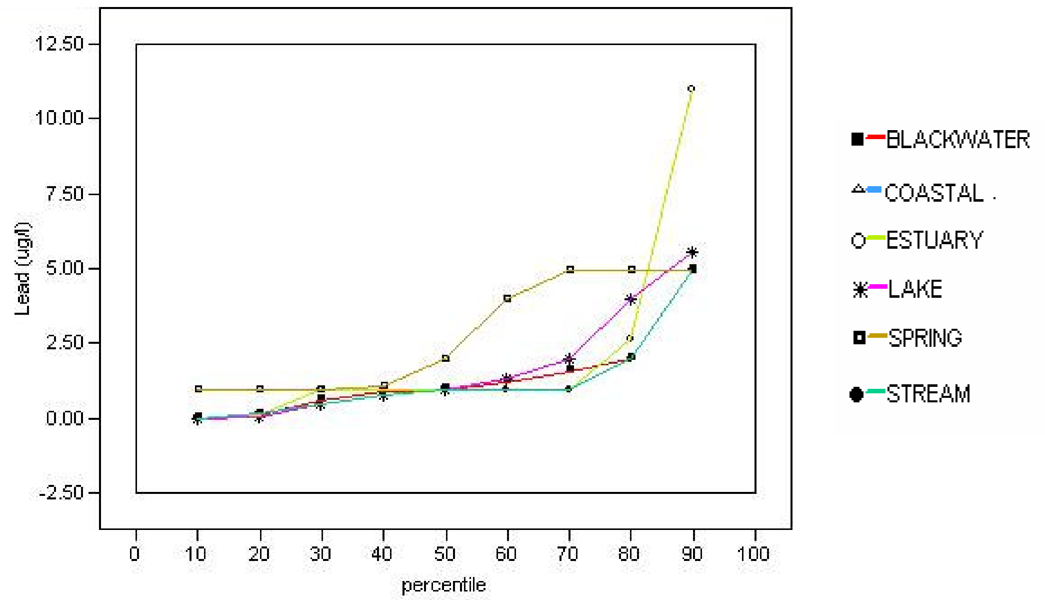
Micrograms per liter (µg/L)

Lead, a naturally occurring metal, is found in all parts of our environment. Much of it comes from human activities, including burning fossil fuels, mining, and manufacturing. Lead is used in the production of batteries, ammunition, metal products (solder and pipes), and devices to shield X-rays. Because of health concerns, the levels of lead in gasoline, paints and ceramic products, caulking, and pipe solder have been dramatically reduced in recent years.

Lead itself does not break down, but lead compounds are changed by sunlight, air, and water. When lead is released to the air, it may travel long distances before settling to the ground. Once lead falls onto soil, it usually sticks to soil particles. The movement of lead from soil into ground water depends on the type of lead compound and the characteristics of the soil. Much of the lead in inner-city soils comes from old houses painted with lead-based paint.

Lead affects almost every organ and system in the body. The most sensitive is the central nervous system, particularly in children. Even at low levels, lead can affect a child's mental and physical growth. Lead also damages kidneys and the reproductive system. The effects are the same whether it is breathed or swallowed. The EPA limits lead in drinking water to 15 µg/L.

Source: ATSDR



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.00	.	0.00	0.00	1.00	0.00
20	0.13	.	0.12	0.09	1.00	0.19
30	0.62	.	1.00	0.50	1.00	0.50
40	0.92	.	1.00	0.80	1.10	0.80
50	1.00	.	1.00	1.00	2.00	1.00
60	1.21	.	1.00	1.33	4.00	1.00
70	1.56	.	1.00	2.00	5.00	1.00
80	2.00	.	2.65	4.00	5.00	2.00
90	5.00	.	11.00	5.60	5.00	5.00

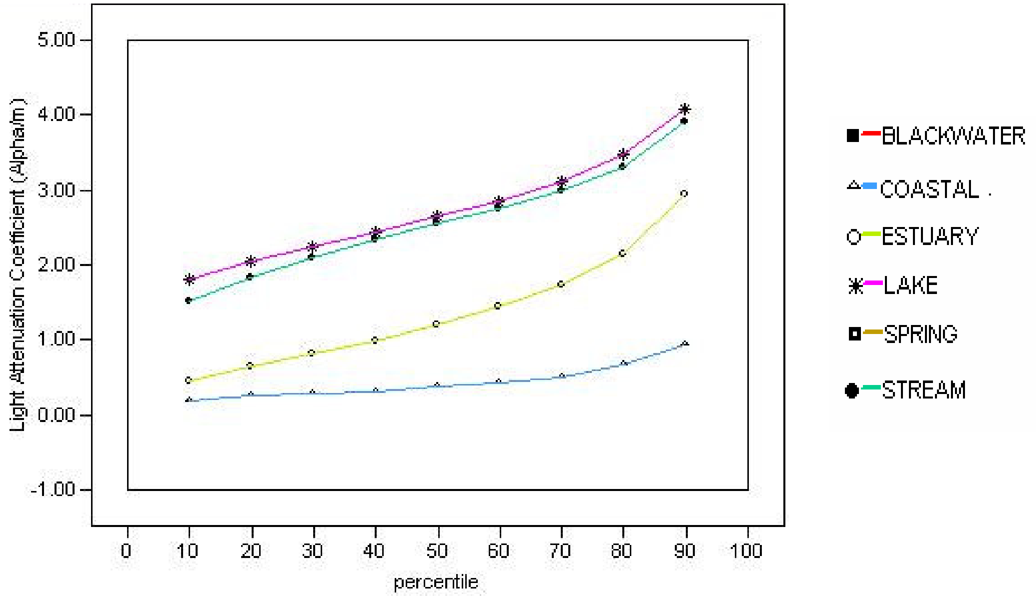
Light Attenuation Coefficient (LIGHT)

Alpha (fraction of photons) per meter (alpha/m)

This measure of water clarity defines how rapidly the level of sunlight penetrating the water decreases with depth. Sunlight is absorbed and scattered by suspended particles, dissolved substances, and the water itself. Light penetration can be measured to determine if it is sufficient to support phytoplankton photosynthesis. The attenuation coefficient is the natural logarithm of the ratio of the intensity of light of a specified wavelength on a horizontal surface to the intensity of the same wavelength of light on a horizontal surface 1 meter deeper in the water.

A high attenuation coefficient indicates poor water clarity, or a rapid decrease in the amount of light penetrating the water. An attenuation coefficient greater than 2.30 is equivalent to the transmission of only 10 percent of the light on the water surface to a depth of 1 meter. Fair water clarity is defined as an attenuation coefficient between 1.39 and 2.30, which is equivalent to the transmission of 25 percent of the light on the water surface to a depth of 1 meter. Good water clarity refers to an attenuation coefficient of less than 1.39.

Source: EPA, USGS



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	.	0.20	0.47	1.81	.	1.54
20	.	0.27	0.65	2.07	.	1.85
30	.	0.30	0.82	2.26	.	2.11
40	.	0.33	1.00	2.45	.	2.35
50	.	0.38	1.21	2.66	.	2.56
60	.	0.43	1.46	2.87	.	2.76
70	.	0.52	1.74	3.12	.	3.00
80	.	0.67	2.16	3.48	.	3.32
90	.	0.94	2.96	4.09	.	3.92

Magnesium as MG (MG)

Micrograms per liter (µg/L)

Magnesium, the eighth most abundant natural element, is a common component of water. It is found in many geologic formations, including dolomite, and is also present in high concentrations in vegetables, algae, fish, and mammals.

Natural sources contribute more magnesium to the environment than all human activities combined. An essential nutrient for all organisms, magnesium is found in chlorophyll and is used in the metabolism of plants, algae, fungi, and bacteria. Freshwater organisms need very little magnesium compared with the amount available to them in water. Because there is so little biological demand for magnesium compounds and because they are highly soluble, magnesium concentrations in waterbodies fluctuate very little.

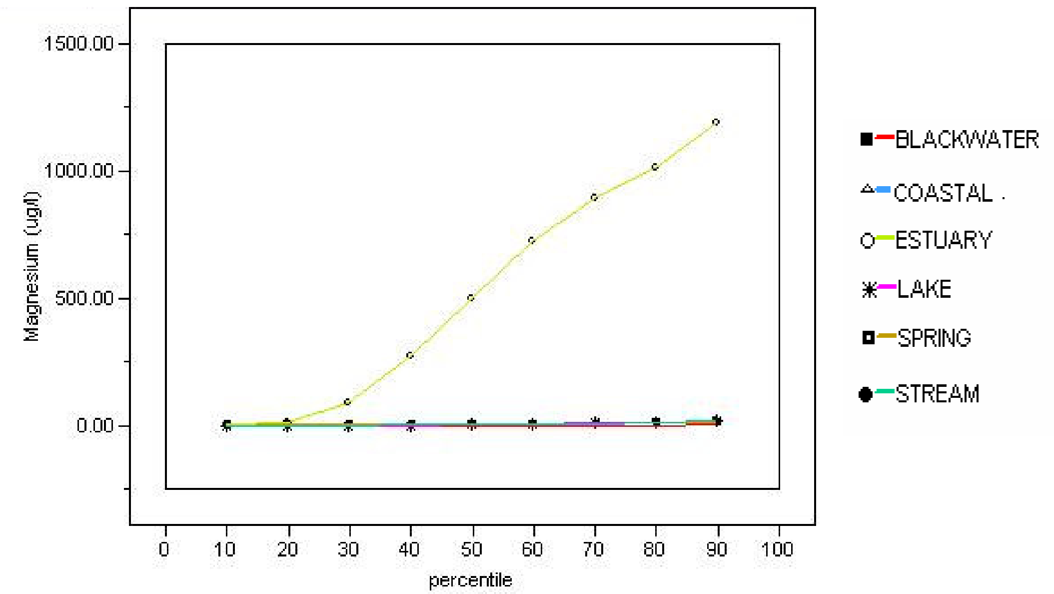
Like elevated calcium levels, elevated magnesium concentrations can cause "hard" water, which can cause a crusty mineral buildup called "scale" that clogs irrigation lines and water pipes and reduces the efficiency of hot water heaters.

Magnesium causes no known human health problems. Drinking large amounts of hard water when the body is accustomed to soft water, however, may have a laxative effect.

Source: Florida LakeWatch

Percentile distribution of water quality parameters by waterbody type

MG



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.70	.	8.50	1.60	3.60	1.40
20	0.90	.	18.00	2.40	5.10	2.20
30	1.10	.	93.60	3.00	5.90	3.07
40	1.30	.	278.00	4.00	6.40	4.10
50	1.50	.	499.50	5.40	7.10	5.50
60	1.70	.	728.50	8.10	8.20	7.02
70	2.20	.	900.00	11.18	10.00	9.10
80	3.00	.	1014.95	14.30	12.10	12.60
90	4.80	.	1190.00	19.55	15.70	20.79

Manganese (MN)

Micrograms per liter (µg/L)

Manganese, a naturally occurring metal, is found in many types of rocks. Pure manganese does not occur naturally but combines with other substances such as oxygen, sulfur, or chlorine. Manganese can also be combined with carbon to make organic manganese compounds such as pesticides and MMT, a fuel additive in some gasolines.

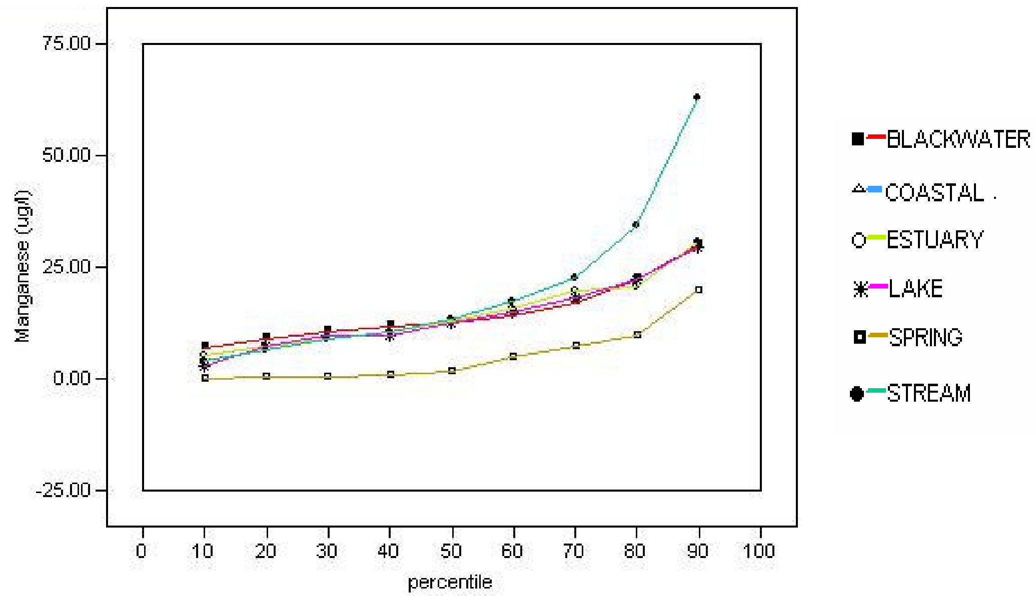
An essential trace element, manganese is necessary for good health. It is found in grains and cereals, and is also present in high levels in foods such as tea.

Manganese enters the air from iron, steel, and power plants; coke ovens; and dust from mining operations. It enters water and soil from natural deposits, the disposal of wastes, or deposits from airborne sources. Manganese exists naturally in rivers, lakes, and underground water. Aquatic plants can take up some of the manganese from water and concentrate it.

At high levels, manganese can damage the brain, liver, kidneys, and the developing fetus. The EPA has set a nonenforceable guideline for the level of manganese in drinking water at 0.05 mg/L.

Source: ATSDR

Percentile distribution of water quality parameters by waterbody type



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	7.00	.	5.34	3.00	0.20	4.40
20	9.22	.	7.45	7.50	0.50	6.58
30	10.50	.	9.04	10.00	0.50	9.00
40	11.70	.	10.61	10.00	1.00	10.70
50	12.71	.	13.00	12.60	2.00	13.47
60	14.50	.	16.00	15.30	5.00	17.60
70	17.05	.	20.00	18.30	7.50	22.60
80	22.25	.	20.70	22.40	10.00	34.57
90	30.00	.	31.00	29.80	19.90	63.00

Mercury (HG)

Micrograms per liter (µg/L)

Mercury, a naturally occurring metal, has both inorganic and organic forms. Inorganic metallic mercury is used to produce chlorine gas and caustic soda, and is used in thermometers, dental fillings, and batteries. Mercury also combines with other elements, such as chlorine, sulfur, or oxygen, to form inorganic mercury compounds, or "salts," which are sometimes used in skin-lightening creams and as antiseptic creams and ointments. Inorganic mercury enters the air from mining ore deposits, burning coal and waste, and manufacturing plants. It enters the water or soil from natural deposits, waste disposal, and volcanic activity.

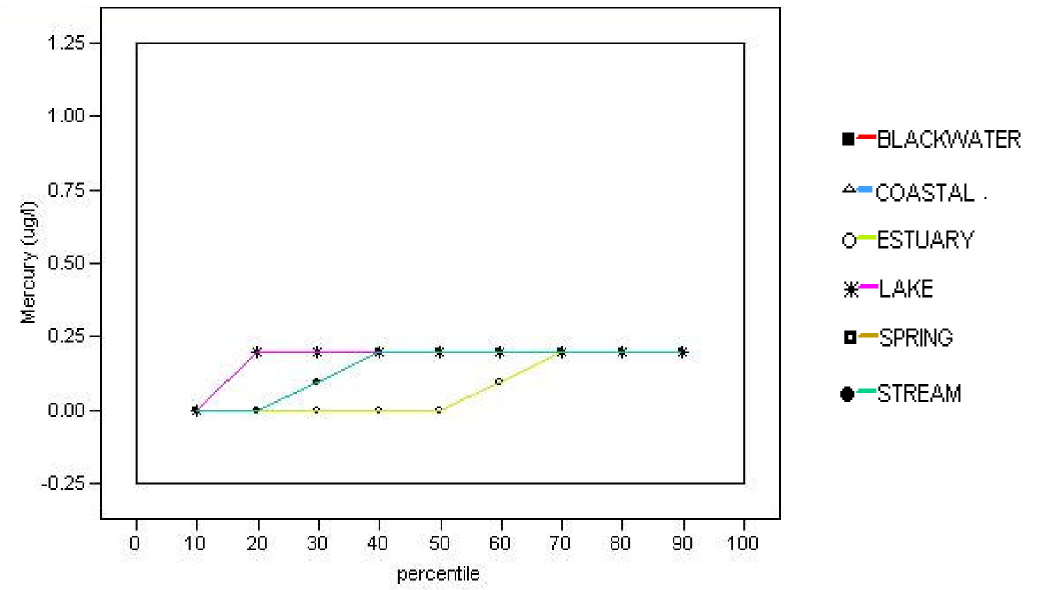
Mercury combines with carbon to make organic mercury compounds. Methylmercury, the most common of these compounds, is produced mainly by bacteria in water and soil.

Methylmercury bioaccumulates in fish and wildlife. The nervous system is very sensitive to all forms of mercury. Methylmercury and metallic mercury vapors are especially harmful because more mercury reaches the brain. Very young children are more sensitive to mercury than adults. The EPA has set a limit of 2 ppb of mercury in drinking water.

Source: ATSDR

Percentile distribution of water quality parameters by waterbody type

HG



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	.	.	0.00	0.00	.	0.00
20	.	.	0.00	0.20	.	0.00
30	.	.	0.00	0.20	.	0.10
40	.	.	0.00	0.20	.	0.20
50	.	.	0.00	0.20	.	0.20
60	.	.	0.10	0.20	.	0.20
70	.	.	0.20	0.20	.	0.20
80	.	.	0.20	0.20	.	0.20
90	.	.	0.20	0.20	.	0.20

Molybdenum, Total as MO (MO)

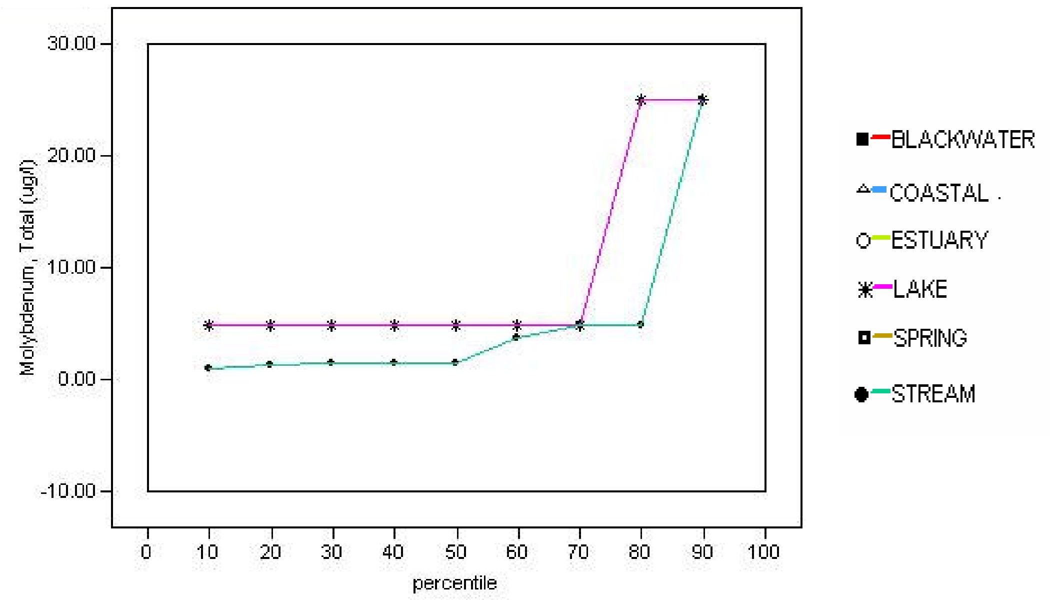
Micrograms per liter (µg/L)

Molybdenum is a silvery-white metal. Because it is extremely hard and has one of the highest melting points of all pure elements, it is used in steel, cast iron, and superalloys to enhance hardness, strength, toughness, and resistance to wear and corrosion. Molybdenum is found in aircraft and missile parts, and in filaments. It is also used in numerous chemical applications, including catalysts, lubricants, and pigments. The main commercial source of molybdenum is molybdenite, which is mined directly and is also a by-product of copper mining.

Plants require trace amounts of molybdenum, and soils can be barren due to molybdenum deficiencies. Plants and animals generally contain a few parts per million of molybdenum. In plants, molybdenum is involved in nitrogen fixation and nitrate reduction. In some animals, adding a small amount of dietary molybdenum enhances growth.

Molybdenum dusts and molybdenum compounds, such as molybdenum trioxide and water-soluble molybdates, may be slightly toxic if inhaled or ingested orally. Acute toxicity in humans is unlikely because the dose required is exceptionally large. Insoluble molybdenum compounds, such as the lubricant molybdenum disulfide, are considered nontoxic.

Source: USGS; Science Daily



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	.	.	.	5.00	.	1.00
20	.	.	.	5.00	.	1.30
30	.	.	.	5.00	.	1.60
40	.	.	.	5.00	.	1.60
50	.	.	.	5.00	.	1.60
60	.	.	.	5.00	.	3.80
70	.	.	.	5.00	.	5.00
80	.	.	.	25.00	.	5.00
90	.	.	.	25.00	.	25.00

Nickel (NI)

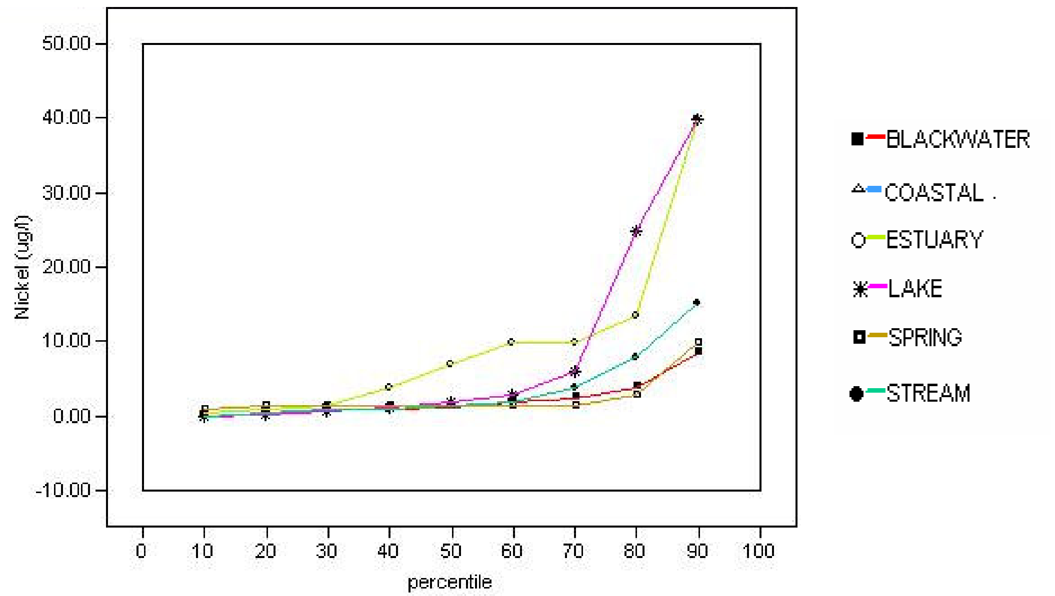
Micrograms per liter (µg/L)

Nickel, a very abundant element, is found primarily combined with oxygen (oxides) or sulfur (sulfides). It is found in all soils and is emitted from volcanoes. Pure nickel, a hard, silvery-white metal, can be combined with metals such as iron, copper, chromium, and zinc to make stainless steel and other alloys that are used to manufacture metal coins, jewelry, and other metal items. Nickel compounds are also used for nickel plating, to color ceramics, to make some batteries, and as catalysts that increase the rate of chemical reactions.

Small nickel particles in the air settle to the ground, or are taken out of the air in rain. Much of the nickel in the environment is found with soil and sediments, because nickel attaches to particles that contain iron or manganese, which are often present in soil and sediments. Nickel does not appear to collect in fish, plants, or animals used for food.

Nickel is required to maintain health in animals. A small amount of nickel is probably essential for human health. The EPA recommends that children's drinking water should contain no more than 0.04 mg/L of nickel for one to ten days of exposure.

Source: ATSDR



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.00	.	0.64	0.00	1.00	0.00
20	0.51	.	1.00	0.23	1.50	0.50
30	1.00	.	1.55	0.86	1.50	1.00
40	1.00	.	4.00	1.13	1.50	1.00
50	1.18	.	7.00	2.00	1.50	1.60
60	1.98	.	10.00	2.90	1.50	2.00
70	2.46	.	10.00	6.00	1.50	3.86
80	4.00	.	13.50	25.00	3.00	8.10
90	8.40	.	40.00	40.00	10.00	15.30

Nickel in Sediment (NIS)
Milligrams per kilogram (mg/kg)

Nickel (in dissolved and particulate form) enters the aquatic environment in effluents and leachates, as well as through atmospheric deposition after being released into the air by human activities.

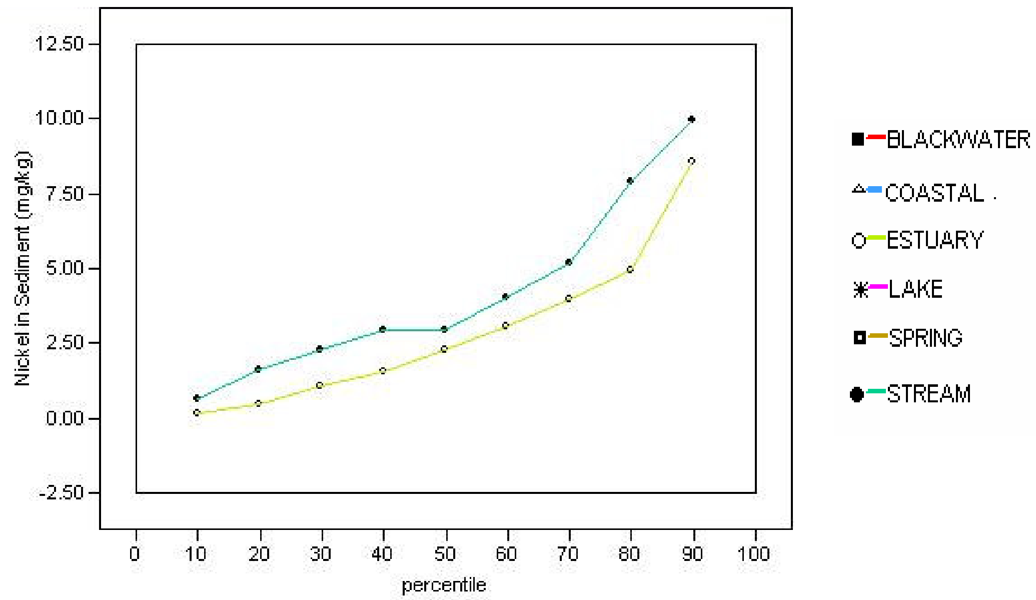
Assessing sediments for contamination is important because (1) various toxic contaminants found in only trace amounts in water accumulate in sediments to elevated levels; (2) sediments serve as both a reservoir and a source of contaminants for water; (3) sediments integrate contaminant concentrations over time; (4) sediment contaminants affect benthic and other sediment-associated organisms; and (5) sediments are an integral part of the aquatic environment, providing habitat, feeding, and rearing areas for many aquatic organisms.

The uptake (and effects) of sediment-associated contaminants is largely a function of bioavailability, which is strongly influenced by complex physical, chemical, and biological factors. The complexity of trace metal bioavailability makes it difficult to predict its effects.

Sources: Regional Niagara Public Health Department; Oak Ridge National Laboratory

Percentile distribution of water quality parameters by waterbody type

NIS



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	.	.	0.20	.	.	0.70
20	.	.	0.50	.	.	1.62
30	.	.	1.11	.	.	2.30
40	.	.	1.61	.	.	3.00
50	.	.	2.30	.	.	3.00
60	.	.	3.12	.	.	4.04
70	.	.	4.00	.	.	5.20
80	.	.	5.00	.	.	7.96
90	.	.	8.62	.	.	10.00

Nitrate (NO3)

Milligrams per liter (mg/L)

Nitrate is a form of nitrogen. Organic nitrates come mainly from septic systems, animal feedlots, fertilizers, manure, industrial wastewater, sanitary landfills, and garbage dumps. The primary inorganic nitrates are potassium nitrate and ammonium nitrate, both of which are widely used as fertilizers.

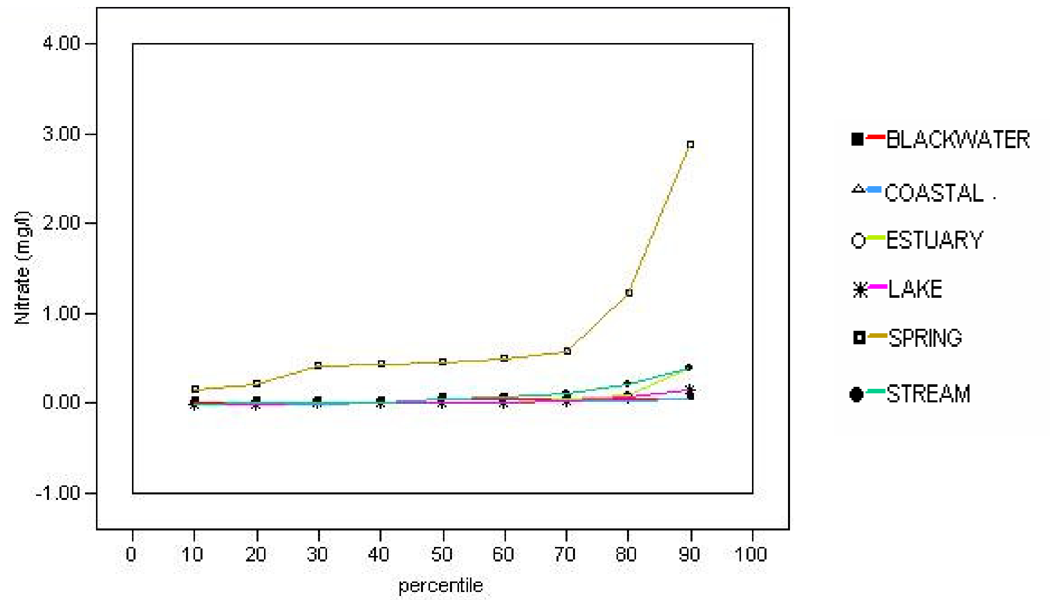
Since they are soluble and do not bind to soils, nitrates can easily enter ground water and surface water. Short-term exposure to drinking water with a nitrate level at or just above the maximum contaminant level (MCL) of 10 mg/L is a potential health problem primarily for infants. It can lead to a condition called "blue baby syndrome," or methemoglobinemia, in which the red blood cells cannot carry oxygen. Because nitrates are found in sewage or animal waste, excessive levels in drinking water may indicate the presence of other potentially harmful contaminants.

Excess nitrogen in surface water, in combination with other nutrients such as phosphorus, can accelerate the growth of algae and other aquatic plants. This can decrease oxygen levels and harm aquatic life.

Sources: EPA; Michigan and Idaho Departments of Environmental Quality; Orange County, Florida

Percentile distribution of water quality parameters by waterbody type

N03



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.02	0.00	0.00	0.00	0.15	0.00
20	0.02	0.00	0.01	0.01	0.22	0.01
30	0.02	0.01	0.01	0.01	0.41	0.01
40	0.02	0.01	0.01	0.01	0.44	0.03
50	0.05	0.01	0.01	0.02	0.47	0.05
60	0.05	0.02	0.03	0.02	0.50	0.08
70	0.05	0.03	0.05	0.05	0.58	0.12
80	0.05	0.04	0.10	0.08	1.22	0.21
90	0.06	0.06	0.40	0.16	2.89	0.41

Nitrate Nitrite (NO3O2)
Milligrams per liter (mg/L)

Nitrate nitrate, which is highly water soluble and easily used by algae, is a combination of all the intermediate forms of nitrogen in the oxidation process.

Nitrate does not normally cause health problems unless it is reduced to nitrite, which can cause a condition in infants known as "blue baby syndrome" (methemoglobinemia), in which the red blood cells cannot carry oxygen.

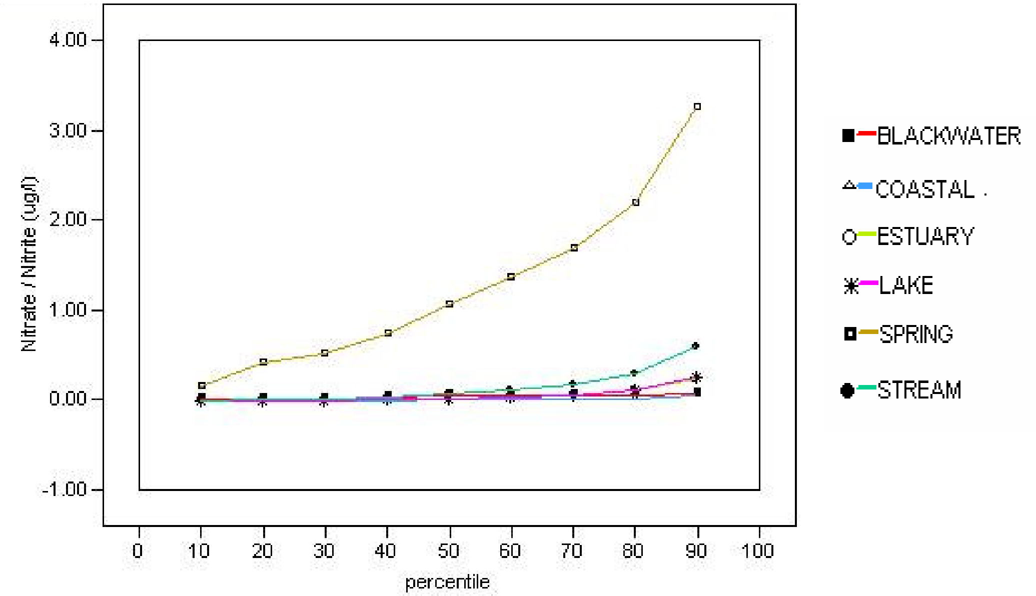
Nitrite can be toxic to fish. It is usually not a problem in waterbodies, however, because if enough oxygen is available in the water bacteria readily convert the nitrite to nitrate.

The EPA has established an MCL of 1 mg/L for nitrite in drinking water.

Source: Florida LakeWatch; Orange County, Florida

Percentile distribution of water quality parameters by waterbody type

N0302



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.01	0.00	0.00	0.00	0.16	0.01
20	0.02	0.00	0.01	0.00	0.42	0.01
30	0.02	0.00	0.01	0.01	0.53	0.02
40	0.04	0.01	0.02	0.01	0.75	0.04
50	0.05	0.01	0.02	0.02	1.06	0.07
60	0.05	0.01	0.04	0.04	1.36	0.11
70	0.05	0.02	0.06	0.06	1.70	0.18
80	0.05	0.03	0.12	0.13	2.20	0.31
90	0.08	0.05	0.23	0.26	3.26	0.60

Nitrite Nitrogen as N (NO2)

Milligrams per liter (mg/L)

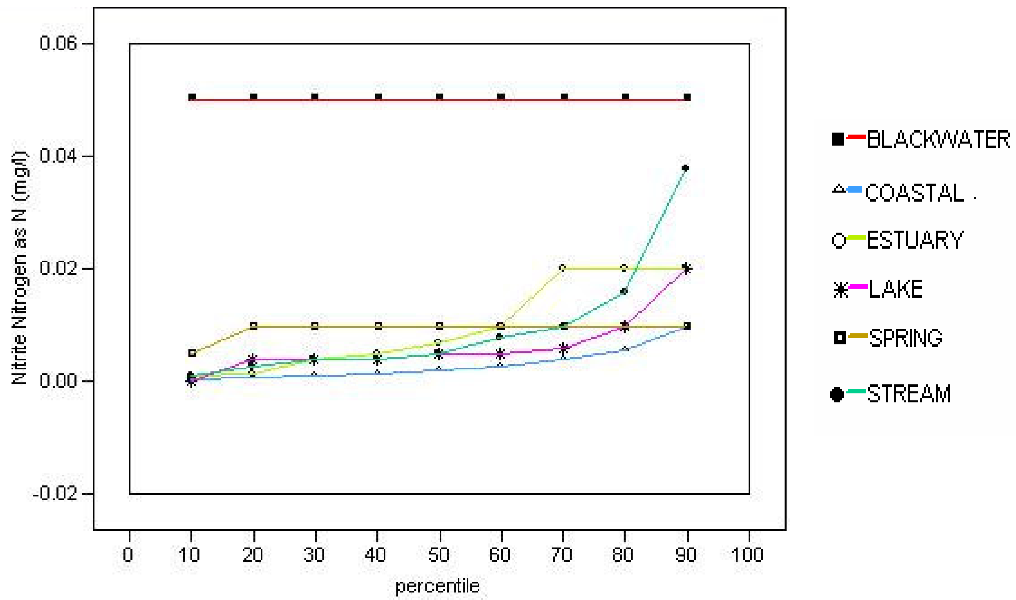
Nitrite nitrogen is a product of the oxidation of ammonia nitrogen. It is found in wastewater treatment plants and water distribution systems.

While nitrite nitrogen is not as toxic as ammonia nitrogen, it is harmful to aquatic species.

Source: Aquasol, Inc.; Orange County, Florida

Percentile distribution of water quality parameters by waterbody type

NO2



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.05	0.00	0.00	0.00	0.01	0.00
20	0.05	0.00	0.00	0.00	0.01	0.00
30	0.05	0.00	0.00	0.00	0.01	0.00
40	0.05	0.00	0.01	0.00	0.01	0.00
50	0.05	0.00	0.01	0.01	0.01	0.01
60	0.05	0.00	0.01	0.01	0.01	0.01
70	0.05	0.00	0.02	0.01	0.01	0.01
80	0.05	0.01	0.02	0.01	0.01	0.02
90	0.05	0.01	0.02	0.02	0.01	0.04

Nitrogen Ammonia as N (NH4)
Milligrams per liter (mg/L)

A form of nitrogen found in decaying plants and animals, sewage, and many fertilizers, nitrogen ammonia is produced by the decomposition of organic, nitrogen-containing compounds. It is essential for many biological processes.

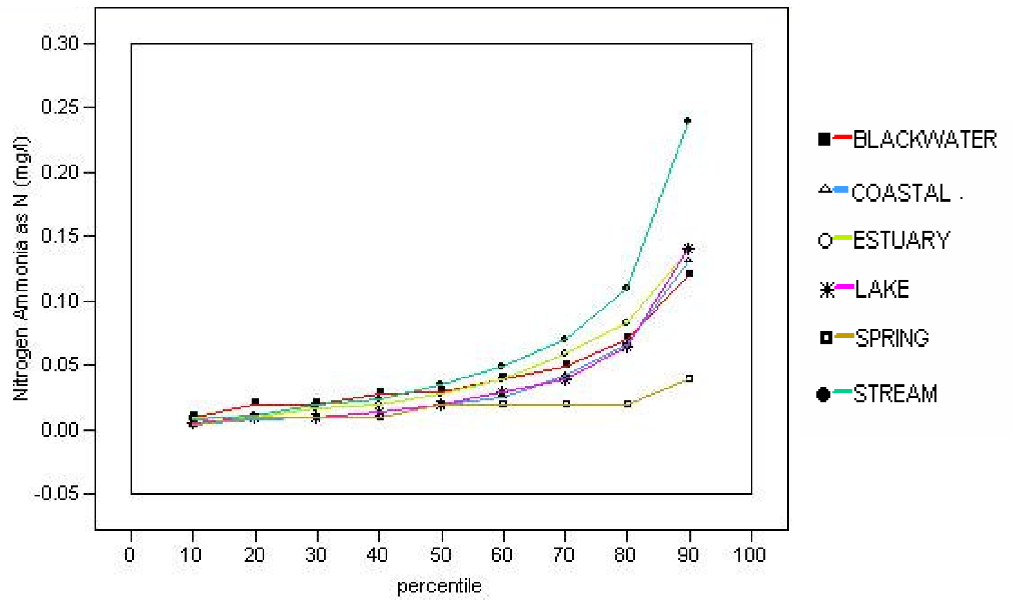
Because ammonia can be readily used by most aquatic plants, it is an important nutrient. Ammonia converts rapidly to nitrate if oxygen is present. The conversion rate speeds up as the water temperature increases.

Ammonia is toxic to fish at relatively low concentrations in pH-neutral or alkaline water. Under acid conditions, nontoxic ammonium ions form, but at high pH values (increased alkalinity) the toxic compound ammonium hydroxide develops.

Source: NALMS; Orange County, Florida

Percentile distribution of water quality parameters by waterbody type

N04



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.01	0.00	0.01	0.01	0.01	0.01
20	0.02	0.01	0.01	0.01	0.01	0.01
30	0.02	0.01	0.02	0.01	0.01	0.02
40	0.03	0.01	0.02	0.01	0.01	0.02
50	0.03	0.02	0.03	0.02	0.02	0.04
60	0.04	0.03	0.04	0.03	0.02	0.05
70	0.05	0.04	0.06	0.04	0.02	0.07
80	0.07	0.07	0.08	0.07	0.02	0.11
90	0.12	0.13	0.14	0.14	0.04	0.24

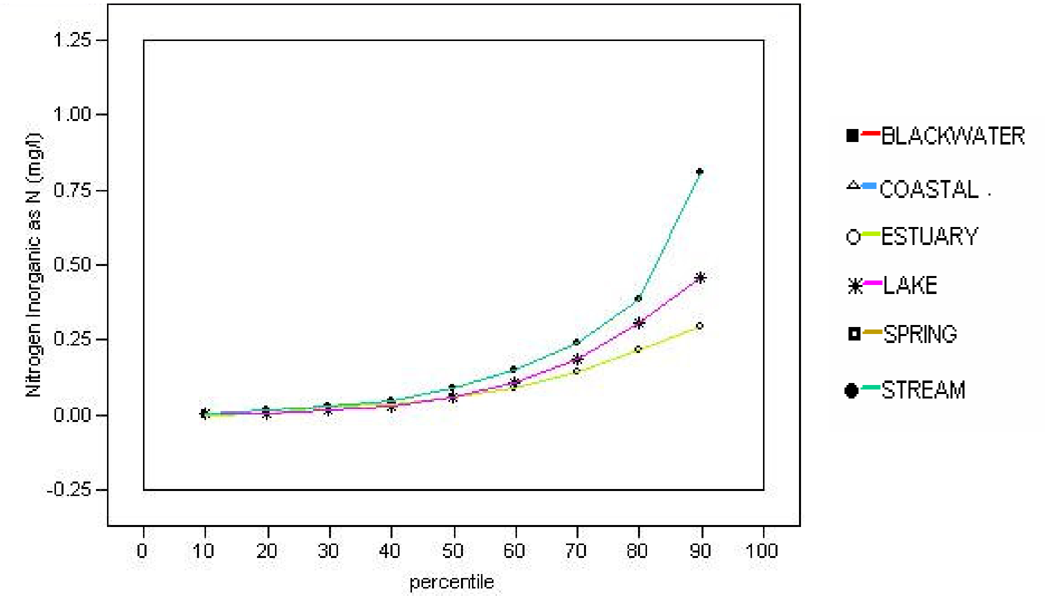
Nitrogen Inorganic as N (NIORG)

Milligrams per liter (mg/L)

Nitrogen is an essential component of many carbon-based or organic molecules, such as proteins in living tissues. When microorganisms use the carbon in organic materials for energy, nitrogen is released in a molecular form that is no longer associated with carbon.

This process of transformation from organic to inorganic nitrogen is called mineralization. Microorganisms take up inorganic nitrogen, a process called immobilization. Both of these processes occur simultaneously and provide continuous movement between the organic and inorganic pools of nitrogen in the environment.

Source: North Dakota State University Extension Service



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	.	.	0.00	0.01	.	0.01
20	.	.	0.01	0.01	.	0.02
30	.	.	0.03	0.02	.	0.03
40	.	.	0.04	0.03	.	0.05
50	.	.	0.06	0.06	.	0.09
60	.	.	0.09	0.11	.	0.15
70	.	.	0.14	0.19	.	0.24
80	.	.	0.22	0.31	.	0.39
90	.	.	0.30	0.46	.	0.81

Nitrogen Kjeldahl as N (TKN)
Milligrams per liter (mg/L)

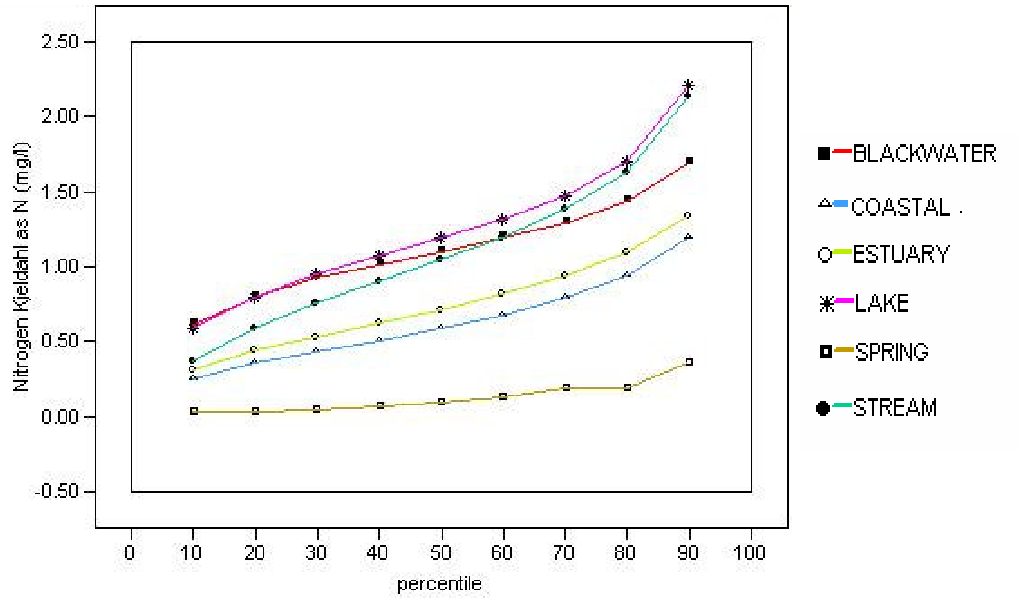
Total Kjeldahl nitrogen (TKN) is the analytical method used to measure the amount of organic nitrogen from plant and animal matter in a water sample. TKN is the combination of ammonia and organic nitrogen. Organic nitrogen includes such materials as proteins, peptides, nucleic acids, urea, and numerous synthetic organic compounds.

The Kjeldahl method breaks down the proteins and other organic substances in a water sample using sulfuric acid, in the presence of other catalysts. The nitrogen present is converted to ammonium sulphate, which is then measured by a titration or a colorimetric method.

Source: Orange County, Florida

Percentile distribution of water quality parameters by waterbody type

TKN



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.62	0.26	0.32	0.60	0.04	0.38
20	0.80	0.36	0.45	0.80	0.04	0.60
30	0.93	0.44	0.54	0.95	0.05	0.77
40	1.02	0.51	0.63	1.08	0.08	0.92
50	1.10	0.59	0.72	1.20	0.10	1.06
60	1.20	0.68	0.82	1.32	0.13	1.20
70	1.30	0.80	0.94	1.48	0.20	1.39
80	1.44	0.94	1.10	1.71	0.20	1.63
90	1.70	1.20	1.34	2.21	0.37	2.14

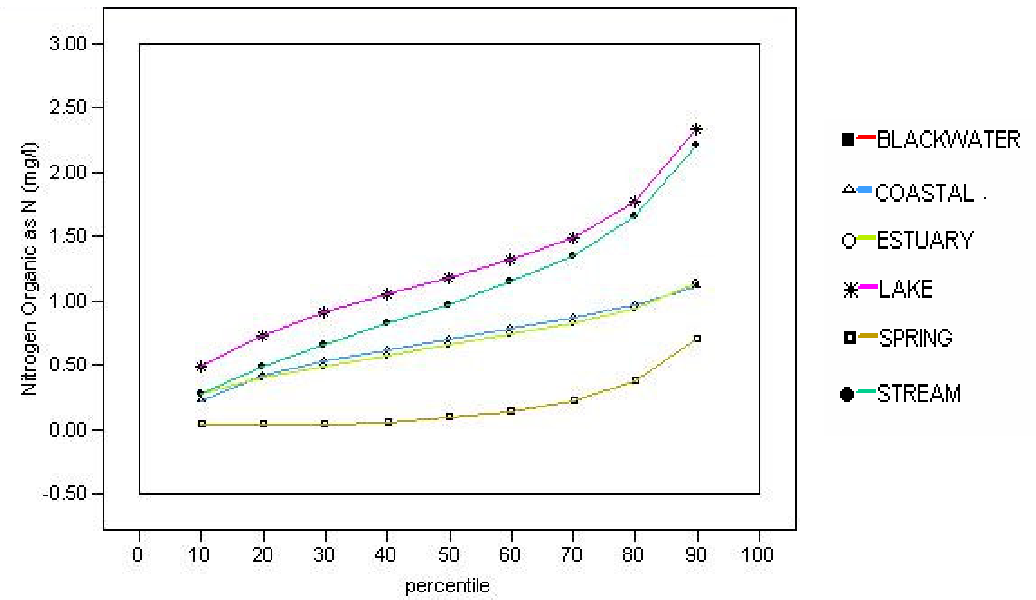
Nitrogen Organic as N (ORGN)
Milligrams per liter (mg/L)

Organic nitrogen is the naturally occurring fraction of the nitrogen in lakes and streams. This form of nitrogen is bound to carbon-containing compounds. It must be subjected to mineralization or decomposition before it can be used by aquatic and terrestrial plant communities. In contrast, inorganic nitrogen, which is in a mineral state, is more readily utilized by plant communities.

Source: NALMS

Percentile distribution of water quality parameters by waterbody type

ORGN



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	.	0.22	0.28	0.50	0.05	0.29
20	.	0.43	0.41	0.73	0.05	0.50
30	.	0.54	0.50	0.92	0.05	0.66
40	.	0.62	0.58	1.06	0.06	0.83
50	.	0.71	0.66	1.19	0.10	0.98
60	.	0.79	0.75	1.33	0.14	1.16
70	.	0.87	0.84	1.50	0.23	1.36
80	.	0.98	0.95	1.78	0.39	1.67
90	.	1.12	1.14	2.34	0.70	2.22

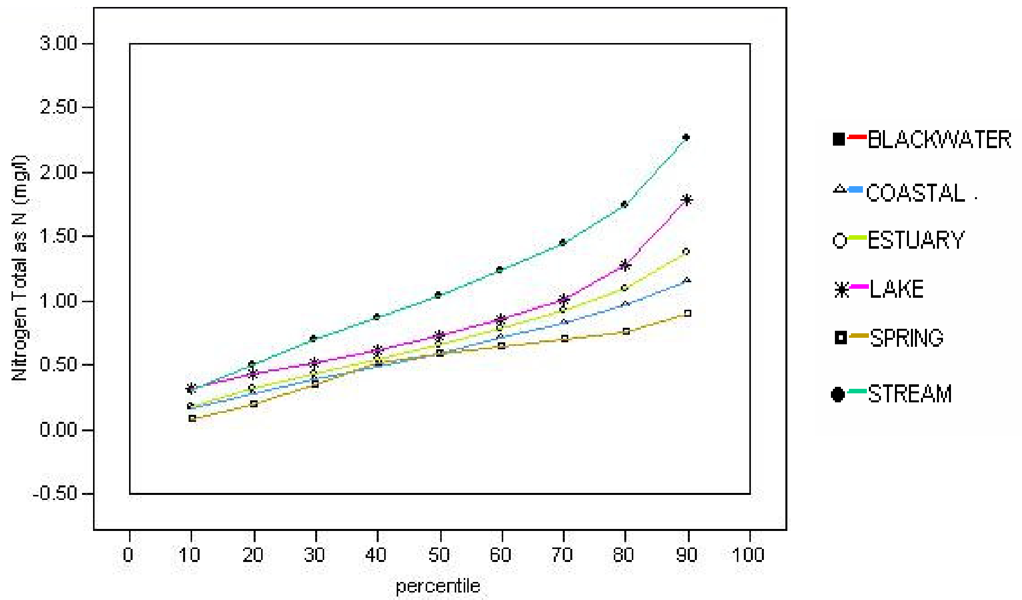
Nitrogen Total as N (TN)

Milligrams per liter (mg/L)

Total nitrogen is the combined measurement of nitrate (NO3), nitrite (NO2), ammonia, and organic nitrogen found in water. Nitrogen compounds function as important nutrients for many aquatic organisms and are essential to the chemical processes that exist between land, air, and water. The most readily bioavailable forms of nitrogen are ammonia and nitrate. These compounds, in conjunction with other nutrients, serve as an important base for primary productivity.

The major sources of excessive amounts of nitrogen in surface water are the effluent from municipal treatment plants and runoff from agricultural sites. When nutrient concentrations consistently exceed natural levels, the resulting nutrient imbalance can cause undesirable changes in a waterbody's biological community and increase the rate of eutrophication (or accelerated aging) in an aquatic system. Usually, the eutrophication process is observed as a change in the structure of the algal community and includes severe algal blooms that may cover large areas of a waterbody for extended periods. Large algal blooms are generally followed by a depletion in dissolved oxygen concentrations as a result of algal decomposition.

Source: FDEP



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	.	0.17	0.19	0.33	0.09	0.31
20	.	0.29	0.32	0.44	0.20	0.51
30	.	0.40	0.44	0.53	0.35	0.70
40	.	0.50	0.55	0.62	0.52	0.88
50	.	0.60	0.67	0.73	0.59	1.05
60	.	0.72	0.79	0.86	0.65	1.24
70	.	0.84	0.93	1.02	0.70	1.45
80	.	0.97	1.10	1.29	0.77	1.75
90	.	1.16	1.39	1.80	0.90	2.28

Oil/Grease (OIL)

Milligrams per liter (mg/L)

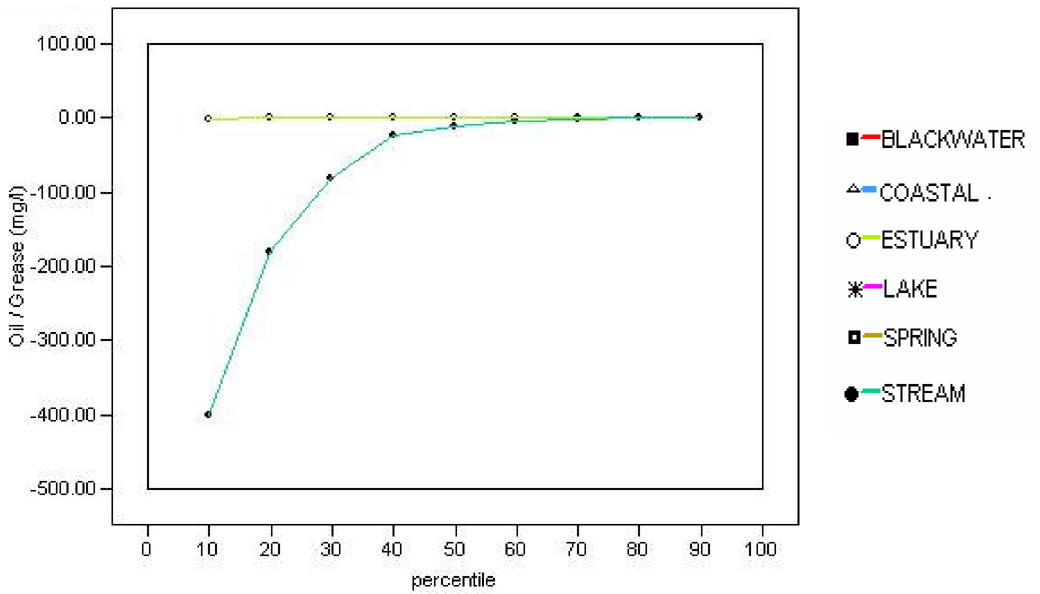
Oil and grease include relatively nonvolatile hydrocarbons, vegetable oils, animal fats, waxes, soaps, greases, and related materials. These substances can enter surface water through runoff from roads, or from commercial or industrial activities. They can harm aquatic life by decreasing the light penetration needed for photosynthesis, or by forming a physical barrier that smothers aquatic species.

Oil and grease are extracted from a water sample using a solvent, n-hexane.

Source: EPA

Percentile distribution of water quality parameters by waterbody type

OIL



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	.	.	0.30	.	.	-400.00
20	.	.	1.12	.	.	-180.00
30	.	.	2.50	.	.	-81.00
40	.	.	2.50	.	.	-23.00
50	.	.	2.50	.	.	-10.00
60	.	.	2.50	.	.	-3.60
70	.	.	2.50	.	.	-1.00
80	.	.	2.50	.	.	1.00
90	.	.	2.50	.	.	2.50

Orthophosphate as PO4 (PORTH)

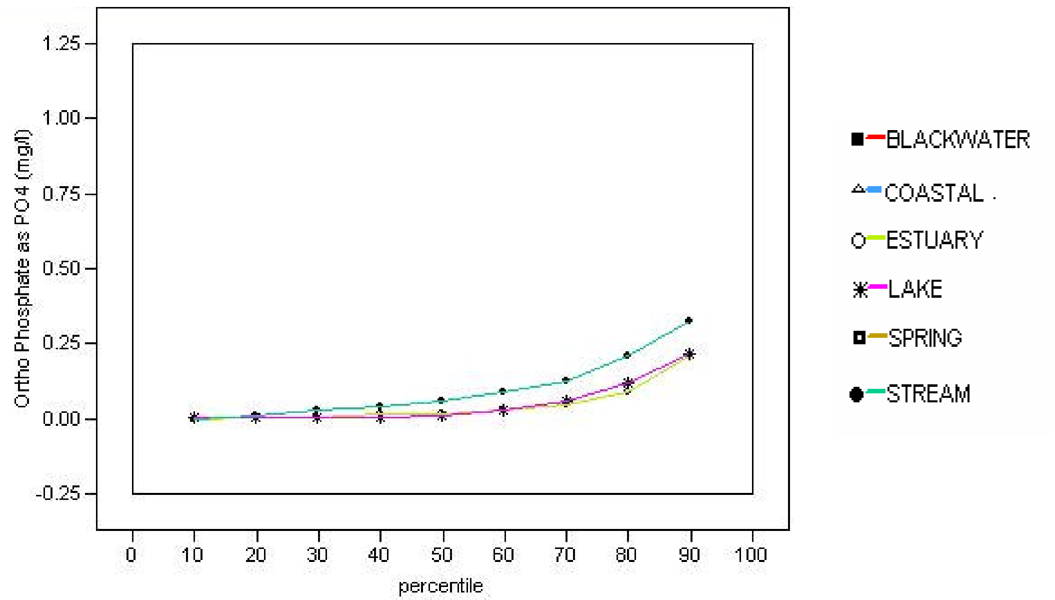
Milligrams per liter (mg/L)

Even very low concentrations of phosphorus can dramatically affect water quality in rivers and lakes. Monitoring phosphorus is challenging because it involves measuring very low concentrations down to 0.01 mg/L or even lower in a water sample.

The term "orthophosphate" is a chemistry-based term that refers to the phosphate molecule all by itself, and the total orthophosphate test measures the quantity of reactive phosphorus in a water sample. Because the sample is not filtered, the procedure measures the concentrations of both dissolved and suspended orthophosphate.

The EPA-approved method for measuring total orthophosphate is known as the ascorbic acid method. A reagent reacts with orthophosphate in a sample to form a blue compound. The intensity of the blue color is directly proportional to the amount of orthophosphate in the water.

Source: EPA



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	.	.	0.00	0.01	.	0.00
20	.	.	0.01	0.01	.	0.01
30	.	.	0.01	0.01	.	0.03
40	.	.	0.02	0.01	.	0.04
50	.	.	0.02	0.02	.	0.06
60	.	.	0.03	0.03	.	0.09
70	.	.	0.05	0.06	.	0.13
80	.	.	0.09	0.12	.	0.21
90	.	.	0.21	0.22	.	0.33

(Dissolved) Oxygen Percent Saturation (DOSAT)

Percent (%)

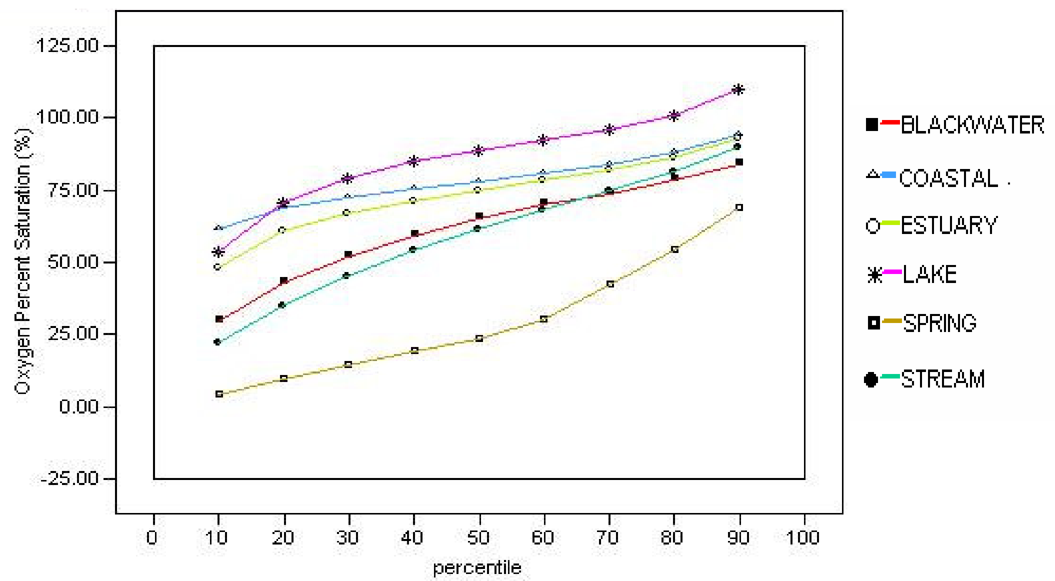
Although the concentration of dissolved oxygen (DO) in the water column is an important indicator of existing water quality and reflects the ability of a waterbody to support a healthy and diverse biological community, measuring the percent saturation takes into account water's varying ability to hold oxygen, which is based on temperature and conductivity.

The maximum amount of oxygen that can be dissolved in water (saturation concentration) decreases with increasing temperature. For example, air-saturated water at 15 degrees C. contains 10.1 mg/L DO. At 25 degrees C., not an uncommon temperature for many waterbodies in Florida, a stream is air saturated at about 8.3 mg/L DO.

Water may receive substantially more DO from the pure oxygen produced by photosynthesis. In contrast, air is only 21 percent oxygen. Typically, pure oxygen enters a waterbody through the photosynthetic processes of algae and other submerged aquatic plants; oxygen exchange between a waterbody and the atmosphere occurs where rippling, wave and/or wind action, and fast-moving water exist.

Source: YSI Environmental

Percentile distribution of water quality parameters by waterbody type



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	29.63	61.90	48.70	53.95	4.60	22.50
20	43.29	68.98	60.98	70.98	9.78	35.44
30	52.20	72.84	67.06	79.38	14.77	45.70
40	59.58	75.96	71.43	85.12	19.32	54.43
50	65.69	78.41	75.00	89.09	23.80	62.00
60	70.25	81.11	78.48	92.59	30.47	68.63
70	74.12	84.21	82.20	96.29	42.55	75.01
80	78.75	88.16	86.67	101.19	54.55	81.97
90	84.31	94.54	93.00	110.02	68.89	90.40

pH (PH)

Standard units (SU)

The pH of a body of water denotes its hydrogen ion activity, based on the negative logarithm of hydrogen ion concentrations. A pH of 1 to 7 is acidic, a pH of 7 is neutral, and a pH of 7 to 14 is alkaline.

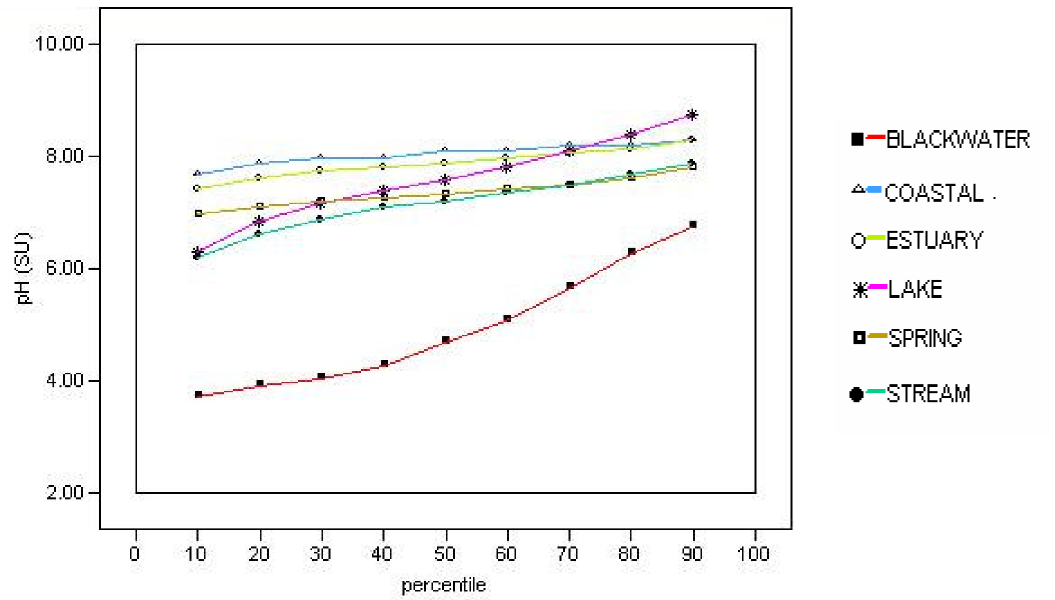
pH significantly affects the chemical and biological interactions in the aquatic environment. This is of particular concern in considering the effects of toxic substances on aquatic organisms, especially the release of metals from sediments. At certain pH levels, a particular toxicant may increase in toxicity or become more soluble, and thus is more likely to affect aquatic organisms.

The problems of acidic deposition and the acidification of lakes and streams have gained widespread attention. However, certain biological communities are adapted to acidic conditions (e.g., blackwater stream systems, where pH ranges from 4 to 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.

Source: FDEP

Percentile distribution of water quality parameters by waterbody type

PH



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	3.74	7.70	7.43	6.30	7.00	6.20
20	3.91	7.90	7.62	6.86	7.11	6.64
30	4.06	7.99	7.75	7.17	7.20	6.90
40	4.28	8.00	7.83	7.40	7.27	7.10
50	4.69	8.10	7.90	7.61	7.34	7.22
60	5.09	8.10	8.00	7.83	7.42	7.37
70	5.66	8.20	8.07	8.10	7.51	7.50
80	6.26	8.20	8.15	8.39	7.62	7.68
90	6.75	8.30	8.30	8.76	7.81	7.90

Pheophytin A (PHEOA)

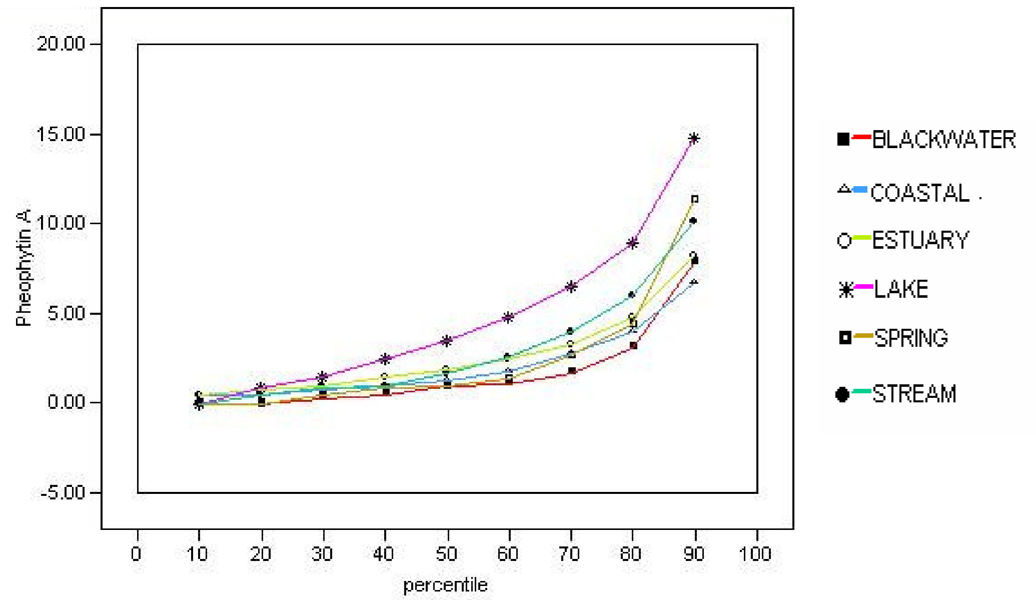
Micrograms per liter (µg/L)

Pheophytin a is a common degradation product of chlorophyll a. Because it absorbs light and fluoresces in the same region of the spectrum as chlorophyll a, the presence of pheophytin a can cause errors in the measurement of chlorophyll a values.

The ratio of chlorophyll a to pheophytin a serves as a good indicator of the physiological condition of phytoplankton in a water sample.

Source: Soil and Water Conservation Society of Metro Halifax, Nova Scotia

Percentile distribution of water quality parameters by waterbody type



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.00	0.50	0.50	0.00	0.00	0.00
20	0.00	0.51	0.82	0.90	0.02	0.50
30	0.29	0.80	1.00	1.50	0.50	0.85
40	0.54	1.00	1.48	2.50	0.85	1.00
50	0.99	1.30	1.92	3.53	1.00	1.66
60	1.06	1.80	2.51	4.84	1.42	2.60
70	1.66	2.80	3.35	6.50	2.70	4.00
80	3.09	4.07	4.80	9.00	4.40	6.00
90	7.83	6.79	8.23	14.80	11.40	10.16

Percentile distribution of water quality parameters by waterbody type

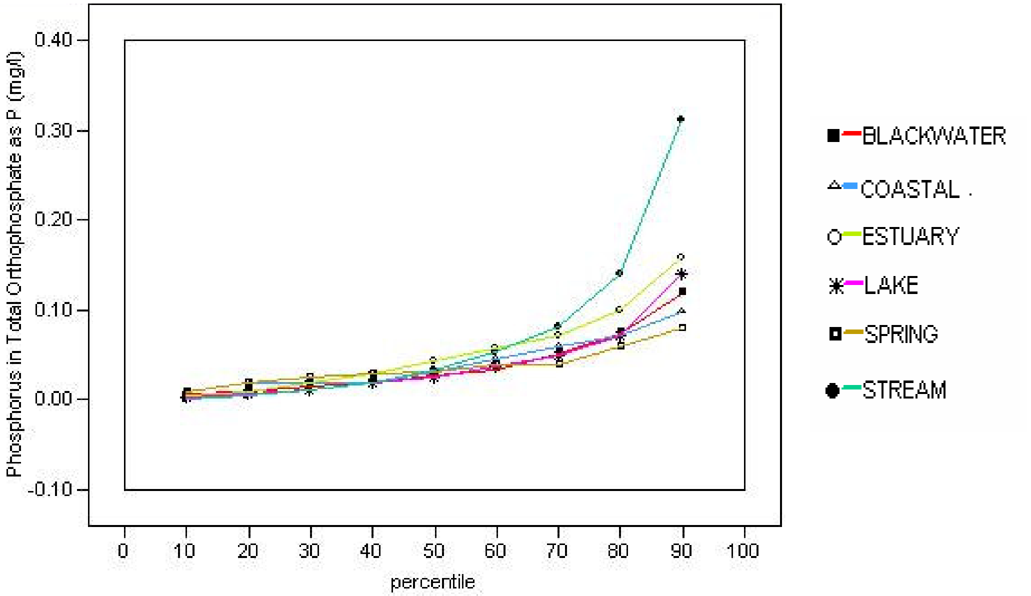
Phosphorus in Total Orthophosphate as P (TORTH)
Milligrams per liter (mg/L)

The term "orthophosphate" is a chemistry-based term for the phosphate molecule. "Reactive phosphorus," a corresponding method-based term, describes what is actually measured when the test for orthophosphate is performed.

Monitoring phosphorus is challenging because it involves measuring very low concentrations down to 0.01 mg/L or even lower. Even very low concentrations of phosphorus can have a dramatic impact on streams. Less sensitive methods should be used only to identify serious problem areas.

The total orthophosphate test is largely a measure of orthophosphate. Because the sample is not filtered, the procedure measures both dissolved and suspended orthophosphate. The EPA-approved method for measuring total orthophosphate is called the ascorbic acid method. A reagent containing ascorbic acid and ammonium molybdate reacts with orthophosphate in the sample to form a blue compound. The intensity of the blue color is directly proportional to the amount of orthophosphate in the water.

Source: EPA



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.01	0.01	0.01	0.00	0.01	0.00
20	0.01	0.02	0.01	0.01	0.02	0.01
30	0.01	0.02	0.02	0.01	0.03	0.01
40	0.02	0.02	0.03	0.02	0.03	0.02
50	0.03	0.03	0.04	0.03	0.03	0.03
60	0.04	0.05	0.06	0.04	0.04	0.05
70	0.05	0.06	0.07	0.05	0.04	0.08
80	0.07	0.07	0.10	0.07	0.06	0.14
90	0.12	0.10	0.16	0.14	0.08	0.31

Phosphorus Total as P (TP)

Milligrams per liter (mg/L)

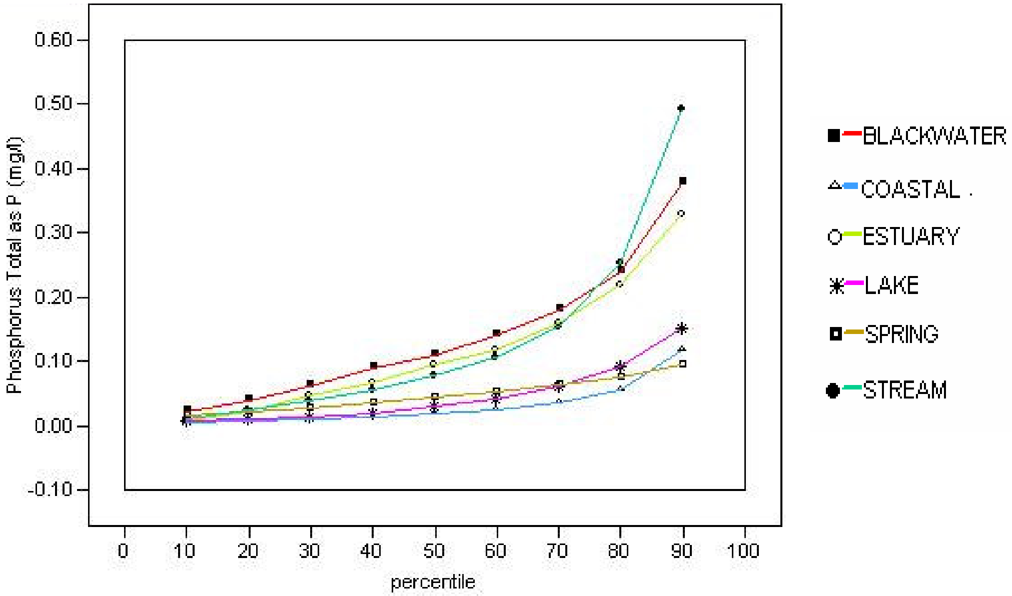
Phosphorus is one of the primary nutrients that regulates the growth of algae and larger aquatic plants, particularly in fresh water. Phosphate, the form in which almost all phosphorus is found in water, can enter the aquatic environment in a number of ways. Natural processes transport phosphate to water through atmospheric deposition, ground water 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 caused by phosphate mining and fertilizer processing activities.

High phosphorus concentrations are frequently responsible for accelerating the process of eutrophication (or accelerated aging) of a waterbody. Once phosphorus and other important nutrients enter the ecosystem, they are extremely difficult to remove because they are taken up by plants or deposited in sediments. Nutrients, particularly phosphates, deposited in sediments generally are redistributed into the water. This type of cycling compounds the difficulty of halting the eutrophication process.

Source: FDEP

Percentile distribution of water quality parameters by waterbody type

TP



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.02	0.01	0.01	0.01	0.02	0.01
20	0.04	0.01	0.02	0.01	0.02	0.03
30	0.06	0.01	0.05	0.01	0.03	0.04
40	0.09	0.01	0.07	0.02	0.04	0.06
50	0.11	0.02	0.10	0.03	0.04	0.08
60	0.14	0.03	0.12	0.04	0.05	0.11
70	0.18	0.04	0.16	0.06	0.07	0.16
80	0.24	0.06	0.22	0.09	0.08	0.25
90	0.38	0.12	0.33	0.15	0.10	0.49

Phosphorus, Dissolved Organic as P (POD)

Milligrams per liter (mg/L)

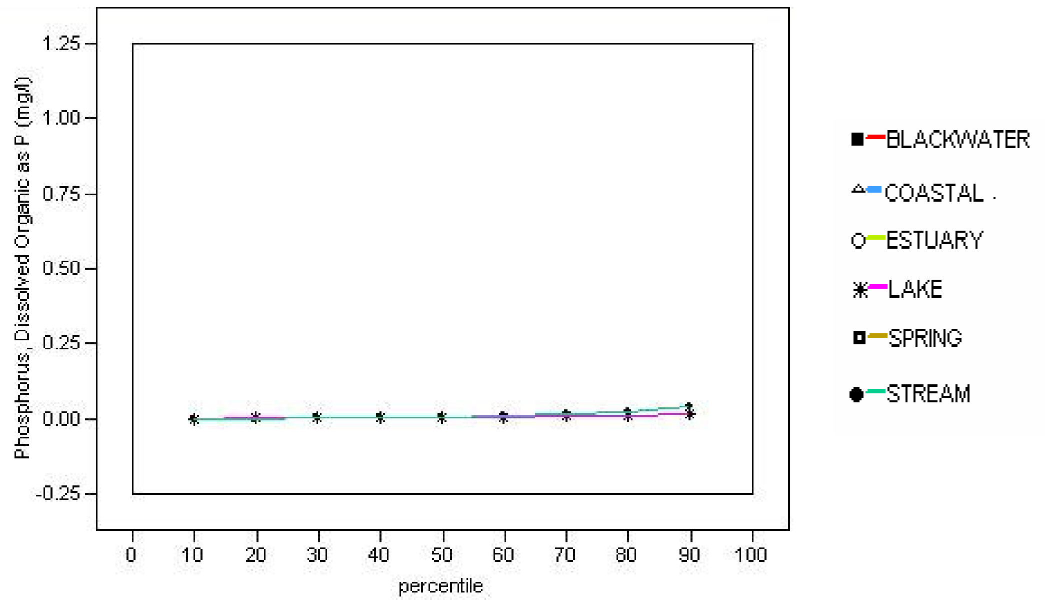
Dissolved organic phosphorus is the amount of phosphorus in a water sample that comes from organic sources such as decayed plants and animals. It is determined by subtracting the amount of dissolved inorganic phosphorus in a water sample from the amount of total dissolved phosphorus.

Dissolved organic phosphorus is bound to carbon-containing compounds and cannot be utilized directly by plants.

Sources: Corning School of Ocean Studies; Minnesota Shoreland Management Resource Guide

Percentile distribution of water quality parameters by waterbody type

POD



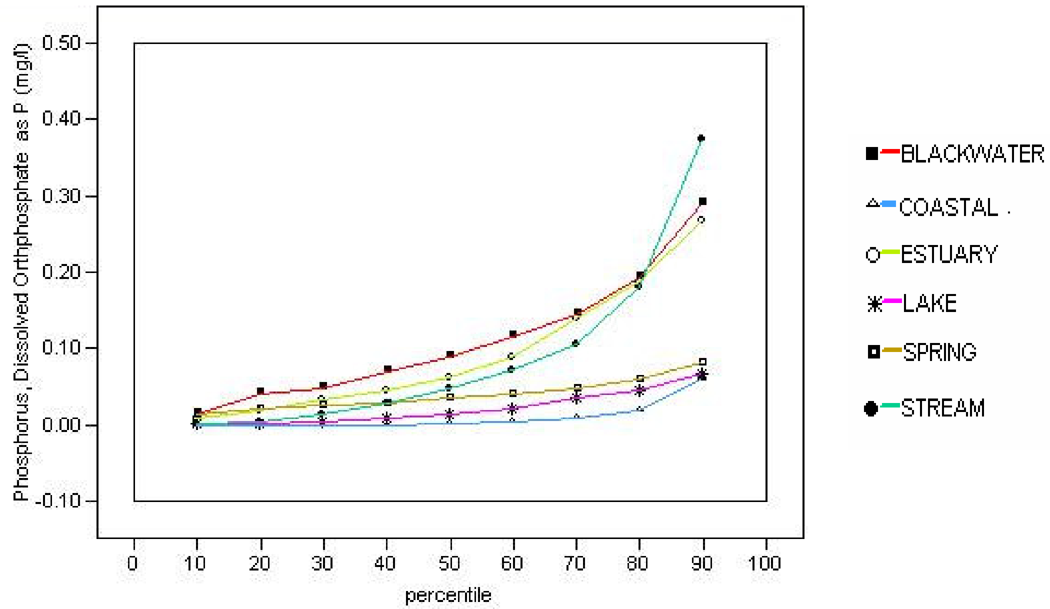
Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	.	.	.	0.00	.	0.00
20	.	.	.	0.01	.	0.00
30	.	.	.	0.01	.	0.01
40	.	.	.	0.01	.	0.01
50	.	.	.	0.01	.	0.01
60	.	.	.	0.01	.	0.01
70	.	.	.	0.01	.	0.02
80	.	.	.	0.01	.	0.03
90	.	.	.	0.02	.	0.04

Phosphorus, Dissolved Orthophosphate as P (PORD)
Milligrams per liter (mg/L)

Dissolved orthophosphate is the concentration of inorganic dissolved reactive phosphorus in a water sample (sometimes referred to as soluble reactive phosphorus). It measures the amount of phosphorus that is readily available for use by algae.

Dissolved inorganic phosphorus concentrations often fluctuate seasonally as the result of normal plankton cycles.

Sources: Corning School of Ocean Studies; Minnesota Shoreland Management Resource Guide



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.02	0.00	0.01	0.00	0.01	0.00
20	0.04	0.00	0.02	0.00	0.02	0.01
30	0.05	0.00	0.03	0.01	0.03	0.01
40	0.07	0.00	0.05	0.01	0.03	0.03
50	0.09	0.00	0.06	0.01	0.04	0.05
60	0.12	0.00	0.09	0.02	0.04	0.07
70	0.15	0.01	0.14	0.04	0.05	0.11
80	0.19	0.02	0.19	0.05	0.06	0.18
90	0.29	0.06	0.27	0.07	0.08	0.38

Potassium as K (TP)

Milligrams per liter (mg/L)

Potassium, an important mineral, constitutes about 2 percent of the earth's crust. Natural sources of potassium are numerous in aquatic environments. Man-made sources include industrial effluents and agricultural runoff (potassium is used in most fertilizers).

Because potassium salts are water soluble, potassium is found primarily in a dissolved form in waterbodies, rather than in a particulate form. Potassium concentrations in natural surface water are generally less than 10 mg/L, but concentrations as high as 100 mg/L can occur.

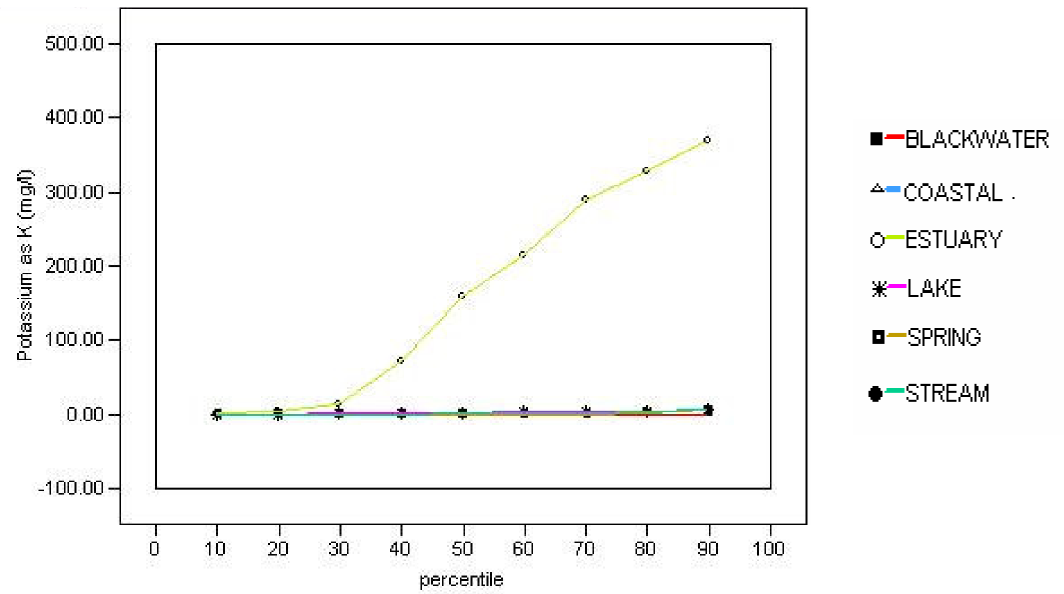
Potassium is essential to plant and animal nutrition. Because potassium concentrations in fresh waters are generally adequate for meeting the nutritional needs of the biological community, potassium is not usually considered a limiting nutrient such as phosphorus and nitrogen.

Higher potassium concentrations generally occur naturally along the coast, because marine waters have higher average potassium concentrations than fresh water. If potassium concentrations in a coastal waterbody are uncharacteristically high, it may indicate that saltwater is seeping through the ground, a process called saltwater intrusion.

Source: Florida LakeWatch

Percentile distribution of water quality parameters by waterbody type

TP



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.10	.	2.70	0.60	0.20	0.48
20	0.20	.	5.75	1.30	0.34	0.78
30	0.40	.	15.90	2.06	0.50	1.09
40	0.50	.	74.19	2.80	0.50	1.50
50	0.50	.	160.00	3.57	0.60	2.10
60	0.50	.	216.50	4.27	0.80	2.88
70	0.84	.	290.00	5.02	1.00	3.96
80	1.00	.	330.00	6.02	1.90	5.30
90	1.20	.	370.00	8.20	6.50	7.90

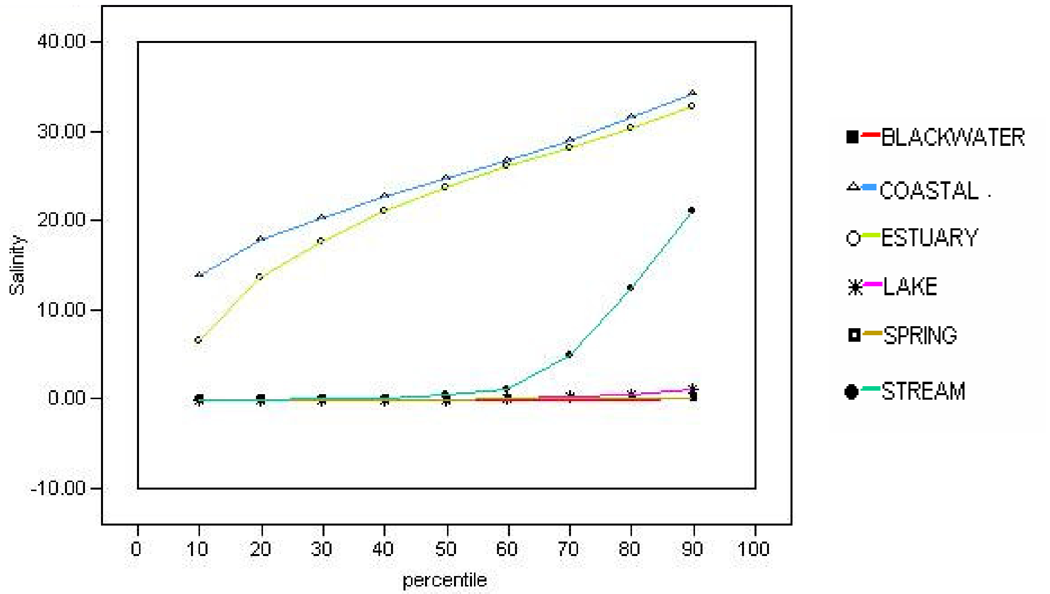
Salinity (SALIN)

Milligrams per liter (mg/L)

Salinity, or the saltiness of water, is influenced by leaching from rock and soil formations, runoff from a watershed, atmospheric precipitation and deposition, and evaporation. The Atlantic Ocean and the Gulf of Mexico typically have salinity values around 35 parts per thousand (ppt), although there is significant variation, particularly in nearshore areas. Salinity is often lower in areas receiving flows of fresh water, such as the mouths of rivers. It is often higher in areas where the evaporation rate is high—for example, in hot, dry climates.

Source: Florida LakeWatch

Percentile distribution of water quality parameters by waterbody type



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.00	13.90	6.60	0.00	0.00	0.00
20	0.00	17.90	13.70	0.00	0.00	0.01
30	0.00	20.40	17.80	0.00	0.00	0.10
40	0.00	22.70	21.10	0.00	0.00	0.22
50	0.00	24.70	23.80	0.00	0.00	0.50
60	0.00	26.80	26.10	0.15	0.10	1.17
70	0.00	29.00	28.20	0.37	0.15	5.10
80	0.00	31.70	30.50	0.54	0.20	12.40
90	0.10	34.30	32.90	1.24	0.20	21.20

Secchi Depth (SD)

Meters (m)

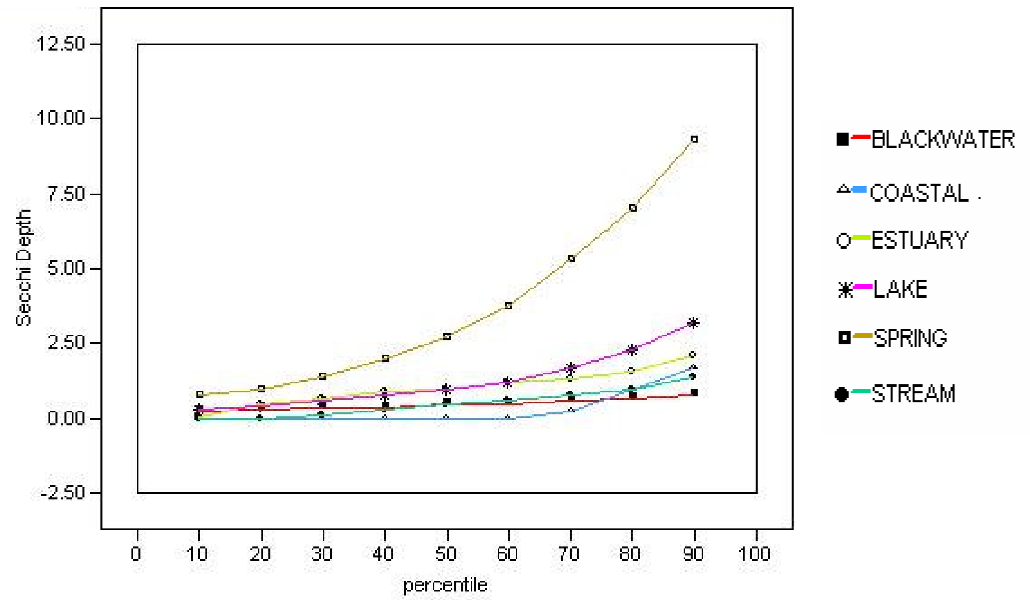
Secchi depth is a simple, effective measurement of water clarity. It is determined by observing the depth at which an 8-inch-diameter, black-and-white painted disc (named for its inventor, Pietro Angelo Secchi) becomes indistinguishable when viewed from the water's surface. A cord is attached through the center of the disc and marked off in intervals such as meters or feet. The disc is then lowered into the water to find the depth at which it first vanishes from sight. If the disc can still be seen as it rests on the lake bottom or if it disappears into plant growth, the depth at which this happens is not considered the Secchi depth.

The recorded Secchi depth largely depends on 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.

Source: Florida LakeWatch

Percentile distribution of water quality parameters by waterbody type

SD



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.25	0.00	0.09	0.30	0.80	0.00
20	0.30	0.00	0.50	0.46	1.00	0.03
30	0.40	0.00	0.70	0.61	1.40	0.12
40	0.40	0.00	0.90	0.80	2.00	0.30
50	0.50	0.01	1.00	1.00	2.75	0.50
60	0.50	0.02	1.20	1.25	3.75	0.60
70	0.60	0.28	1.35	1.70	5.35	0.80
80	0.65	1.00	1.60	2.29	7.01	1.00
90	0.80	1.70	2.10	3.20	9.35	1.40

Selenium (SE)

Micrograms per liter (µg/L)

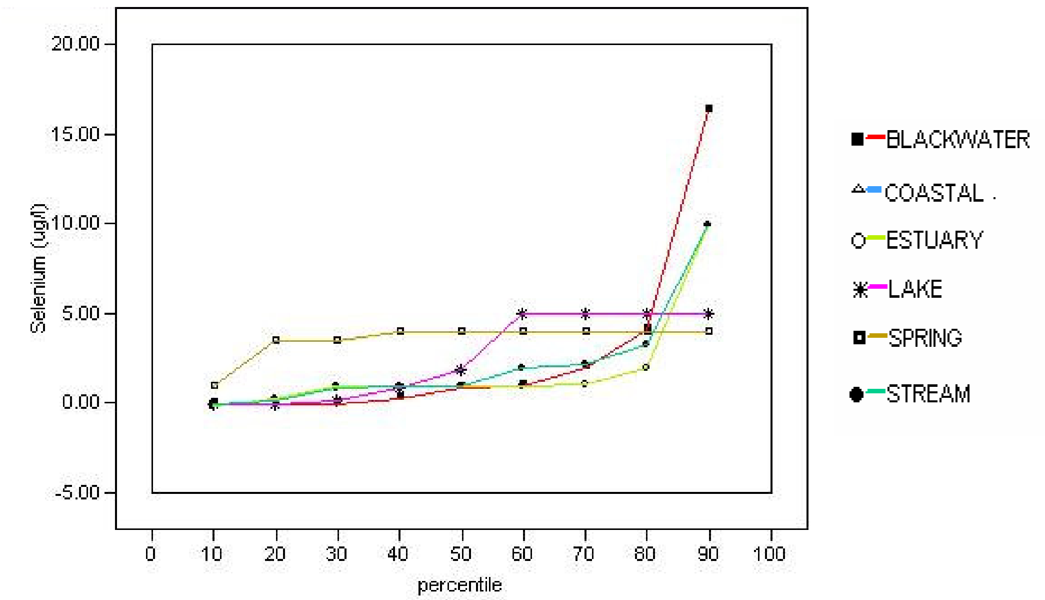
Selenium, a naturally occurring element, is widely distributed and present in most rocks and soils. It is usually combined with sulfide, silver, copper, lead, or nickel minerals. Most processed selenium is used in the electronics industry, but it is also used as a nutritional supplement; in the glass industry; as a component of pigments in plastics, paints, enamels, inks, and rubber; in pharmaceuticals; as a nutritional feed additive for poultry and livestock; in pesticide formulations; in rubber production; as an ingredient in antidandruff shampoos; and in fungicides. Radioactive selenium is used in diagnostic medicine.

Selenium dust enters the air from burning coal and oil, and eventually settles over land and water. It also enters water from rocks and soil, and from agricultural and industrial waste. Some selenium compounds dissolve in water, and some settle to the bottom as particles. Insoluble forms of selenium remain in soil, but soluble forms are very mobile and may enter surface water from soils.

Selenium bioaccumulates up the food chain. It functions as an antioxidant, and low doses are needed to maintain good health. However, exposure to high levels can cause adverse health effects. The EPA restricts the amount of selenium allowed in public water supplies to 50 ppb.

Source: ATSDR

Percentile distribution of water quality parameters by waterbody type



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.00	.	-0.13	0.00	1.00	0.00
20	0.00	.	0.33	0.01	3.50	0.15
30	0.01	.	1.00	0.24	3.50	0.87
40	0.33	.	1.00	0.92	4.00	1.00
50	0.93	.	1.00	1.95	4.00	1.00
60	1.00	.	1.00	5.00	4.00	2.00
70	2.00	.	1.07	5.00	4.00	2.20
80	4.15	.	2.00	5.00	4.00	3.30
90	16.30	.	10.00	5.00	4.00	10.00

Silver (AG)

Micrograms per liter (µg/L)

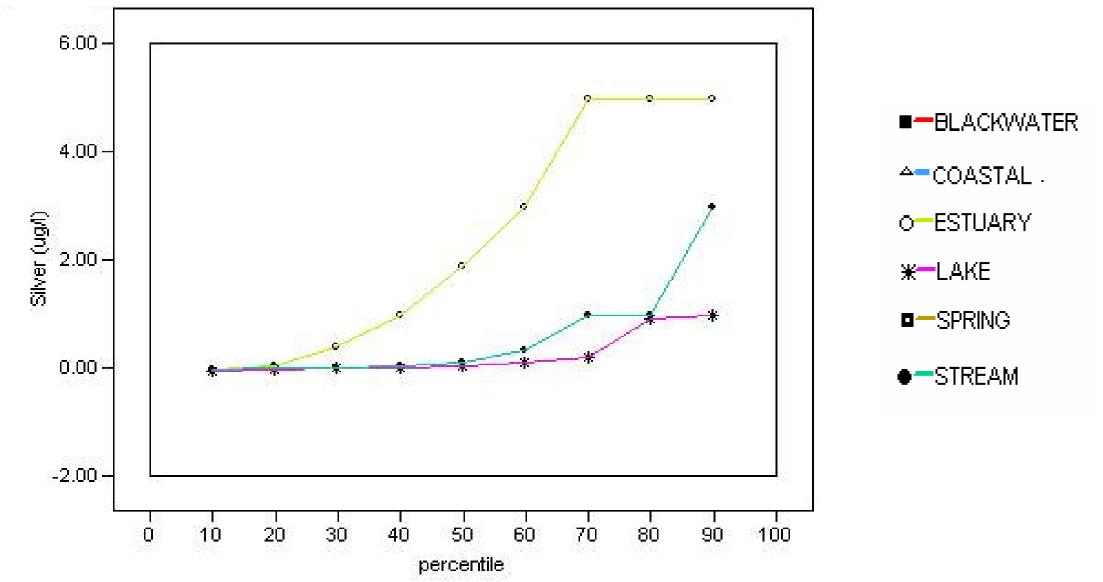
Silver, a naturally occurring metal, is found mainly in association with elements such as iron (pyrite), lead (galena), tellurides, and gold. It is often a by-product of the retrieval of copper, lead, zinc, and gold ores. Silver is found in surface waters in various forms: (1) as the monovalent ion (e.g., sulphide, bicarbonate, or sulfate salts); (2) as part of more complex ions with chlorides and sulfates; and (3) adsorbed onto particulate matter. Silver is used to make jewelry, silverware, electronic equipment, and dental fillings. It is also used to make photographs, in brazing alloys and solders, to disinfect drinking water and water in swimming pools, and as an antibacterial agent.

Silver is released into the air and water through natural processes such as the weathering of rocks and soil erosion. The photographic industry and sewage disposal are the major human sources of silver in the environment. Processing ores, manufacturing cement, and burning fossil fuel may release silver into the air. Silver can leach from soil into ground water; acidic conditions and good drainage increase the leaching rate. Silver can bioconcentrate moderately in fish and invertebrates. The EPA recommends that the concentration of silver in drinking water not exceed 0.10 mg/L.

Source: ATSDR

Percentile distribution of water quality parameters by waterbody type

AG



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	.	.	0.00	-0.06	.	0.00
20	.	.	0.05	0.00	.	0.00
30	.	.	0.40	0.01	.	0.01
40	.	.	1.00	0.02	.	0.05
50	.	.	1.90	0.05	.	0.11
60	.	.	3.00	0.10	.	0.34
70	.	.	5.00	0.20	.	1.00
80	.	.	5.00	0.93	.	1.00
90	.	.	5.00	1.00	.	3.00

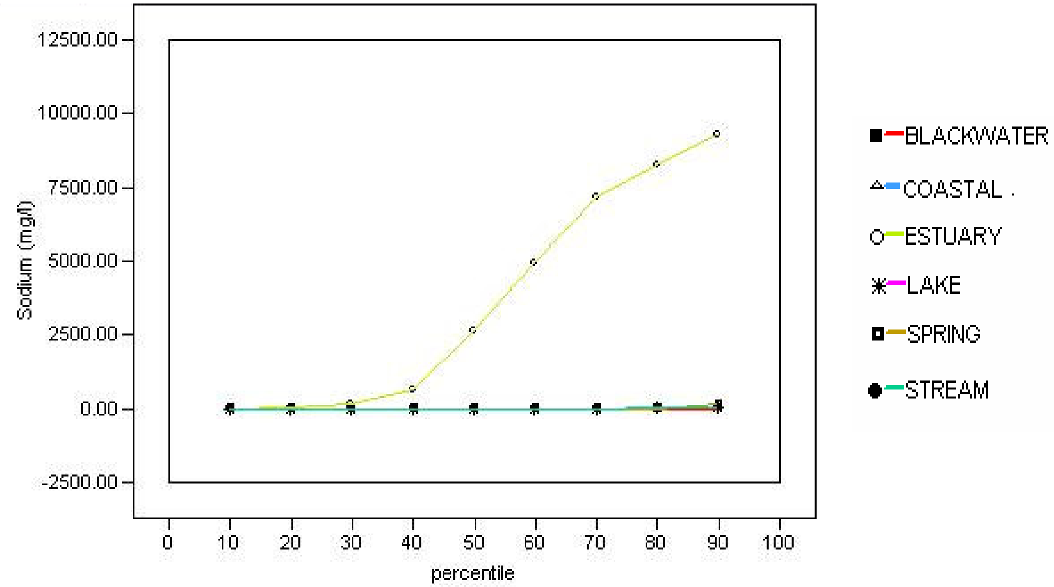
Sodium as NA (NA)
Milligrams per liter (mg/L)

Sodium, the sixth most abundant element on earth, is often associated with chloride; common table salt is mostly sodium chloride. Sodium is used extensively in industrial processes and food processing, and in some water-softening devices.

All surface waters contain sodium, which is essential to all animals and some microorganisms and plants. Generally, sodium is not considered a limiting factor, unless concentrations reach levels at which freshwater organisms cannot survive. As sodium levels increase in a waterbody, there can be a continuous transition from freshwater organisms, to those adapted to brackish water, to marine (saltwater) organisms.

High sodium concentrations occur in areas near the coast that receive sodium-enriched ground water from saltwater intrusion; areas where the water has been in contact with natural salt deposits; areas with excessive evaporation (such as hot and/or dry climates); and areas receiving pollution from agricultural runoff containing fertilizer residues, discharges containing human or animal waste, and backwash from water softeners using the sodium exchange process.

Source: Florida LakeWatch



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	2.80	.	25.00	5.00	2.10	3.60
20	3.10	.	50.00	7.10	2.40	5.30
30	3.40	.	181.00	9.00	2.70	7.40
40	3.70	.	683.00	11.00	3.10	10.30
50	4.00	.	2674.26	13.60	3.70	14.44
60	4.40	.	5000.00	19.40	4.20	21.50
70	5.00	.	7200.00	34.40	5.70	32.76
80	5.80	.	8300.00	54.00	9.30	52.60
90	7.47	.	9300.00	99.10	170.00	100.40

Stream Velocity (STREV)

Feet per second (ft/sec)

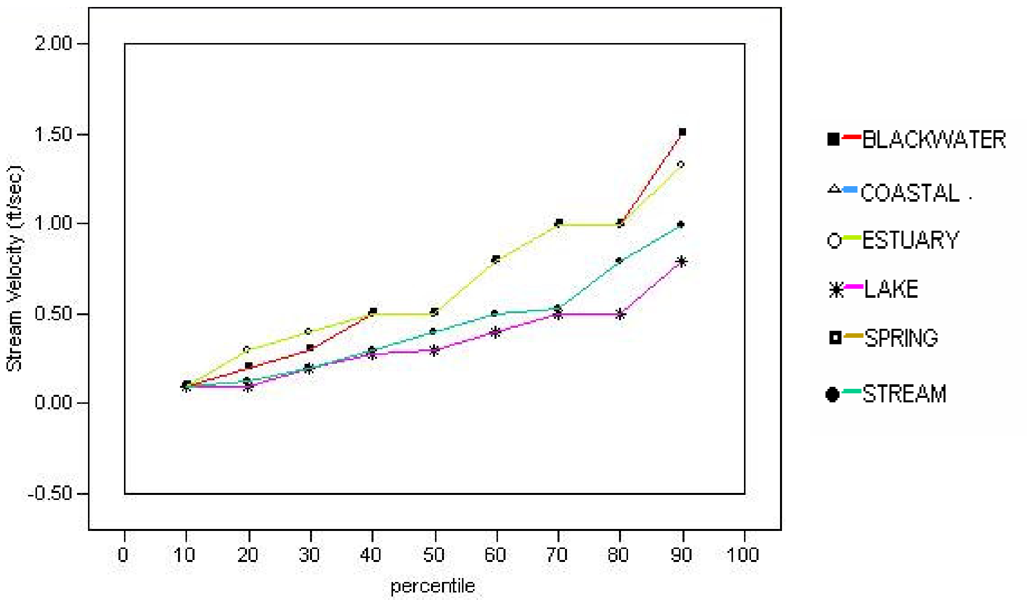
Stream velocity is a stream's rate of motion, measured in terms of the distance its water travels in a unit of time. Velocity depends on factors such as the size and shape of the stream channel, the roughness of the channel, and the stream gradient.

Stream velocity increases as a stream's volume of water increases. For example, increased stormwater runoff from impervious surfaces rapidly increases velocity, which in turn increases the erosion rates of streambanks and channels. Changing flow rates can significantly affect a stream's water quality.

Velocity determines the types of plants and animals that are present in a stream (some need fast-flowing areas, while others need quiet pools). It also affects the amount of silt and sediment carried in the water. Sediment introduced to quiet, slow-flowing streams settles quickly to the bottom. In contrast, fast-moving streams keep sediment suspended longer in the water column. Fast-moving streams generally have higher levels of dissolved oxygen than slow streams because they are better aerated.

Sources: Florida LakeWatch; EPA; Tulane University; Georgia Rivers Alive

Percentile distribution of water quality parameters by waterbody type



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.10	.	0.10	0.10	.	0.10
20	0.20	.	0.30	0.10	.	0.13
30	0.30	.	0.40	0.20	.	0.20
40	0.50	.	0.50	0.28	.	0.30
50	0.50	.	0.50	0.30	.	0.40
60	0.80	.	0.80	0.40	.	0.50
70	1.00	.	1.00	0.50	.	0.54
80	1.00	.	1.00	0.50	.	0.80
90	1.50	.	1.33	0.80	.	1.00

Sulfate as SO4 (SO4)

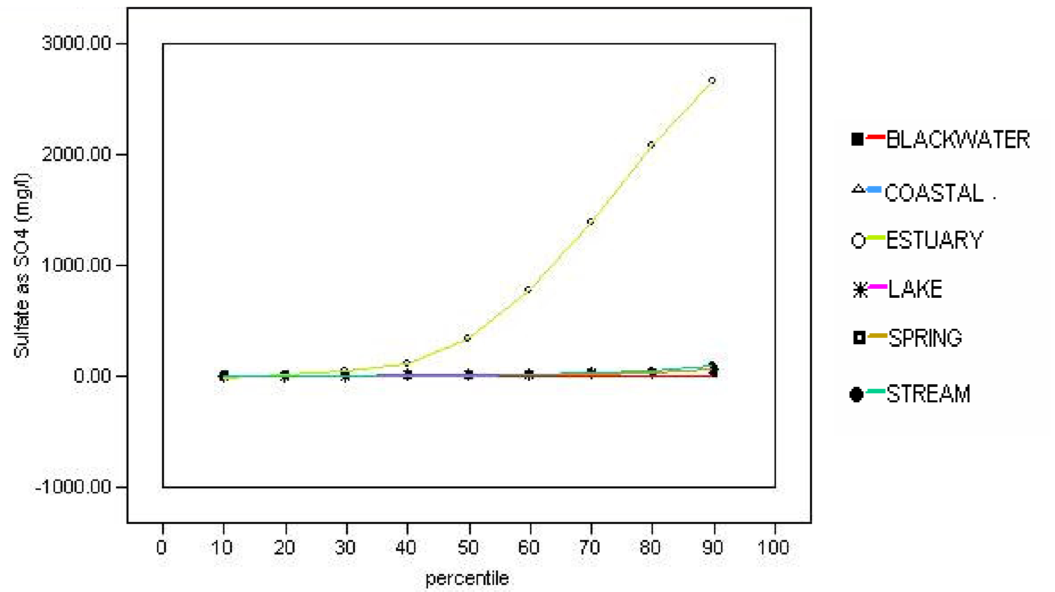
Milligrams per liter (mg/L)

Sulfates are widely distributed in nature and can be present in waterbodies in significant amounts. They come from many diverse sources, including industry and agriculture, atmospheric deposition, anaerobic bacteria, and volcanic emissions.

All aquatic organisms use sulfur for building proteins. Sulfur cycles through the environment in complex ways. Sulfur cycling can influence the cycles of other nutrients such as iron and phosphorus, and can also affect the biological productivity and distribution of organisms in a waterbody.

Bacteria can significantly influence the sulfur cycle in water. For example, under conditions where dissolved oxygen is lacking, bacteria can convert sulfate to hydrogen sulfide gas. Hydrogen sulfide gas has a distinctive rotten egg smell, and in high concentrations can be toxic to aquatic animals and fish. Sulfates pose no known direct threat to human health.

Source: Florida LakeWatch



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.80	.	0.00	3.50	5.00	1.20
20	1.00	.	24.77	7.90	8.70	3.40
30	1.00	.	59.00	11.65	10.00	7.00
40	2.00	.	120.00	17.00	11.60	11.00
50	3.00	.	341.15	24.00	14.00	15.60
60	3.00	.	788.51	29.30	19.00	23.00
70	3.60	.	1400.00	36.00	29.20	34.00
80	8.00	.	2094.00	46.20	45.00	56.00
90	13.90	.	2670.00	69.00	73.00	97.00

Temperature (TEMP)
Celsius (ºC)

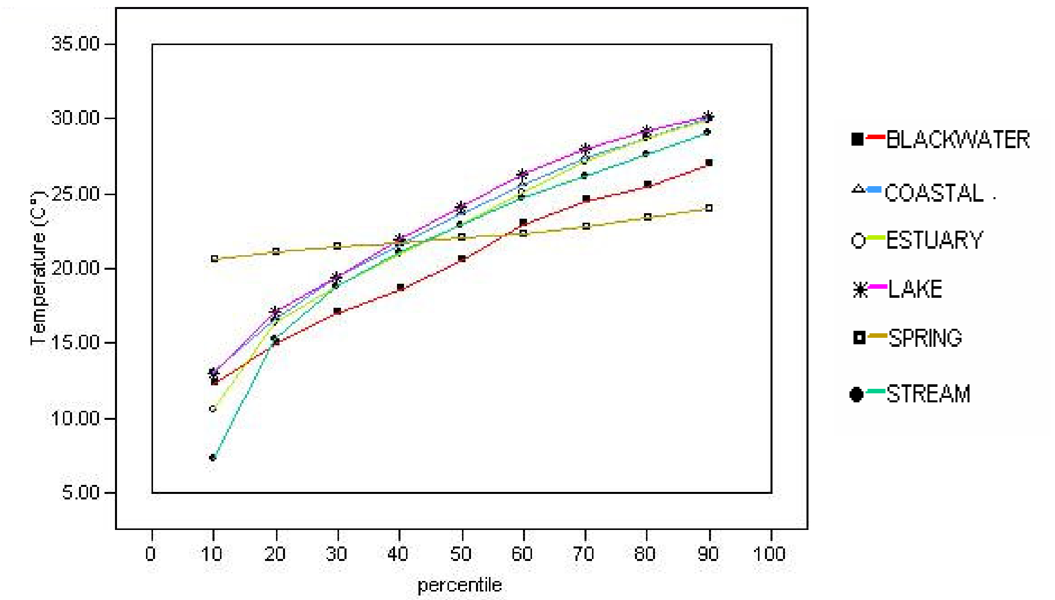
Water temperature is an important factor in controlling chemical interactions and reactivity in the water column. Temperature also affects biological activity, since many aquatic organisms have strict temperature requirements and thus are susceptible to temperature fluctuations.

There is a large variation in annual average water temperature from northern to southern Florida that significantly affects several water quality constituents such as dissolved oxygen saturation and biological productivity parameters.

Source: FDEP

Percentile distribution of water quality parameters by waterbody type

TEMP



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	12.30	13.20	10.60	13.03	20.70	7.30
20	15.00	16.70	16.38	17.18	21.20	15.40
30	17.00	19.40	18.90	19.50	21.50	18.80
40	18.60	21.67	21.00	22.00	21.80	21.10
50	20.60	23.70	23.00	24.18	22.10	23.01
60	23.00	25.60	25.10	26.32	22.30	24.80
70	24.50	27.40	27.20	28.00	22.90	26.20
80	25.50	28.81	28.80	29.20	23.50	27.70
90	26.90	30.10	30.00	30.17	24.00	29.10

Thallium (TL)

Micrograms per liter (µg/L)

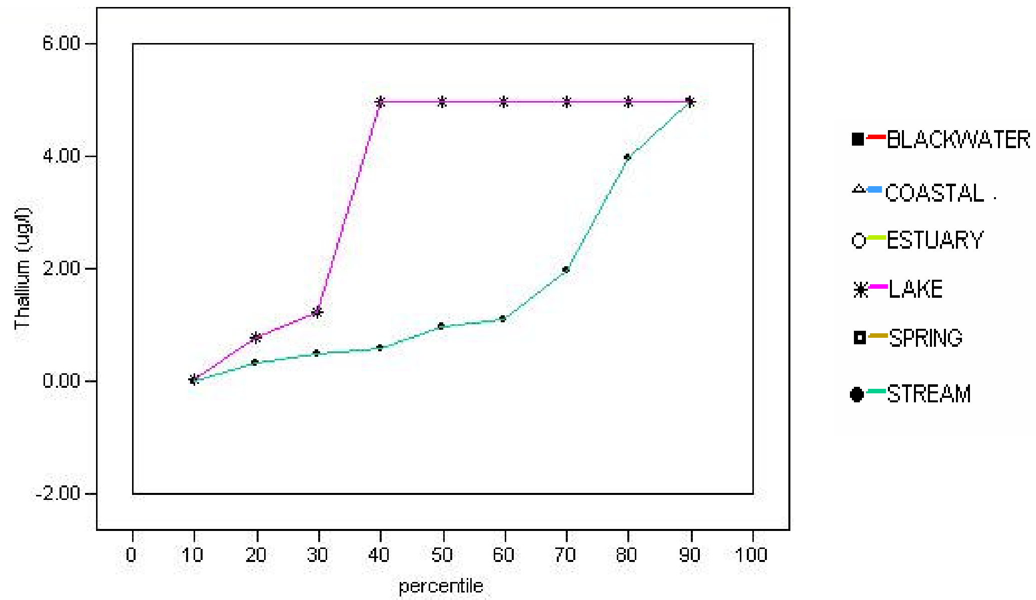
Thallium, a bluish-white metal, is found in trace amounts in the earth's crust. In the past, thallium was obtained as a by-product from smelting other metals; however, it has not been produced in the United States since 1984. Currently, all the thallium used is obtained from imports and from thallium reserves.

In its pure form, thallium is odorless and tasteless. It can also be found combined with other substances such as bromine, chlorine, fluorine, and iodine. Thallium is used mostly in manufacturing electronic devices, switches, and closures, primarily for the semiconductor industry. It also has limited use in the manufacture of special glass and for certain medical procedures.

Thallium enters the environment primarily from coal-burning and smelting. It stays in the air, water, and soil for a long time and is not broken down. Some thallium compounds are removed from the atmosphere in rain and snow. Thallium is absorbed by plants and enters the food chain. It bioaccumulates in fish and shellfish.

Exposure to high levels of thallium can harm the nervous system, lungs, heart, liver, and kidneys. The effects of ingesting low levels over a long time are not known.

Source: ATSDR



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	.	.	.	0.05	.	0.01
20	.	.	.	0.78	.	0.35
30	.	.	.	1.23	.	0.50
40	.	.	.	5.00	.	0.60
50	.	.	.	5.00	.	1.00
60	.	.	.	5.00	.	1.10
70	.	.	.	5.00	.	2.00
80	.	.	.	5.00	.	4.00
90	.	.	.	5.00	.	5.00

Tin (SN)

Micrograms per liter (µg/L)

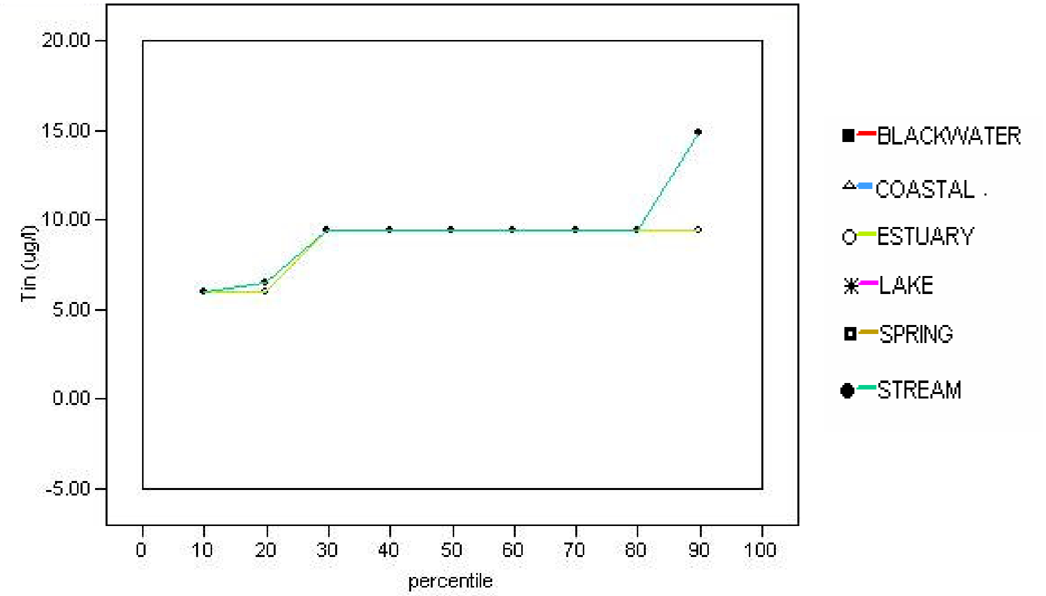
Tin, a natural element in the earth's crust, is a soft, white, silvery metal that doesn't dissolve in water. Tin is used to make cans, and is present in brass, bronze, pewter, and some soldering materials.

When combined with chlorine, sulfur, or oxygen, tin forms inorganic compounds that are used in toothpaste, perfumes, soaps, coloring agents, and dyes. Organotin compounds, formed when tin is combined with materials that contain carbon, are used in plastics, food packages, plastic pipes, pesticides, paints, and pest repellents.

Tin metal, as well as inorganic and organic tin compounds, are found in the air, water, and soil near places where they are naturally present in the rocks, or where they are mined, manufactured, or used.

Tin is released into the environment by both natural processes and human activities such as mining, coal and oil combustion, and the production and use of tin products. In the atmosphere, tin exists as gases and fumes, and attaches to dust particles. Some tin compounds dissolve in water. In water, tin attaches to soil and sediments. Organotins bioaccumulate in fish, other organisms, and plants.

Source: ATSDR



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	.	.	6.00	.	.	6.00
20	.	.	6.00	.	.	6.57
30	.	.	9.51	.	.	9.51
40	.	.	9.51	.	.	9.51
50	.	.	9.51	.	.	9.51
60	.	.	9.51	.	.	9.51
70	.	.	9.51	.	.	9.51
80	.	.	9.51	.	.	9.51
90	.	.	9.51	.	.	14.90

Total Coliform (TCOLI)

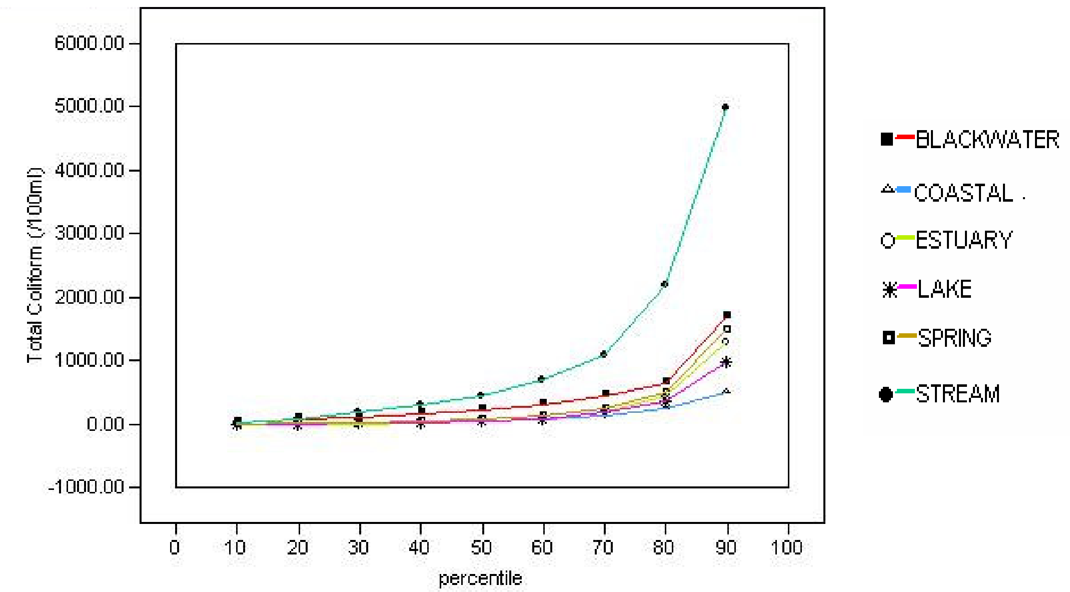
Per 100 milliliters (/100ml)

Organisms in the coliform group are rod-shaped, gram-negative bacteria that ferment lactose at 35°C. Total coliform measurements are used to measure the size of the coliform population in a body of water.

Total coliform measurements are frequently used in conjunction with other information to determine when shellfish harvesting can safely occur and whether designated swimming areas are safe for swimming.

The total coliform procedure is generally used in conjunction with other tests that differentiate fecal and nonfecal bacterial contamination.

Source: FDEP



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	40	4	4	5	10	40
20	80	10	5	11	20	100
30	120	10	10	20	30	200
40	160	20	20	40	60	300
50	220	50	49	62	100	454
60	300	96	100	100	150	700
70	454	148	195	190	260	1100
80	660	250	450	380	500	2200
90	1700	500	1300	1000	1500	5000

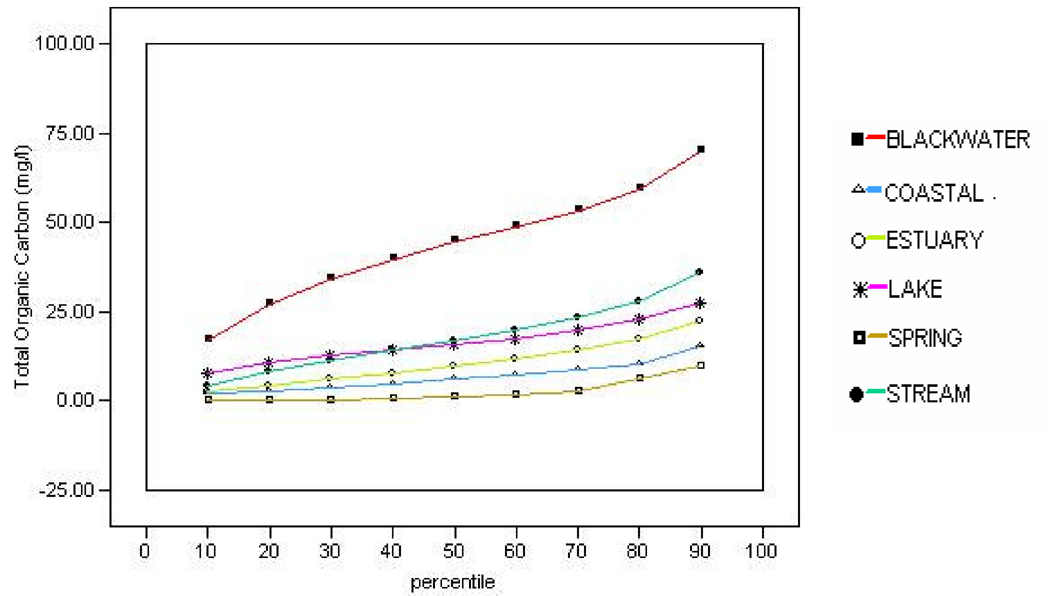
Total Organic Carbon as C (TOC)
Milligrams per liter (mg/L)

Total organic carbon (TOC) 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 waterbody.

Combined with information on nutrients, TOC analysis is one of the conventional measures of eutrophication.

Source: FDEP

Percentile distribution of water quality parameters by waterbody type



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	17.00	2.40	2.80	7.80	0.30	4.40
20	27.00	3.14	4.51	11.02	0.50	8.40
30	34.00	4.10	6.40	13.00	0.70	11.73
40	40.00	5.20	8.21	14.52	1.10	14.51
50	44.90	6.40	10.20	16.00	1.60	17.08
60	48.80	7.70	12.19	17.80	2.00	20.00
70	53.30	8.90	14.40	19.95	3.20	23.51
80	59.30	10.70	17.50	23.10	6.50	28.30
90	70.00	15.60	22.40	27.60	10.20	36.20

Total Residue (RESID)

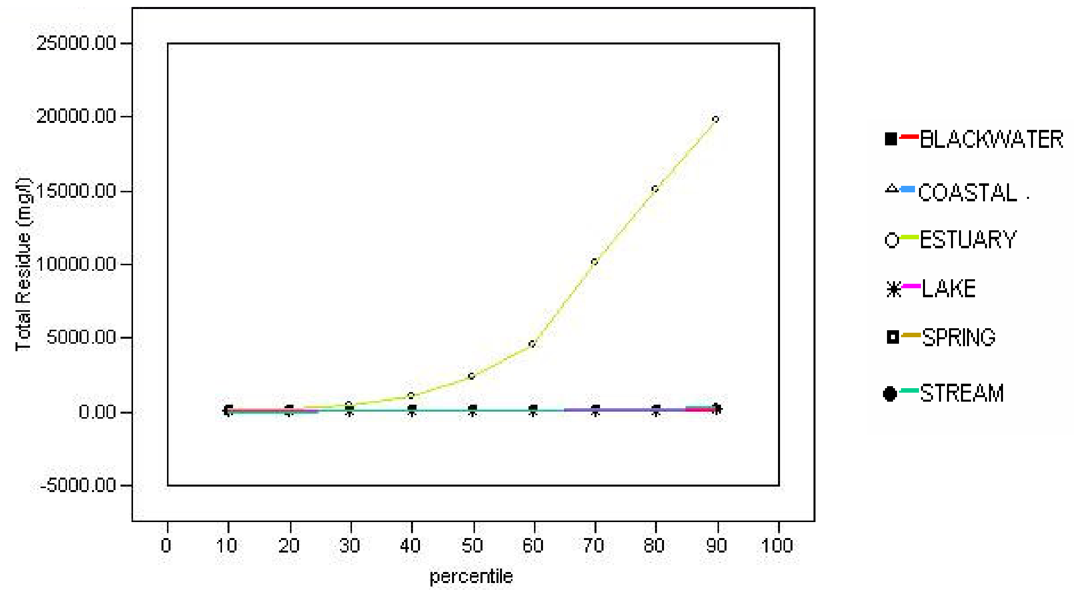
Milligrams per liter (mg/L)

Total residue is matter suspended or dissolved in water; it is related to both specific conductance and turbidity. The term describes material left in a container after evaporation and drying of a water sample. It includes both total filtrable residue and total nonfiltrable residue.

Total residue is measured by evaporating a water sample in a weighed dish, and then drying the residue in an oven at 103° to 105°C. The increase in weight of the dish represents the total residue.

Source: Boulder Community Network

Percentile distribution of water quality parameters by waterbody type



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	81.00	.	222.00	82.00	.	-0.62
20	92.00	.	288.00	104.00	.	52.00
30	99.00	.	530.00	118.00	.	120.00
40	100.00	.	1049.00	128.00	.	143.00
50	110.00	.	2449.00	139.25	.	168.00
60	120.00	.	4666.00	150.00	.	200.00
70	120.00	.	10200.00	164.00	.	245.00
80	140.00	.	15140.00	184.00	.	310.00
90	180.00	.	19800.00	243.50	.	402.00

Total Residue Filtrable Dried (RESF)

Milligrams per liter (mg/L)

Total filtrable residue consists of the solids in water that can be trapped by a filter. It includes silt, decaying plant and animal matter, industrial wastes, and sewage. High concentrations of total filtrable residue can affect stream health and aquatic life by reducing photosynthesis, lowering dissolved oxygen levels, increasing water temperature, reducing food sources and habitat, and smothering plants and animals.

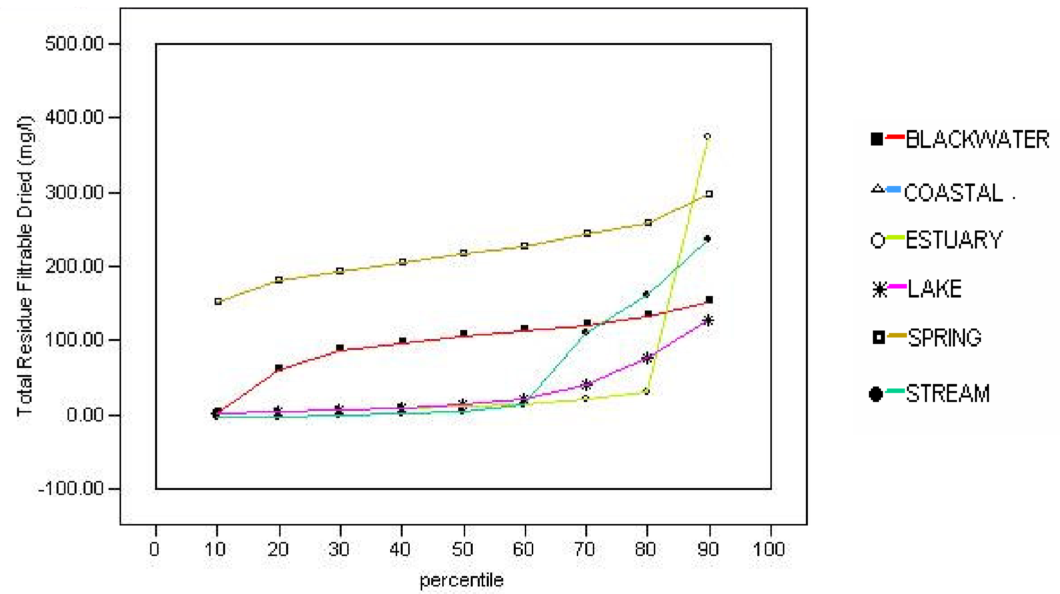
High levels of residue in a waterbody often mean higher concentrations of bacteria, nutrients, pesticides, and metals. Factors affecting residue concentrations include flow rates, soil erosion, urban stormwater runoff, wastewater and septic system effluent, decaying plants and animals, and the presence of bottom-feeding fish that stir up sediments.

To measure total filtrable residue, a water sample is filtered through a preweighed filter. The residue is dried in an oven at 103° to 105°C. until the weight of the filter no longer changes. The increase in weight of the filter represents the total filtrable residue. A value can also be determined by analyzing total residue and subtracting total nonfiltrable residue.

Source: Boulder Community Network

Percentile distribution of water quality parameters by waterbody type

RESF



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	4.00	.	2.80	2.80	154.00	-3.00
20	60.00	.	5.00	4.40	181.00	-2.40
30	87.00	.	6.80	7.00	193.00	1.20
40	98.00	.	9.00	10.00	206.50	3.20
50	106.00	.	12.00	14.00	218.00	5.40
60	115.00	.	16.00	21.20	228.50	15.00
70	121.00	.	21.00	40.50	244.00	112.00
80	134.00	.	31.00	78.67	259.00	162.00
90	154.00	.	376.00	128.00	299.00	238.00

Total Residue Nonfiltrable (RESNF)

Milligrams per liter (mg/L)

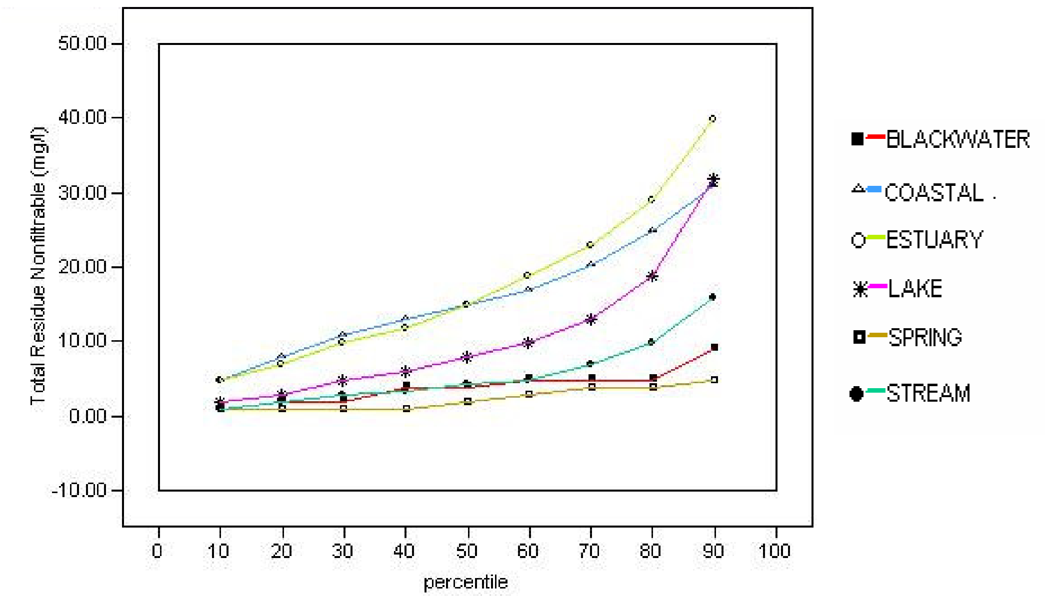
Total nonfiltrable residue consists of the dissolved solids in water that can pass through a filter. These include carbonate, bicarbonate, chloride, sulfate, phosphate, nitrate, calcium, magnesium, sodium, and various ions. Changes in total nonfiltrable concentrations can be harmful because the density of the water determines the flow of water into and out of an organism's cells. If concentrations are too high or too low, the growth of many aquatic species can be limited, and death may occur. High concentrations may also reduce water clarity, decrease photosynthesis, combine with toxic compounds and heavy metals, and increase water temperature.

To measure total nonfiltrable residue, a water sample is filtered, and the filtrate is evaporated in a preweighed dish and dried in an oven at 180°C., until the weight of the dish no longer changes. The increase in the weight of the dish represents the total nonfiltrable residue.

Factors affecting total nonfiltrable residue include a watershed's geology and soil, urban stormwater runoff, fertilizer runoff, wastewater and septic system effluent, soil erosion, and decaying plants and animals.

Source: Boulder Community Network

Percentile distribution of water quality parameters by waterbody type



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	1.00	5.00	5.00	1.91	1.00	1.00
20	1.90	8.00	7.00	3.00	1.00	2.00
30	2.00	11.00	10.00	5.00	1.00	3.00
40	4.00	13.00	12.00	6.00	1.00	3.40
50	4.00	15.00	15.00	8.00	2.00	4.50
60	5.00	17.00	18.80	10.00	3.00	5.00
70	5.00	20.45	23.00	13.00	4.00	7.00
80	5.00	25.00	29.00	19.00	4.00	10.00
90	9.00	31.00	40.00	32.00	5.00	16.00

Total Suspended Solids (TSS)

Milligrams per liter (mg/L)

The measurement of total suspended solids (TSS) consists of determining the dry weight of particulates in the water column. Both organic and inorganic materials contribute to TSS in water.

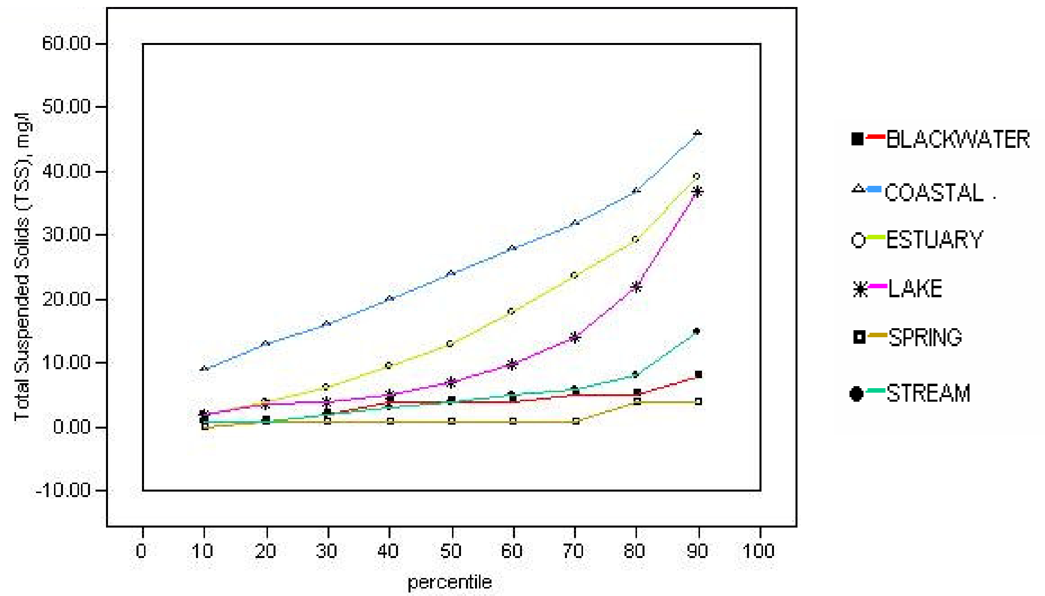
The effects from increased TSS are the same as those associated with turbidity. Suspended solids can affect the aquatic environment and its organisms by damaging macroinvertebrate communities through the processes of deposition; by reducing the abundance of food for fish; by directly affecting fish growth 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, and in these cases TSS is another indicator of eutrophication.

Source: FDEP

Percentile distribution of water quality parameters by waterbody type

TSS



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	1.00	9.00	2.00	2.00	0.00	1.00
20	1.00	13.00	4.00	3.60	1.00	1.00
30	2.00	16.00	6.30	4.00	1.00	2.00
40	4.00	20.00	9.50	5.00	1.00	3.00
50	4.00	24.00	13.00	7.00	1.00	4.00
60	4.00	28.00	18.00	10.00	1.00	5.00
70	5.00	32.00	23.60	14.00	1.00	6.00
80	5.00	37.00	29.40	22.00	4.00	8.20
90	8.00	46.00	39.20	37.00	4.00	15.00

Turbidity (TURB)

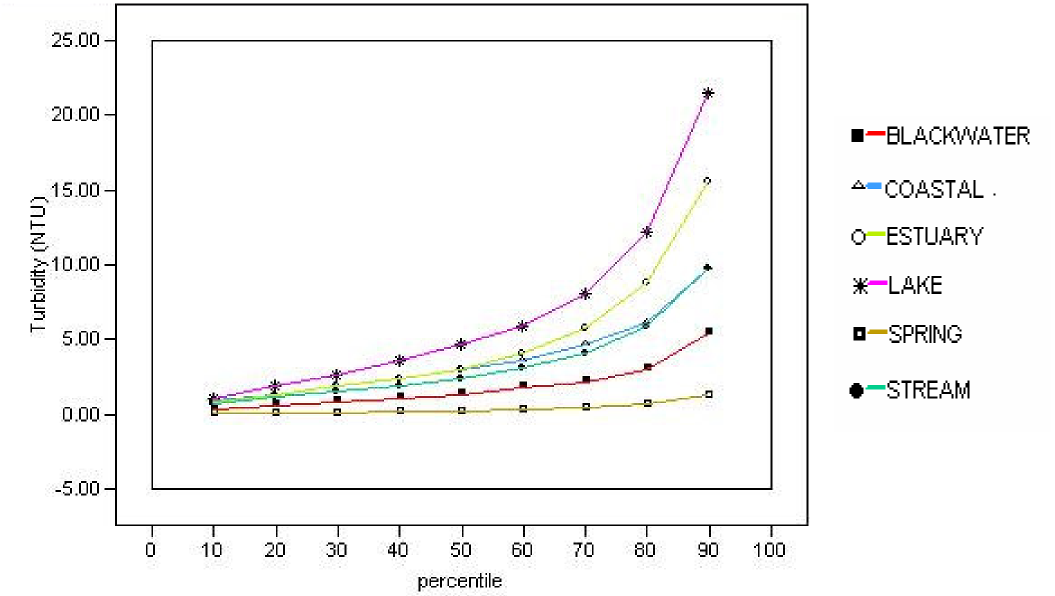
Nephelometric turbidity units (NTUs)

Turbidity is the measurement of light dispersion caused by particulate material 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 and 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 in a stream bed, a downstream lake, or 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.

Source: FDEP



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.40	1.00	0.87	1.10	0.09	0.80
20	0.60	1.40	1.40	2.00	0.10	1.18
30	0.85	2.00	1.90	2.70	0.17	1.58
40	1.10	2.40	2.40	3.60	0.21	2.00
50	1.40	3.00	3.10	4.70	0.30	2.50
60	1.80	3.70	4.10	6.00	0.40	3.12
70	2.20	4.70	5.80	8.10	0.50	4.10
80	3.10	6.20	8.90	12.20	0.80	5.90
90	5.50	9.80	15.60	21.60	1.30	9.80

Unionized Ammonia (UNNH4)

Milligrams per liter (mg/L)

Ammonia and nitrate are the most common forms of nitrogen (an essential nutrient) in aquatic systems. Ammonia, a colorless gas with a pungent odor, is very water soluble at low pH. It is excreted by animals and produced by algae and decaying organic matter. Human sources of ammonia include domestic, industrial, and agricultural pollution containing fertilizers and organic or fecal matter.

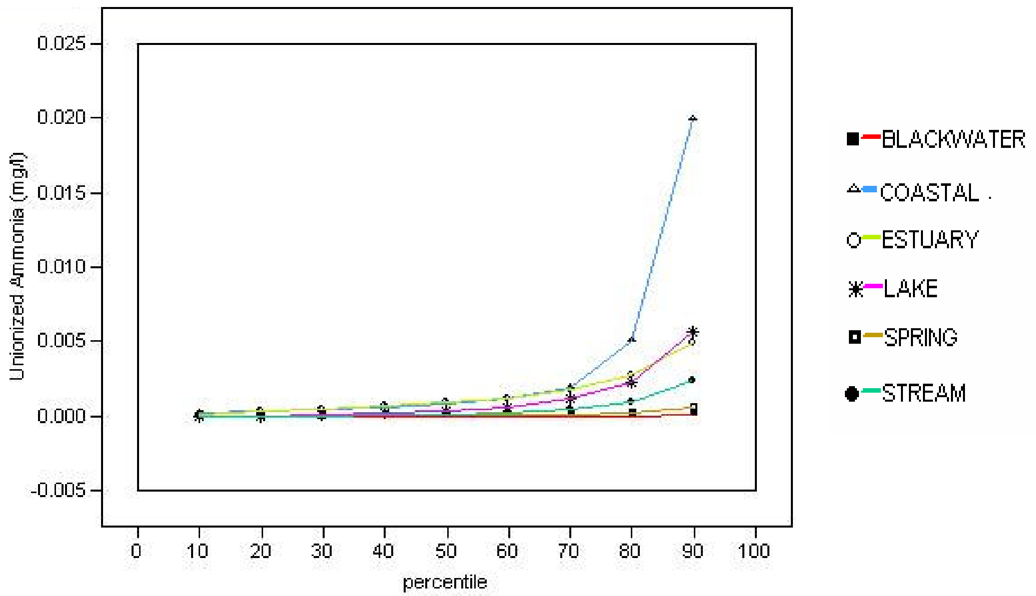
Ammonia is broken down through a natural process called hydrolysis. Under certain conditions such as high pH levels and high temperature, hydrolysis is not complete and increased amounts of unionized ammonia remain. This form of ammonia diffuses readily across cell membranes and is acutely toxic to aquatic life.

In some animals, even slightly elevated concentrations of unionized ammonia are associated with reduced hatching success, reduced growth rate and development, and organ and tissue damage. Extremely high levels can kill fish and other aquatic life. Fish are more sensitive to ammonia than invertebrates, and sensitivity varies depending on fish species.

Source: FDEP; California State Water Resources Control Board

Percentile distribution of water quality parameters by waterbody type

UNNH4



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00
60	0.00	0.00	0.00	0.00	0.00	0.00
70	0.00	0.00	0.00	0.00	0.00	0.00
80	0.00	0.01	0.00	0.00	0.00	0.00
90	0.00	0.02	0.00	0.01	0.00	0.00

Vanadium, Total as V (V)

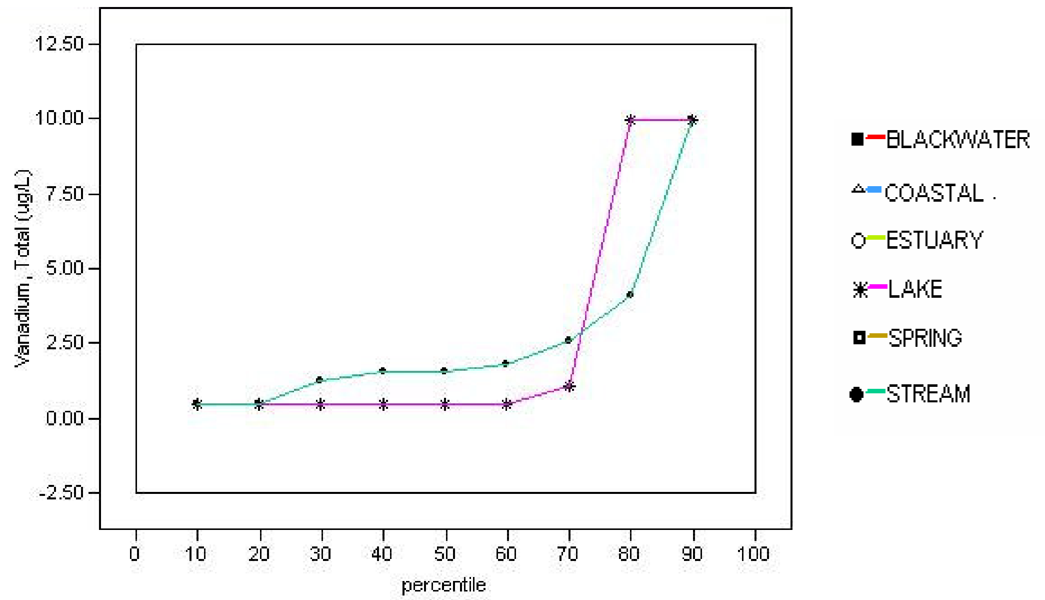
Micrograms per liter (µg/L)

Vanadium occurs in nature as a white-to-gray metal, and is often found as crystals. It usually combines with other elements such as oxygen, sodium, sulfur, or chloride. Vanadium and vanadium compounds are found in the earth's crust and in rocks, some iron ores, and crude petroleum deposits.

Vanadium is mostly combined with other metals to make alloys. Vanadium oxide is a component in special kinds of steel used for automobile parts, springs, and ball bearings. Most of the vanadium used in the United States is used to make steel. Vanadium is also mixed with iron to make parts for aircraft engines. Small amounts of vanadium are used in making rubber, plastics, ceramics, and other chemicals.

Vanadium mainly enters the environment from natural sources and from the burning of fuel oils. It stays in the air, water, and soil for a long time, and does not dissolve well in water. It combines with other elements and particles, and sticks to soil sediments. Low levels have been found in plants, but vanadium is not likely to build up in the tissues of animals. Exposure to high levels of vanadium can cause harmful health effects.

Source: ATSDR



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	.	.	.	0.50	.	0.50
20	.	.	.	0.50	.	0.50
30	.	.	.	0.50	.	1.30
40	.	.	.	0.50	.	1.60
50	.	.	.	0.50	.	1.60
60	.	.	.	0.50	.	1.80
70	.	.	.	1.10	.	2.60
80	.	.	.	10.00	.	4.14
90	.	.	.	10.00	.	10.00

Zinc (ZN)

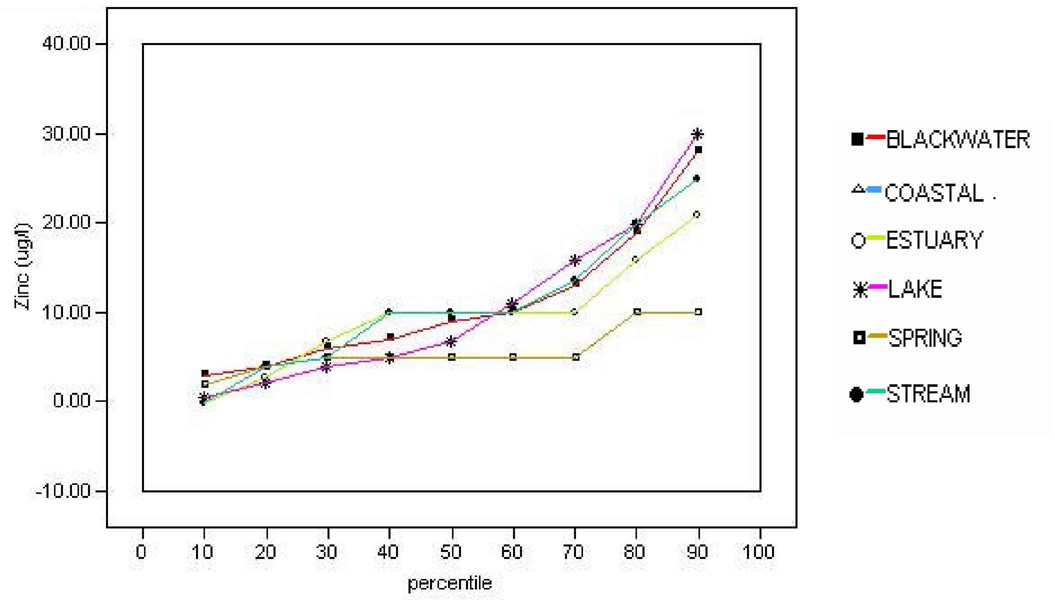
Micrograms per liter (µg/L)

Zinc, one of the most common elements in the earth's crust, is found in air, soil, and water, and is present in all foods. Zinc has many commercial uses: as coatings to prevent rust, in dry cell batteries, and mixed with other metals to make alloys such as brass and bronze. A zinc and copper alloy is used to make U.S. pennies.

Zinc combines with other elements to form zinc compounds. Common zinc compounds found at hazardous waste sites include zinc chloride, zinc oxide, zinc sulfate, and zinc sulfide. Some zinc is released into the environment by natural processes, but most comes from human activities such as mining, steel production, coal burning, and burning of waste. Zinc compounds are widely used to make paint, rubber, dye, wood preservatives, and ointments.

Zinc attaches to soil, sediments, and dust particles in the air. Rain and snow carry these particles to the land surface, and from there, into ground water and lakes, streams, and rivers. Most of the zinc in soil stays bound to soil particles. It builds up in fish and other organisms, but not in plants. In humans, too little zinc can cause health problems, but too much zinc is also harmful. The EPA recommends no more than 5 ppm of zinc in drinking water because of taste.

Source: ATSDR



Percentile	Blackwater	Coastal	Estuary	Lake	Spring	Stream
10	3.00	.	0.00	0.63	2.00	0.00
20	4.00	.	2.85	2.13	4.00	4.00
30	5.96	.	6.90	4.00	5.00	5.00
40	7.00	.	10.00	5.00	5.00	10.00
50	8.99	.	10.00	6.83	5.00	10.00
60	10.00	.	10.00	11.00	5.00	10.00
70	13.00	.	10.00	16.00	5.00	13.70
80	19.00	.	16.00	20.00	10.00	20.00
90	28.00	.	21.00	30.00	10.00	25.00

Appendix A

Table 1: STORET Water Quality Parameter Codes

Table 2: Summary of Florida Water Quality Criteria, Section 62-302.530, F.A.C.

Table 1: STORET Water Quality Parameter Codes

Table 2: Summary of Florida Water Quality Criteria, Section 62-302.530, Florida Administrative Code (F.A.C.)

Parameter	Units	Class I: Potable Water Supply	Class II: Shellfish Propagation or Harvesting	Class III: Recreation, Propagation, and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife		Class IV: Agricultural Water Supplies	Class V: Navigation, Utility, and Industrial Use
				Predominantly Fresh Waters	Predominantly Marine Waters		
(1) Alkalinity	Milligrams/L as $CaCO_3$	Shall not be depressed below 20		Shall not be depressed below 20		$\leq$ 600	
(2) Aluminum	Milligrams/L		$\leq$ 1.5		$\leq$ 1.5		
(3) Ammonia (un-ionized)	Milligrams/L as NH_3	$\leq$ 0.02		$\leq$ 0.02			
(4) Antimony	Micrograms/L	$\leq$ 14.0	$\leq$ 4,300	$\leq$ 4,300	$\leq$ 4,300		
(5) (a) Arsenic (total)	Micrograms/L	$\leq$ 50	$\leq$ 50	$\leq$ 50	$\leq$ 50	$\leq$ 50	$\leq$ 50
(5) (b) Arsenic (trivalent)	Micrograms/L measured as total recoverable Arsenic		$\leq$ 36		$\leq$ 36		
(6) Bacteriological Quality (Fecal Coliform Bacteria)	Number per 100 ml (Most Probable Number [MPN] or Membrane Filter [MF])	MPN or MF counts shall not exceed a monthly average of 200, nor exceed 400 in 10 percent of the samples, nor exceed 800 on any one day. Monthly averages shall be expressed as geometric means based on a minimum of 5 samples taken over a 30-day period.	MPN shall not exceed a median value of 14 with not more than 10 percent of the samples exceeding 43, nor exceed 800 on any one day.	MPN or MF counts shall not exceed a monthly average of 200, nor exceed 400 in 10 percent of the samples, nor exceed 800 on any one day. Monthly averages shall be expressed as geometric means based on a minimum of 10 samples taken over a 30-day period.	MPN or MF counts shall not exceed a monthly average of 200, nor exceed 400 in 10 percent of the samples, nor exceed 800 on any one day. Monthly averages shall be expressed as geometric means based on a minimum of 10 samples taken over a 30-day period.		

Notes: (1) "In H" means the natural logarithm of total hardness expressed as milligrams/L of $CaCO_3$. For metals criteria involving equations with hardness, the hardness shall be set at 25 mg/L if actual hardness is < 25 mg/L and set at 400 mg/L if actual hardness is > 400 mg/L. (2) This criterion is protective of human health, not of aquatic life. (3) For application of dissolved metals criteria, see Subsection 62-302.500(2)(d), F.A.C.

Table 2 (continued)

Parameter	Units	Class I	Class II	Class III: Fresh Water	Class III: Marine Water	Class IV	Class V
(7) Bacteriological Quality (Total Coliform Bacteria)	Number per 100 ml (Most Probable Number [MPN] or Membrane Filter [MF])	≤ 1,000 as a monthly average, nor exceed 1,000 in more than 20 percent of samples examined during any month, nor exceed 2,400 at any time, using either MPN or MF counts.	Median MPN shall not exceed 70, and not more than 10 percent of the samples shall exceed an MPN of 230.	≤ 1,000 as a monthly average; nor exceed 1,000 in more than 20 percent of the samples examined during any month; ≤ 2,400 at any time. Monthly averages shall be expressed as geometric means based on a minimum of 10 samples taken over a 30-day period, using either the MPN or MF counts.	≤ 1,000 as a monthly average; nor exceed 1,000 in more than 20 percent of the samples examined during any month; ≤ 2,400 at any time. Monthly averages shall be expressed as geometric means based on a minimum of 10 samples taken over a 30-day period, using either the MPN or MF counts.		
(8) Barium	Milligrams/L	≤ 1					
(9) Benzene	Micrograms/L	≤ 1.18	≤ 71.28 annual average	≤ 71.28 annual average	≤ 71.28 annual average		
(10) Beryllium	Micrograms/L	≤ 0.0077 annual average	≤ 0.13 annual average	≤ 0.13 annual average	≤ 0.13 annual average	≤ 100 in waters with a hardness in mg/L of $CaCO_3$ of less than 250 and shall not exceed 500 in harder waters	

Notes: (1) "In H" means the natural logarithm of total hardness expressed as milligrams/L of $CaCO_3$. For metals criteria involving equations with hardness, the hardness shall be set at 25 mg/L if actual hardness is < 25 mg/L and set at 400 mg/L if actual hardness is > 400 mg/L. (2) This criterion is protective of human health, not of aquatic life. (3) For application of dissolved metals criteria, see Subsection 62-302.500(2)(d), F.A.C.

Table 2 (continued)

Parameter	Units	Class I	Class II	Class III: Fresh Water	Class III: Marine Water	Class IV	Class V
(11) Biological Integrity	Percent reduction of Shannon-Wiener Diversity Index	The index for benthic macroinvertebrates shall not be reduced to less than 75 percent of background levels, as measured using organisms retained by a U.S. Standard No. 30 sieve and collected and composited from a minimum of three Hester-Dendy type artificial substrate samplers of 0.10 to 0.15 m^2 area each, incubated for a period of four weeks.	The index for benthic macroinvertebrates shall not be reduced to less than 75 percent of established background levels, as measured using organisms retained by a U.S. Standard No. 30 sieve and collected and composited from a minimum of three natural substrate samples, taken with Ponar type samplers with minimum sampling area of 225 cm^2.	The index for benthic macroinvertebrates shall not be reduced to less than 75 percent of established background levels, as measured using organisms retained by a U.S. Standard No. 30 sieve and collected and composited from a minimum of three Hester-Dendy type artificial substrate samplers of 0.10 to 0.15 m^2 area each, incubated for a period of four weeks.	The index for benthic macroinvertebrates shall not be reduced to less than 75 percent of established background levels, as measured using organisms retained by a U.S. Standard No. 30 sieve and collected and composited from a minimum of three natural substrate samples, taken with Ponar type samplers with minimum sampling area of 225 cm^2.		
(12) BOD (Biochemical Oxygen Demand)		Shall not be increased to exceed values that would cause dissolved oxygen to be depressed below the limit established for each class and, in no case, shall it be great enough to produce nuisance conditions.					
(13) Boron	Milligrams/L					$\leq$ 0.75	
(14) Bromates	Milligrams/L		$\leq$ 100		$\leq$ 100		
(15) Bromine (free molecular)	Milligrams/L		$\leq$ 0.1		$\leq$ 0.1		
(16) Cadmium	Micrograms/L See Notes (1) and (3).	Cd $\leq e^{(0.7852[lnH]-3.49)}$	$\leq$ 9.3	Cd $\leq e^{(0.7852[lnH]-3.49)}$	$\leq$ 9.3		
(17) Carbon tetrachloride	Micrograms/L	$\leq$ 0.25 annual average; 3.0 maximum	$\leq$ 4.42 annual average	$\leq$ 4.42 annual average	$\leq$ 4.42 annual average		

Notes: (1) "ln H" means the natural logarithm of total hardness expressed as milligrams/L of $CaCO_3$. For metals criteria involving equations with hardness, the hardness shall be set at 25 mg/L if actual hardness is < 25 mg/L and set at 400 mg/L if actual hardness is > 400 mg/L. (2) This criterion is protective of human health, not of aquatic life. (3) For application of dissolved metals criteria, see Subsection 62-302.500(2)(d), F.A.C.

Table 2 (continued)

Parameter	Units	Class I	Class II	Class III: Fresh Water	Class III: Marine Water	Class IV	Class V
(18) Chlorides	Milligrams/L	$\leq$ 250	Not increased more than 10 percent above normal background. Normal daily and seasonal fluctuations shall be maintained.		Not increased more than 10 percent above normal background. Normal daily and seasonal fluctuations shall be maintained.		In predominantly marine waters, not increased more than 10 percent above normal background. Normal daily and seasonal fluctuations shall be maintained.
(19) Chlorine (total residual)	Milligrams/L	$\leq$ 0.01	$\leq$ 0.01	$\leq$ 0.01	$\leq$ 0.01		
(20) (a) Chromium (trivalent)	Micrograms/L measured as total recoverable Chromium See Notes (1) and (3).	Cr (III) $\leq e^{(0.819[lnH]+0.6848)}$		Cr (III) $\leq e^{(0.819[lnH]+0.6848)}$		Cr (III) $\leq e^{(0.819[lnH]+0.6848)}$	In predominantly fresh waters, $\leq e^{(0.819[lnH]+0.6848)}$
(20) (b) Chromium (hexavalent)	Micrograms/L See Note (3).	$\leq$ 11	$\leq$ 50	$\leq$ 11	$\leq$ 50	$\leq$ 11	In predominantly fresh waters, $\leq$ 11. In predominantly marine waters, $\leq$ 50
(21) Chronic Toxicity (see definition in Subsection 62-302.200(3), F.A.C., and also see below, "Substances in concentrations which...")							

Notes: (1) "ln H" means the natural logarithm of total hardness expressed as milligrams/L of $CaCO_3$. For metals criteria involving equations with hardness, the hardness shall be set at 25 mg/L if actual hardness is < 25 mg/L and set at 400 mg/L if actual hardness is > 400 mg/L. (2) This criterion is protective of human health, not of aquatic life. (3) For application of dissolved metals criteria, see Subsection 62-302.500(2)(d), F.A.C.

Table 2 (continued)

Parameter	Units	Class I	Class II	Class III: Fresh Water	Class III: Marine Water	Class IV	Class V
(22) Color, etc. (see also Minimum Criteria, Odor, Phenols, etc.)	Color, odor, and taste producing substances and other deleterious substances, including other chemical compounds attributable to domestic wastes, industrial wastes, and other wastes					Only such amounts as will not render the waters unsuitable for agricultural irrigation, livestock watering, industrial cooling, industrial process water supply purposes, or fish survival.	
(23) Conductance, Specific	Micromhos/cm	Shall not be increased more than 50 percent above background or to 1275, whichever is greater		Shall not be increased more than 50 percent above background or to 1275, whichever is greater		Shall not be increased more than 50 percent above background or to 1275, whichever is greater	Shall not exceed 4,000
(24) Copper	Micrograms/L See Notes (1) and (3).	$Cu \leq e^{(0.8545[lnH]-1.702)}$	$\leq$ 3.7	$Cu \leq e^{(0.8545[lnH]-1.702)}$	$\leq$ 3.7	$\leq$ 500	$\leq$ 500
(25) Cyanide	Micrograms/L	$\leq$ 5.2	$\leq$ 1.0	$\leq$ 5.2	$\leq$ 1.0	$\leq$ 5.0	$\leq$ 5.0
(26) Definitions (see Section 62-302.200, F.A.C.)							
(27) Detergents	Milligrams/L	$\leq$ 0.5	$\leq$ 0.5	$\leq$ 0.5	$\leq$ 0.5	$\leq$ 0.5	$\leq$ 0.5
(28) 1,1-Dichloroethylene (1,1-di-chloroethene)	Micrograms/L	$\leq$ 0.057 annual average; $\leq$ 7.0 maximum	$\leq$ 3.2 annual average	$\leq$ 3.2 annual average	$\leq$ 3.2 annual average		
(29) Dichloromethane (methylene chloride)	Micrograms/L	$\leq$ 4.65 annual average	$\leq$ 1,580 annual average	$\leq$ 1,580 annual average	$\leq$ 1,580 annual average		

Notes: (1) "In H" means the natural logarithm of total hardness expressed as milligrams/L of $CaCO_3$. For metals criteria involving equations with hardness, the hardness shall be set at 25 mg/L if actual hardness is < 25 mg/L and set at 400 mg/L if actual hardness is > 400 mg/L. (2) This criterion is protective of human health, not of aquatic life. (3) For application of dissolved metals criteria, see Subsection 62-302.500(2)(d), F.A.C.

Table 2 (continued)

Parameter	Units	Class I	Class II	Class III: Fresh Water	Class III: Marine Water	Class IV	Class V
(30) 2,4-Dinitrotoluene	Micrograms/L	≤ 0.11 annual average	≤ 9.1 annual average	≤ 9.1 annual average	≤ 9.1 annual average		
(31) Dissolved Oxygen	Milligrams/L	Shall not be less than 5.0. Normal daily and seasonal fluctuations above this level shall be maintained.	Shall not average less than 5.0 in a 24-hour period and shall never be less than 4.0. Normal daily and seasonal fluctuations above these levels shall be maintained.	Shall not be less than 5.0. Normal daily and seasonal fluctuations above these levels shall be maintained.	Shall not average less than 5.0 in a 24-hour period and shall never be less than 4.0. Normal daily and seasonal fluctuations above these levels shall be maintained.	Shall not average less than 4.0 in a 24-hour period and shall never be less than 3.0.	Shall not be less than 0.3, 50 percent of the time on an annual basis for flows greater than or equal to 250 cubic feet per second and shall never be less than 0.1. Normal daily and seasonal fluctuations above these levels shall be maintained.
(32) Dissolved Solids	Milligrams/L	≤ 500 as a monthly average; ≤ 1,000 maximum					
(33) Fluorides	Milligrams/L	≤ 1.5	≤ 1.5	≤ 10.0	≤ 5.0	≤ 10.0	≤ 10.0
(34) "Free Forms" (see Minimum Criteria in Section 62-302.500, F.A.C.)							
(35) "General Criteria" (see Section 62-302.510, F.A.C., and individual criteria)							

Notes: (1) "In H" means the natural logarithm of total hardness expressed as milligrams/L of $CaCO_3$. For metals criteria involving equations with hardness, the hardness shall be set at 25 mg/L if actual hardness is < 25 mg/L and set at 400 mg/L if actual hardness is > 400 mg/L. (2) This criterion is protective of human health, not of aquatic life. (3) For application of dissolved metals criteria, see Subsection 62-302.500(2)(d), F.A.C.

Table 2 (continued)

Parameter	Units	Class I	Class II	Class III: Fresh Water	Class III: Marine Water	Class IV	Class V
(36) (a) Halomethanes (Total trihalomethanes) (total of bromoform, chlorodibromo-methane, dichlorobromo-methane, and chloroform). Individual halomethanes shall not exceed (b) 1. to (b) 5. below.	Micrograms/L	≤ 100					
(36) (b) 1. Halomethanes (individual): Bromoform	Micrograms/L	≤ 4.3 annual average	≤ 360 annual average	≤ 360 annual average	≤ 360 annual average		
(36) (b) 2. Halomethanes (individual): Chlorodibromo-methane	Micrograms/L	≤ 0.41 annual average	≤ 34 annual average	≤ 34 annual average	≤ 34 annual average		
(36) (b) 3. Halomethanes (individual): Chloroform	Micrograms/L	≤ 5.67 annual average	≤ 470.8 annual average	≤ 470.8 annual average	≤ 470.8 annual average		
(36) (b) 4. Halomethanes (individual): Chloromethane (methyl chloride)	Micrograms/L	≤ 5.67 annual average	≤ 470.8 annual average	≤ 470.8 annual average	≤ 470.8 annual average		

Notes: (1) "ln H" means the natural logarithm of total hardness expressed as milligrams/L of $CaCO_3$. For metals criteria involving equations with hardness, the hardness shall be set at 25 mg/L if actual hardness is < 25 mg/L and set at 400 mg/L if actual hardness is > 400 mg/L. (2) This criterion is protective of human health, not of aquatic life. (3) For application of dissolved metals criteria, see Subsection 62-302.500(2)(d), F.A.C.

Table 2 (continued)

Parameter	Units	Class I	Class II	Class III: Fresh Water	Class III: Marine Water	Class IV	Class V
(36) (b) 5. Halomethanes (individual): Dichlorobromo-methane	Micrograms/L	≤ 0.27 annual average	≤ 22 annual average	≤ 22 annual average	≤ 22 annual average		
(37) Hexachlorobuta-diene	Micrograms/L	≤ 0.45 annual average	≤ 49.7 annual average	≤ 49.7 annual average	≤ 49.7 annual average		
(38) Imbalance (see Nutrients)							
(39) Iron	Milligrams/L	≤ 0.3	≤ 0.3	≤ 1.0	≤ 0.3	≤ 1.0	
(40) Lead	Micrograms/L See Notes (1) and (3).	$Pb \leq e^{(1.273[InH]- 4.705)}$	≤ 8.5	$Pb \leq e^{(1.273 [InH] -4.705)}$	≤ 8.5	≤ 50	≤ 50
(41) Manganese	Milligrams/L		≤ 0.1				
(42) Mercury	Micrograms/L	≤ 0.012	≤ 0.025	≤ 0.012	≤ 0.025	≤ 0.2	≤ 0.2
(43) Minimum Criteria (see Section 62-302. 500, F.A.C.)							
(44) Mixing Zones (See Section 62-4.246, F.A.C.)							
(45) Nickel	Micrograms/L See Notes (1) and (3).	$Ni \leq e^{(0.846[InH]+0.0584)}$	≤ 8.3	$Ni \leq e^{(0.846[InH]+0.0584)}$	≤ 8.3	≤ 100	
(46) Nitrate	Milligrams/L as N	≤ 10 or that concentration that exceeds the nutrient criteria					
(47) Nuisance Species		Substances in concentrations that result in the dominance of nuisance species: none shall be present.					

Notes: (1) "In H" means the natural logarithm of total hardness expressed as milligrams/L of $CaCO_3$. For metals criteria involving equations with hardness, the hardness shall be set at 25 mg/L if actual hardness is < 25 mg/L and set at 400 mg/L if actual hardness is > 400 mg/L. (2) This criterion is protective of human health, not of aquatic life. (3) For application of dissolved metals criteria, see Subsection 62-302.500(2)(d), F.A.C.

Table 2 (continued)

Parameter	Units	Class I	Class II	Class III: Fresh Water	Class III: Marine Water	Class IV	Class V
(48) (a) Nutrients		The discharge of nutrients shall continue to be limited as needed to prevent violations of other standards contained in this chapter. Man-induced nutrient enrichment (total nitrogen or total phosphorus) shall be considered degradation in relation to the provisions of Sections 62-302.300, 62-302.700, and 62-4.242, F.A.C.					
(48) (b) Nutrients		In no case shall nutrient concentrations of a body of water be altered so as to cause an imbalance in natural populations of aquatic flora or fauna.					
(49) Odor (also see Color, Minimum Criteria, Phenolic Compounds, etc.)	Threshold odor number		Shall not exceed 24 at 60 degrees C. as a daily average.				Odor-producing substances: only in such amounts as will not unreasonably interfere with use of the water for the designated purpose of this classification.
(50) (a) Oils and Greases	Milligrams/L	Dissolved or emulsified oils and greases shall not exceed 5.0.	Dissolved or emulsified oils and greases shall not exceed 5.0.	Dissolved or emulsified oils and greases shall not exceed 5.0.	Dissolved or emulsified oils and greases shall not exceed 5.0.	Dissolved or emulsified oils and greases shall not exceed 5.0.	Dissolved or emulsified oils and greases shall not exceed 10.0.
(50) (b) Oils and Greases		No undissolved oil, or visible oil defined as iridescence, shall be present so as to cause taste or odor, or otherwise interfere with the beneficial use of waters.					
(51) Pesticides and Herbicides							
(51) (a) 2,4,5-TP	Micrograms/L	≤ 10					
(51) (b) 2-4-D	Micrograms/L	≤ 100					
(51) (c) Aldrin	Micrograms/L	≤ .00013 annual average; 3.0 maximum	≤ .00014 annual average; 1.3 maximum	≤ .00014 annual average; 3.0 maximum	≤ .00014 annual average; 1.3 maximum		
(51) (d) Beta-hexachlorocyclo-hexane (b-BHC)	Micrograms/L	≤ 0.014 annual average	≤ 0.046 annual average	≤ 0.046 annual average	≤ 0.046 annual average		

Notes: (1) "In H" means the natural logarithm of total hardness expressed as milligrams/L of $CaCO_3$. For metals criteria involving equations with hardness, the hardness shall be set at 25 mg/L if actual hardness is < 25 mg/L and set at 400 mg/L if actual hardness is > 400 mg/L. (2) This criterion is protective of human health, not of aquatic life. (3) For application of dissolved metals criteria, see Subsection 62-302.500(2)(d), F.A.C.

Table 2 (continued)

Parameter	Units	Class I	Class II	Class III: Fresh Water	Class III: Marine Water	Class IV	Class V
(51) (e) Chlordane	Micrograms/L	≤ 0.00058 annual average; 0.0043 maximum	≤ 0.00059 annual average; 0.004 maximum	≤ 0.00059 annual average; 0.0043 maximum	≤ 0.00059 annual average; 0.004 maximum		
(51) (f) DDT	Micrograms/L	≤ 0.00059 annual average; 0.001 maximum	≤ 0.00059 annual average; 0.001 maximum	≤ 0.00059 annual average; 0.001 maximum	≤ 0.00059 annual average; 0.001 maximum		
(51) (g) Demeton	Micrograms/L	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1		
(51) (h) Dieldrin	Micrograms/L	≤ 0.00014 annual average; 0.0019 maximum	≤ 0.00014 annual average; 0.0019 maximum	≤ 0.00014 annual average; 0.0019 maximum	≤ 0.00014 annual average; 0.0019 maximum		
(51) (i) Endosulfan	Micrograms/L	≤ 0.056	≤ 0.0087	≤ 0.056	≤ 0.0087		
(51) (j) Endrin	Micrograms/L	≤ 0.0023	≤ 0.0023	≤ 0.0023	≤ 0.0023		
(51) (k) Guthion	Micrograms/L	≤ 0.01	≤ 0.01	≤ 0.01	≤ 0.01		
(51) (l) Heptachlor	Micrograms/L	≤ 0.00021 annual average; 0.0038 maximum	≤ 0.00021 annual average; 0.0036 maximum	≤ 0.00021 annual average; 0.0038 maximum	≤ 0.00021 annual average; 0.0036 maximum		
(51) (m) Lindane (g-benzene hexachloride)	Micrograms/L	≤ 0.019 annual average; 0.08 maximum	≤ 0.063 annual average; 0.16 maximum	≤ 0.063 annual average; 0.08 maximum	≤ 0.063. annual average; 0.16 maximum		
(51) (n) Malathion	Micrograms/L	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1		
(51) (o) Methoxychlor	Micrograms/L	≤ 0.03	≤ 0.03	≤ 0.03	≤ 0.03		
(51) (p) Mirex	Micrograms/L	≤ 0.001	≤ 0.001	≤ 0.001	≤ 0.001		
(51) (q) Parathion	Micrograms/L	≤ 0.04	≤ 0.04	≤ 0.04	≤ 0.04		
(51) (r) Toxaphene	Micrograms/L	≤ 0.0002	≤ 0.0002	≤ 0.0002	≤ 0.0002		

Notes: (1) "ln H" means the natural logarithm of total hardness expressed as milligrams/L of $CaCO_3$. For metals criteria involving equations with hardness, the hardness shall be set at 25 mg/L if actual hardness is < 25 mg/L and set at 400 mg/L if actual hardness is > 400 mg/L. (2) This criterion is protective of human health, not of aquatic life. (3) For application of dissolved metals criteria, see Subsection 62-302.500(2)(d), F.A.C.

Table 2 (continued)

Parameter	Units	Class I	Class II	Class III: Fresh Water	Class III: Marine Water	Class IV	Class V
(52) (a) pH (Class I and Class IV Waters)	Standard Units	Shall not vary more than 1 unit above or below natural background provided that the pH is not lowered to less than 6 units or raised above 8.5 units. If natural background is less than 6 units, the pH shall not vary below natural background or vary more than 1 unit above natural background. If natural background is higher than 8.5 units, the pH shall not vary above natural background or vary more than 1 unit below background.					
(52) (b) pH (Class II Waters)	Standard Units	Shall not vary more than 1 unit above or below natural background of coastal waters as defined in Subsection 62-302.520(3)(b), F.A.C., or more than 2/10ths unit above or below natural background of open waters as defined in Subsection 62-302.520(3)(f), F.A.C., provided that the pH is not lowered to less than 6.5 units or raised above 8.5 units. If natural background is less than 6.5 units, the pH shall not vary below natural background or vary more than 1 unit above natural background for coastal waters or more than 2/10ths unit above natural background for open waters. If natural background is higher than 8.5 units, the pH shall not vary above natural background or vary more than 1 unit below natural background of coastal waters or more than 2/10ths unit below natural background of open waters.					
(52) (c) pH (Class III Waters)	Standard Units	Shall not vary more than 1 unit above or below natural background of predominantly fresh waters and coastal waters as defined in Subsection 62-302.520(3)(b), F.A.C. or more than 2/10ths unit above or below natural background of open waters as defined in Subsection 62-302.520(3)(f), F.A.C., provided that the pH is not lowered to less than 6 units in predominantly fresh waters, or less than 6.5 units in predominantly marine waters, or raised above 8.5 units. If natural background is less than 6 units, in predominantly fresh waters or 6.5 units in predominantly marine waters, the pH shall not vary below natural background or vary more than 1 unit above natural background of predominantly fresh waters and coastal waters, or more than 2/10ths unit above natural background of open waters. If natural background is higher than 8.5 units, the pH shall not vary above natural background or vary more than 1 unit below natural background of predominantly fresh waters and coastal waters, or more than 2/10ths unit below natural background of open waters.					
(52) (d) pH (Class V Waters)	Standard Units	Not lower than 5.0 nor greater than 9.5 except certain swamp waters, which may be as low as 4.5.					
(53)(a) Phenolic Compounds: Total		Phenolic compounds other than those produced by the natural decay of plant material, listed or unlisted, shall not taint the flesh of edible fish or shellfish or produce objectionable taste or odor in a drinking water supply.					
(53) (b) Phenolic Compounds: Total	Micrograms/L	1. The total of all chlorinated phenols, and chlorinated cresols, except as set forth in (c) 1. to (c) 4. below, shall not exceed 1.0 unless higher values are shown not to be chronically toxic. Such higher values shall be approved in writing by the Secretary. 2. The compounds listed in (c) 1. to (c) 6. below shall not exceed the limits specified for each compound.					1. The total of the following Phenolic Compounds shall not exceed 50: a) Chlorinated phenols; b) Chlorinated cresols; and c) 2,4-dinitrophenol.

Notes: (1) "In H" means the natural logarithm of total hardness expressed as milligrams/L of $CaCO_3$. For metals criteria involving equations with hardness, the hardness shall be set at 25 mg/L if actual hardness is < 25 mg/L and set at 400 mg/L if actual hardness is > 400 mg/L. (2) This criterion is protective of human health, not of aquatic life. (3) For application of dissolved metals criteria, see Subsection 62-302.500(2)(d), F.A.C.

Table 2 (continued)

Parameter	Units	Class I	Class II	Class III: Fresh Water	Class III: Marine Water	Class IV	Class V
(53) (c) 1. Phenolic Compound: 2-chlorophenol	Micrograms/L	≤ 120	< 400 See Note (2).	< 400 See Note (2).	< 400 See Note (2).	< 400 See Note (2).	
(53) (c) 2. Phenolic Compound: 2,4-dichlorophenol	Micrograms/L	< 93 See Note (2).	< 790 See Note (2).	< 790 See Note (2).	< 790 See Note (2).	< 790 See Note (2).	
(53) (c) 3. Phenolic Compound: Pentachlorophenol	Micrograms/L	≤ 30 maximum; ≤ 0.28 annual average; ≤ $e^{(1.005[pH]-5.29)}$	≤ 7.9	≤ 30 maximum; ≤ 8.2 annual average; ≤ $e^{(1.005[pH]-5.29)}$	≤ 7.9	≤ 30	
(53) (c) 4. Phenolic Compound: 2,4,6-trichlorophenol	Micrograms/L	≤ 2.1 annual average	≤ 6.5 annual average	≤ 6.5 annual average	≤ 6.5 annual average	≤ 6.5 annual average	
(53) (c) 5. Phenolic Compound: 2,4-dinitrophenol	Milligrams/L	≤ 0.0697 See Note (2).	≤ 14.26 See Note (2).	≤ 14.26 See Note (2).	≤ 14.26 See Note (2).	≤ 14.26 See Note (2).	
(53) (c) 6. Phenolic Compound: Phenol	Milligrams/L	≤ 0.3	≤ 0.3	≤ 0.3	≤ 0.3	≤ 0.3	≤ 0.3
(54) Phosphorus (Elemental)	Micrograms/L		≤ 0.1		≤ 0.1		
(55) Phthalate Esters	Micrograms/L	≤ 3.0		≤ 3.0			
(56) Polychlorinated Biphenyls (PCBs)	Micrograms/L	≤ 0.000044 annual average; 0.014 maximum	≤ 0.000045 annual average; 0.03 maximum	≤ 0.000045 annual average; 0.014 maximum	≤ 0.000045 annual average; 0.03 maximum		

Notes: (1) "ln H" means the natural logarithm of total hardness expressed as milligrams/L of $CaCO_3$. For metals criteria involving equations with hardness, the hardness shall be set at 25 mg/L if actual hardness is < 25 mg/L and set at 400 mg/L if actual hardness is > 400 mg/L. (2) This criterion is protective of human health, not of aquatic life. (3) For application of dissolved metals criteria, see Subsection 62-302.500(2)(d), F.A.C.

Table 2 (continued)

Parameter	Units	Class I	Class II	Class III: Fresh Water	Class III: Marine Water	Class IV	Class V
(57) (a) Polycyclic Aromatic Hydrocarbons (PAHs). Total of Acenaphthylene; Benzo(a)anthracene; Benzo(a)pyrene; Benzo(b)fluoranthene; Benzo-(ghi)perylene; Benzo(k)fluoranthene; Chrysene; Dibenzo-(a,h)anthracene; Indeno(1,2,3-cd)pyrene; and Phenanthrene	Micrograms/L	≤ 0.0028 annual average	≤ 0.031 annual average	≤ 0.031annual average	≤ 0.031 annual average		
(57) (b) 1. (Individual PAHs): Acenaphthene	Milligrams/L	< 1.2 See Note (2).	< 2.7 See Note (2).	< 2.7 See Note (2).	< 2.7 See Note (2).		
(57) (b) 2. (Individual PAHs): Anthracene	Milligrams/L	< 9.6 See Note (2).	< 110 See Note (2).	< 110 See Note (2).	< 110 See Note (2).		
(57) (b) 3. (Individual PAHs): Fluoranthene	Milligrams/L	< 0.3 See Note (2).	< 0.370 See Note (2).	< 0.370 See Note (2).	< 0.370 See Note (2).		
(57) (b) 4. (Individual PAHs): Fluorene	Milligrams/L	< 1.3 See Note (2).	< 14 See Note (2).	< 14 See Note (2).	< 14 See Note (2).		
(57) (b) 5. (Individual PAHs): Pyrene	Milligrams/L	< 0.96 See Note (2).	< 11 See Note (2).	< 11 See Note (2).	< 11 See Note (2).		
(58) (a) Radioactive substances (Combined radium 226 and 228)	Picocuries/L	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5

Notes: (1) "In H" means the natural logarithm of total hardness expressed as milligrams/L of $CaCO_3$. For metals criteria involving equations with hardness, the hardness shall be set at 25 mg/L if actual hardness is < 25 mg/L and set at 400 mg/L if actual hardness is > 400 mg/L. (2) This criterion is protective of human health, not of aquatic life. (3) For application of dissolved metals criteria, see Subsection 62-302.500(2)(d), F.A.C.

Table 2 (continued)

Parameter	Units	Class I	Class II	Class III: Fresh Water	Class III: Marine Water	Class IV	Class V
(58) (b) Radioactive substances (Gross alpha particle activity including radium 226, but excluding radon and uranium)	Picocuries/L	≤ 15	≤ 15	≤ 15	≤ 15	≤ 15	≤ 15
(59) Selenium	Micrograms/L	≤ 5.0	≤ 71	≤ 5.0	≤ 71		
(60) Silver	Micrograms/L See Note (3).	≤ 0.07	See Minimum criteria in Subsection 62-302.500(3)	≤ 0.07	See Minimum criteria in Subsection 62-302.500(3)		
(61) Specific Conductance (see Conductance, Specific, above)							
(62) Substances in concentrations that injure, are chronically toxic to, or produce adverse physiological or behavioral response in humans, plants, or animals		None shall be present.					
(63) 1,1,2,2-Tetra-chloroethane	Micrograms/L	≤ 0.17 annual average	≤ 10.8 annual average	≤ 10.8 annual average	≤ 10.8 annual average		
(64) Tetrachloroethylene (1,1,2,2-tetrachloro-ethene)	Micrograms/L	≤ 0.8 annual average, ≤ 3.0 maximum	≤ 8.85 annual average	≤ 8.85 annual average	≤ 8.85 annual average		
(65) Thallium	Micrograms/L	< 1.7	< 6.3	< 6.3	< 6.3		

Notes: (1) "ln H" means the natural logarithm of total hardness expressed as milligrams/L of $CaCO_3$. For metals criteria involving equations with hardness, the hardness shall be set at 25 mg/L if actual hardness is < 25 mg/L and set at 400 mg/L if actual hardness is > 400 mg/L. (2) This criterion is protective of human health, not of aquatic life. (3) For application of dissolved metals criteria, see Subsection 62-302.500(2)(d), F.A.C.

Table 2 (continued)

Parameter	Units	Class I	Class II	Class III: Fresh Water	Class III: Marine Water	Class IV	Class V
(66) Thermal Criteria (See Section 62-302.520, F.A.C.)							
(67) Total Dissolved Gases	Percent of the saturation value for gases at the existing atmospheric and hydrostatic pressures	≤ 110% of saturation value	≤ 110% of saturation value	≤ 110% of saturation value	≤ 110% of saturation value		
(68) Transparency	Depth of the compensation point for photosynthetic activity	Shall not be reduced by more than 10 percent compared with the natural background value.	Shall not be reduced by more than 10 percent compared with the natural background value.	Shall not be reduced by more than 10 percent compared with the natural background value.	Shall not be reduced by more than 10 percent compared with the natural background value.		
(69) Trichloroethylene (trichloroethene)	Micrograms/L	≤ 2.7 annual average, ≤ 3.0 maximum	≤ 80.7 annual average	≤ 80.7 annual average	≤ 80.7 annual average		
(70) Turbidity	Nephelometric Turbidity Units (NTUs)	≤ 29 above natural background conditions	≤ 29 above natural background conditions	≤ 29 above natural background conditions	≤ 29 above natural background conditions	≤ 29 above natural background conditions	≤ 29 above natural background conditions
(71) Zinc	Micrograms/L See Notes (1) and (3).	$Zn \leq e^{(0.8473[\ln H]+0.884)}$	≤ 86	$Zn \leq e^{(0.8473[\ln H]+0.884)}$	≤ 86	≤ 1,000	≤ 1,000

Notes: (1) "ln H" means the natural logarithm of total hardness expressed as milligrams/L of $CaCO_3$. For metals criteria involving equations with hardness, the hardness shall be set at 25 mg/L if actual hardness is < 25 mg/L and set at 400 mg/L if actual hardness is > 400 mg/L. (2) This criterion is protective of human health, not of aquatic life. (3) For application of dissolved metals criteria, see Subsection 62-302.500(2)(d), F.A.C.

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