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* DRAFT *

Tonetta Lake & Watershed

2008 Data

2008 - Tonetta Lake & Tributary pH

Weather	Clear ~70		
	pH		
	09/08/08	**09/24/08**	
250 SD		8.04	
218 SD		8.46	
182 SD		7.80	
75 TLW		7.35	
OUTLET		7.65	
Lake Top	7.71	7.70	
Lake Mid	7.68		
Lake Bot	7.12		

NW = No water, therefore no sample collected
ND = No data available
Blank = Sampling not scheduled for this site on this date

pH is the negative logarithm of the Hydrogen ion activity.

The pH of pure water is 7. In general, water with a pH lower than 7 is considered acidic, and a pH greater than 7, basic. The normal range for pH in surface water systems is 6.5 to 8.5, and for groundwater systems 6 to 8.5.

Acidic water with a low pH (< 6.5) could be soft, and corrosive. The water might contain elevated levels of toxic metals such as iron, manganese, copper, lead, and zinc. Acidic water can cause damage to metal piping, and have associated aesthetic problems such as a metallic or sour taste, staining of laundry, and the characteristic "blue-green" staining of sinks and drains. More importantly, there are health risks associated with the potential toxins.

Basic water with a high pH (> 8.5) could be hard. Hard water does not pose a health risk, but can cause aesthetic problems. These problems include an alkali (bitter) taste to the water, formation of deposits on dishes and utensils, difficulty in getting soaps and detergents to lather, and formation of insoluble precipitates on clothing.

2008 - Tonetta Lake Tributary & Outlet Flow Measurements (CFS)

Weather	Clear ~70	Sunny, ~80	Cloudy, ~75	Cloudy, ~70	Heavy Rain	Clear, ~70				
Site	**06/17/08**	**07/31/08**	**08/08/08**	**09/05/08**	**09/06/08**	**09/24/08**				
250 SD	0.02	<0.01	0.02	NW	0.30	0.03				
218 SD	0.15	0.04	0.06	0.02	0.60	0.06				
182 SD	0.01	<0.01	0.01	0.01	0.25	0.02				
75 TLW	0.01	<0.01	<0.01	NW	0.18	<0.01				
OUTLET	0.65	0.30	0.35	0.30	0.45	0.40				
WL Height (1/10 ft)	ND	ND	ND	ND	ND	ND				

<0.1 indicates a value between 0.1 and 0.01 cfs
<0.01 indicates minimal flow, but not dry conditions
NW = No water, therefore no sample collected
ND = No data available
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CFS = Cubic Feet per Second. CFS is a standard unit of flow.

The measurements are relative and no conclusions can be drawn from any one figure or date. Over time, after sufficient data has been collected, correlations in flow rates can be made between tributaries. Additionally, flow projections can be made based on precipitation data.

2008 - Tonetta Lake & Tributary Temperature (C°) & Conductivity (umhos/cm)

	Temperature (C°)									
	06/17/08	**07/31/08**	**08/08/08**	**09/05/08**	**09/06/08**	**09/08/08**	**09/24/08**			
250 SD	17.2	21.5	19.2	NW	19.0		16.7			
218 SD	16.4	19.9	19.0	18.8	18.5		16.8			
182 SD	16.7	19.4	18.5	18.6	18.5		18.0			
75 TLW	17.0	NW	19.1	NW	18.8		17.4			
OUTLET	16.4	28.3	28.2	27.9	27.8		24.2			
Lake Top						21.5				
Lake Mid						19.9				
Lake Bot						19.0				
	Conductivity (umhos/cm)									
250 SD	1020	1162	1180	NW	1096		1215			
218 SD	1023	1276	1269	1485	1161		947			
182 SD	1110	1251	1288	1421	1230		1244			
75 TLW	806	NW	954	NW	916		940			
OUTLET	376	402	396	412	388		386			
Lake Top						460				
Lake Mid						465				
Lake Bot						528				

NW = No water, therefore no sample collected
ND = No data available
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Conductivity is reported in micromhos per centimeter (µmho/cm).

Conductivity or specific conductance is the measure of water's ability to conduct an electric current. Conductivity depends on the number of ions or charged particles in the water. Electricity passes easily through water that is high in electrolytes or ions, and poorly through low electrolyte materials such as pure water.

Why do we take conductivity measurements at Tonetta Lake?
Conductivity determinations are useful in aquatic studies because they provide an estimate of dissolved ionic matter in the water. Low values of specific conductance are characteristic of high-quality, oligotrophic (low nutrient) lake waters. High values of specific conductance are observed in eutrophic lakes where plant nutrients (fertilizer) are in greater abundance. Very high values are good indicators of possible pollution sites. For instance, industrial discharges, road salt, and failing septic tanks can raise conductivity. A sudden change in conductivity can indicate a direct discharge or other source of pollution into the water. Unless an historic baseline is established and maintained fluctuations are less meaningful.

2008 - Tonetta Lake & Tributary Turbidity (Reported in NTU)

	Turbidity (NTU)									
Site	**06/17/08**	**07/31/08**	**08/08/08**	**09/05/08**	**09/06/08**	**09/08/08**	**09/24/08**			
250 SD	1.80	1.77	1.68	NW	17.70		1.70			
218 SD	2.07	1.67	1.31	2.56	52.20		2.10			
182 SD	1.30	3.40	5.62	1.10	3.99		2.86			
75 TLW	5.14	NW	2.22	NW	20.60		5.18			
OUTLET	1.47	1.54	1.36	1.28	1.45		1.41			
Lake Top						2.78				
Lake Mid						1.73				
Lake Bot						25.30				

NW = No water, therefore no sample collected
ND = No data available
Blank = Sampling not scheduled for this site on this date
Detection Limits: .01 - 1000 ntu

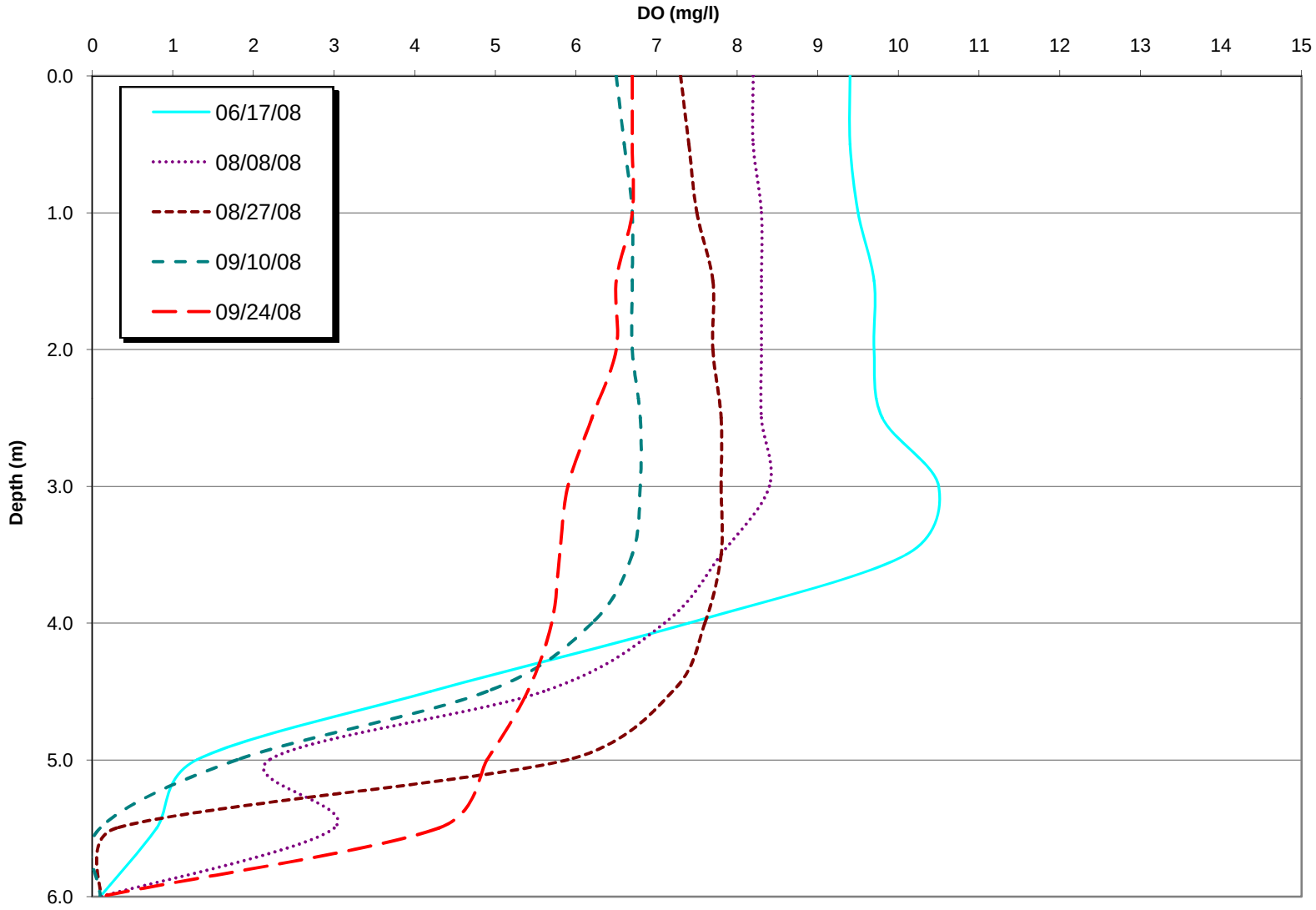
Turbidity is measured in Nephelometric Turbidity Units (NTU).

Turbidity measures the degree to which light traveling through a water column is scattered by the suspended organic (including algae) and inorganic particles. This scattering of light increases with a greater suspended load and is directly related to total suspended solids (description following).

Total suspended solids (TSS) (mg/L) is a measure of particles floating in the water column. Suspended solids consist of an inorganic fraction (silts, clays, etc.) and an organic fraction (algae, zooplankton, bacteria, and detritus). Suspended solids clog and scour pipes and machinery, interfere with effective water treatment, reduce light penetration, smother bottom-dwelling organisms, clog fish gills, absorb sunlight and increase water temperature and adsorb and transport nutrients, toxic chemicals and microorganisms.

The vast majority of suspended solids will be conveyed during storm events. In general, lower numbers are better but little can be concluded from a single measurement. Turbidity readings are ideally looked at in the context of an historical data set that includes storm events.

2008 Tonetta Lake Disolved Oxygen Profiles



2008 - Tonetta Lake Temperature & Dissolved Oxygen Profiles @ TL-1 (C° for temperature and as listed for oxygen)

	Date:	06/17/08			08/08/08			08/27/08			09/10/08			09/24/08					
	Conditions:	Clear ~70, N 8-10			Cloudy ~75, NW 8-10			Sunny ~80 S 3-5			Clear, ~75, N 5-8			Clear ~70, N 1-3					
	Lake Level																		
Site	**Depth (m)**	Temp. C°	DO %	DO mg/L	Temp. C°	DO %	DO mg/L	Temp. C°	DO %	DO mg/L	Temp. C°	DO %	DO mg/L	Temp. C°	DO %	DO mg/L	Temp. C°	DO %	DO mg/L
TL1-0.0	0.0	25.1	113	9.4	26.8	103	8.2	24.9	88	7.3	23.6	76	6.5	21.4	75	6.7			
TL1-0.5	0.5	25.1	114	9.4	26.8	103	8.2	24.5	89	7.4	23.6	78	6.6	21.4	76	6.7			
TL1-1.0	1.0	25.1	115	9.5	26.8	103	8.3	24.3	90	7.5	23.6	79	6.7	21.3	76	6.7			
TL1-1.5	1.5	24.8	116	9.7	26.8	104	8.3	24.0	91	7.7	23.6	79	6.7	20.3	72	6.5			
TL1-2.0	2.0	24.6	117	9.7	26.8	104	8.3	23.7	91	7.7	23.6	79	6.7	20.2	71	6.5			
TL1-2.5	2.5	23.0	118	9.8	26.7	104	8.3	23.5	91	7.8	23.6	80	6.8	20.1	68	6.2			
TL1-3.0	3.0	22.5	122	10.5	26.3	103	8.4	23.4	91	7.8	23.6	80	6.8	20.0	64	5.9			
TL1-3.5	3.5	19.6	118	10.1	25.8	92	7.8	23.3	91	7.8	23.6	79	6.7	20.0	64	5.8			
TL1-4.0	4.0	16.6	87	7.4	23.9	84	7.1	23.2	89	7.6	23.4	73	6.2	19.9	63	5.7			
TL1-4.5	4.5	13.8	39	4.2	22.5	63	5.6	23.1	87	7.2	22.9	58	4.9	19.9	59	5.4			
TL1-5.0	5.0	11.7	16	1.3	20.3	25	2.2	22.8	66	5.9	22.2	23	1.8	19.8	53	4.9			
TL1-5.5	5.5	10.6	8	0.8	18.4	35	3.0	18.7	4	0.3	20.4	2	0.1	19.7	48	4.3			
TL1-6.0	6.0	10.1	1	0.1	15.5	1	0.1	16.2	1	0.1	19.1	1	0.1	19.1	1	0.1			
TL1-6.5	6.5																		
TL1-7.0	7.0																		

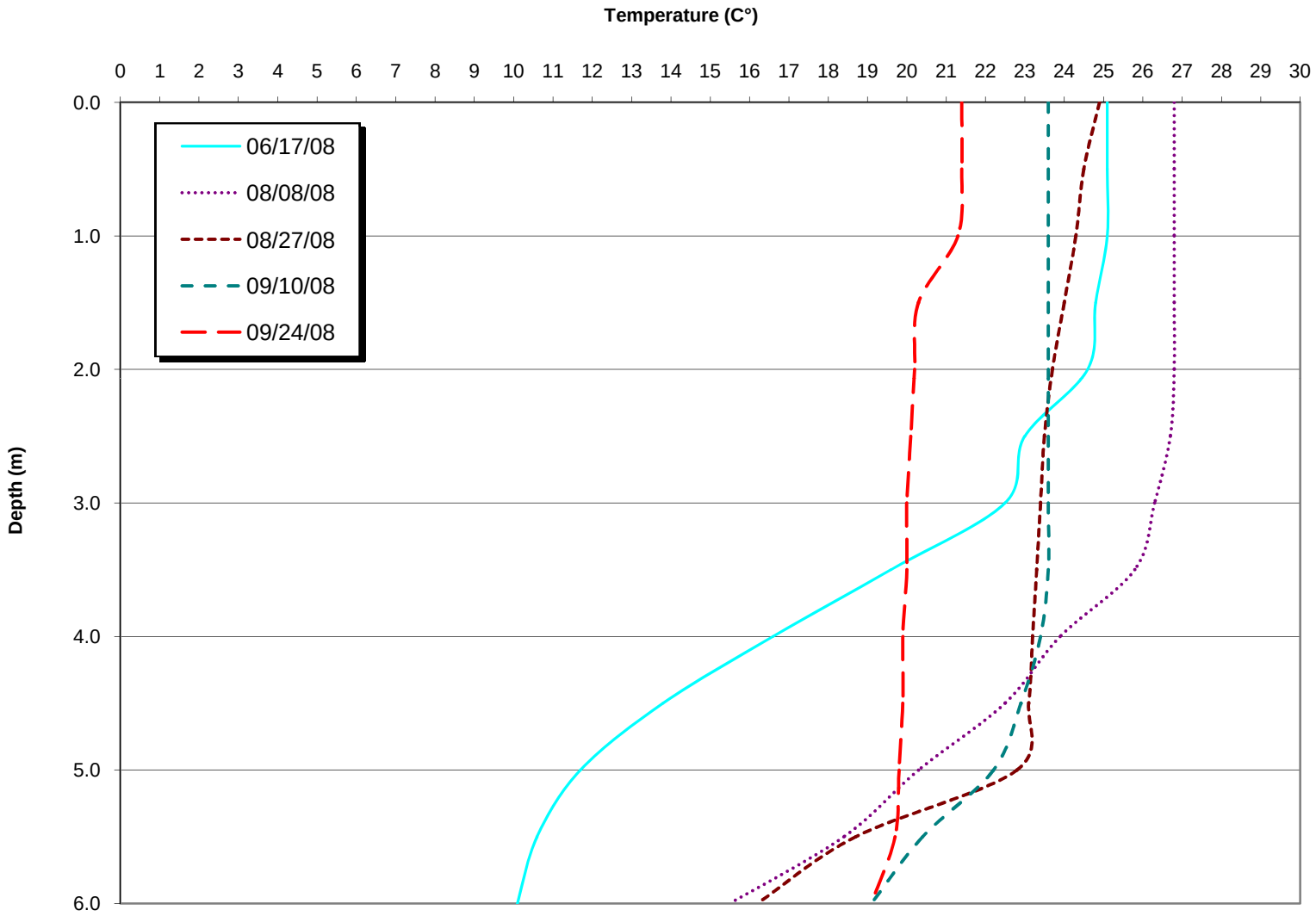
NW = No water, therefore no sample collected
ND = No data available
Blank = Sampling not scheduled for this site on this date

Dissolved Oxygen is reported in both mg/l and as a percent of saturation (The % saturation is the maximum concentration of dissolved oxygen that can be present given a specific temperature)

While there are no regulatory guidelines for dissolved oxygen, fish, invertebrates, plants, and aerobic bacteria all require oxygen for respiration. Much of the dissolved oxygen in water comes from the atmosphere. After dissolving at the surface, oxygen is distributed by current and turbulence. Algae and rooted aquatic plants also deliver oxygen to water through photosynthesis. However, when the algae and plants die off in late summer, the large decaying bio-mass becomes the driving force contributing to decreased dissolved oxygen levels. This decay coupled with higher metabolic rates of aquatic animals, and fewer oxygen producing plants can cause major shifts in the kinds of aquatic organisms found in water bodies.

Specifically for Byram Lake, in addition to giving a general picture of lake conditions, dissolved oxygen and temperature profiles are very useful in determining which of the two intakes (4m or 8m) to draw from.

2008 Tonetta Lake Temperature Profiles



Tonetta Lake Secchi Disk Transparency (m) For TL-1

(TL-1 is ~170 yards from the Private beach & ~80 yards from the public beach)

2007	**Julian Day**	**170**	**190**	**207**	**226**	**244**
	Date	**06/19/07**	**07/09/07**	**07/26/07**	**08/14/07**	**09/01/07**
	Meters	**3.30**	**5.25**	**4.65**	**2.95**	**3.20**
2008	**Julian Day**	**169**	**221**	**240**	**254**	**268**
	Date	**06/17/08**	**08/08/08**	**08/27/08**	**09/10/08**	**09/24/08**
	Meters	**3.5**	**3.5**	**3.3**	**3.0**	**2.2**
2009	**Julian Day**					
	Date					
	Meters					
2010	**Julian Day**					
	Date					
	Meters					
2011	**Julian Day**					
	Date					
	Meters					

The Secchi disk is used to measure water clarity by quantifying the depth of visibility (measured in meters (m))

There are no Secchi disk standards, and readings from one lake should not be compared to another. The most valuable information from Secchi disk data are the temporal changes. Secchi disk readings which show a significant decrease during the summer season can signal a pending algal bloom.

Secchi disk measurements are inexpensive (no lab fees) and easily obtained, yet they provide a very useful "snapshot" of the algal conditions within the lake. In Tonetta Lake, as Secchi disk readings decline, microscopic sampling increases to determine which, if any, algal populations are rising.

2008 - Tonetta Lake and Watershed Ammonia as N (Reported in mg/L)

Sample Type				Grab	Grab	Grab
Weather				Dry	Wet	Dry
	Ammonia as N (mg/L)					
				09/05/08	**09/06/08**	**09/08/08**
250 SD				NW	0.90	
218 SD				<0.02	0.06	
182 SD				0.04	0.03	
75 TLW				NW	0.68	
Lake Top						0.05
Lake Mid						0.04
Lake Bot						0.35

NW = No water, therefore no sample collected
ND = No data available
Blank = Sampling not scheduled for this site on this date
Detection limit for Ammonia = 0.02 mg/L.
<0.02 = less than detection limit
LE = Lab Error

Ammonia is measured in parts per million which is expressed in volumetric terms as milligrams per liter (mg/L).

Ammonia occurs as a breakdown product of nitrogenous materials in natural waters. It's presence could be indicative of contamination from domestic effluent or industrial waste water. In addition, Ammonia can be harmful to fish and other forms of aquatic life. Ammonia analysis is routinely used in the monitoring of drinking water supplies.

The EPA does not publish a Maximum Contaminant Level (MCL) for Ammonia. Measurements less than 1.00 mg/l are generally considered acceptable in drinking water supplies.

2008 - Tonetta Lake and Watershed Nitrate as N (Reported in mg/L)

Sample Type				Grab	Grab	Grab
Weather				Dry	Wet	Dry
	Nitrate as N (mg/L)					
				09/05/08	**09/06/08**	**09/08/08**
250 SD				NW	1.60	
218 SD				2.30	0.62	
182 SD				1.10	0.57	
75 TLW				NW	0.62	
Lake Top						<0.05
Lake Mid						<0.05
Lake Bot						<0.05

NW = No water, therefore no sample collected
ND = No data available
Blank = Sampling not scheduled for this site on this date
Detection limit for Nitrate = 0.05 mg/L.
<0.05 = less than detection limit
LE = Lab Error

Nitrate in measured in parts per million which is expressed in volumetric terms as milligrams per liter (mg/L).

The EPA MCL for nitrate is set at 10 parts per million (ppm) or 10 mg/l. Nitrates are very soluble and do not bind to soils and therefore have a high potential to migrate to ground water. Because they do not evaporate, nitrates are likely to remain in water until consumed by plants or other organisms.

Most nitrogenous materials in natural waters tend to be converted to nitrate, so all sources of combined nitrogen, particularly organic nitrogen and ammonia, should be considered as potential nitrate sources. Primary sources of organic nitrates include human sewage and animal waste. The primary inorganic nitrates found in drinking water are potassium nitrate and ammonium nitrate both of which are widely used as fertilizers.

2008 - Tonetta Lake Kjeldahl Nitrogen as N (Reported in mg/L)

Sample Type				Grab	Grab	Grab
Weather				Dry	Wet	Dry
	Kjeldahl Nitrogen as N (mg/L)					
				09/05/08	**09/06/08**	**09/08/08**
250 SD				NW	2.70	
218 SD				0.47	2.40	
182 SD				0.56	0.94	
75 TLW				NW	2.20	
Lake Top						0.47
Lake Mid						0.53
Lake Bot						1.70

NW = No water, therefore no sample collected
ND = No data available
Blank = Sampling not scheduled for this site on this date
Detection limit for Kjeldahl Nitrogen = 0.1 mg/L.
<0.1 = less than detection limit
LE = Lab Error

Kjeldahl Nitrogen in measured in parts per million which is expressed in volumetric terms as milligrams per liter (mg/L).

The EPA MCL for nitrate is set at 10 parts per million (ppm) or 10 mg/l. Nitrates are very soluble and do not bind to soils and therefore have a high potential to migrate to ground water. Because they do not evaporate, nitrates are likely to remain in water until consumed by plants or other organisms.

Most nitrogenous materials in natural waters tend to be converted to nitrate, so all sources of combined nitrogen, particularly organic nitrogen and ammonia, should be considered as potential nitrate sources. Primary sources of organic nitrates include human sewage and animal waste. The primary inorganic nitrates found in drinking water are potassium nitrate and ammonium nitrate both of which are widely used as fertilizers.

2008 - Tonetta Lake and Watershed Total Phosphorus (ug/L)

Sample Type				Grab	Grab	Grab
Weather				Dry	Wet	Dry
	Total Phosphorus (ug/L)					
				09/05/08	**09/06/08**	**09/08/08**
250 SD				NW	559.8	
218 SD				133.7	689.3	
182 SD				26.3	280.8	
75 TLW				NW	678.1	
Lake Top						14.4
Lake Mid						17.6
Lake Bot						91.8

NW = No water, therefore no sample collected
ND = No data available
Blank = Sampling not scheduled for this site on this date
Detection limit for Total Phosphorus = 0.6 ug/L.
<0.6 = less than detection limit

Total Phosphorus is measured in parts per billion and is expressed volumetrically as micrograms per liter (ug/L).

Phosphorus is an essential nutrient for the growth of aquatic plants and it is only needed in very small quantities relative to nitrogen. Additionally, Phosphorus is typically the limiting element to growth. For this reason even a slight phosphorus enrichment can trigger an algal bloom. Total phosphorus (TP) can be used as a indicator of trophic state. In lake phosphorus levels below 10ug/l are considered oligotrophic. Concentrations in excess of 25-30ug/l are considered eutrophic and usually associated with algal blooms and other related problems.

Typically, the total phosphorus content of a water body must be reduced below 10 ppb to significantly improve water clarity.

2008 - Tonetta Lake and Watershed Total Dissolved Phosphorus (ug/L)

Sample Type				Grab	Grab	Grab
Weather				Dry	Wet	Dry
	Total Dissolved Phosphorus (ug/L)					
				09/05/08	**09/06/08**	**09/08/08**
250 SD				NW	347.5	
218 SD				129.6	241.5	
182 SD				6.4	200.9	
75 TLW				NW	399.3	
Lake Top						4.2
Lake Mid						4.8
Lake Bot						7.0

NW = No water, therefore no sample collected
ND = No data available
Blank = Sampling not scheduled for this site on this date
Detection limit for Total Dissolved Phosphorus = 0.6 ug/L.
<0.6 = less than detection limit

Total Dissolved Phosphorus is measured in parts per billion and is expressed volumetrically as micrograms per liter (ug/L).

Total dissolved phosphorus is the measure of only the dissolved fraction. The particulate fraction is removed through filtration. Phosphorus is an essential nutrient for the growth of aquatic plants and it is only needed in very small quantities relative to nitrogen. Additionally, Phosphorus is typically the limiting element to growth. For this reason even a slight phosphorus enrichment can trigger an algal bloom.

Typically, the total phosphorus content of a water body must be reduced below 10 ppb to significantly improve water clarity.

2008 - Tonetta Tributary: Escherichia Coliform Results (E. Coliform / 100ml)

Sample Type		Grab	Grab	Grab	Grab	Grab	Grab	
	Escherichia Coliform (E. Coliform /100ml)							
						07/31/08		
250 SD						>1000		
218 SD						350		
182 SD						100		
75 TLW						>1000		
Lake Shore						200		

2008 - Tonetta Tributary: Fecal Coliform Results (F. Coliform / 100ml)

Sample Type		Grab	Grab	Grab	Grab	Grab	Grab	
	Fecal Coliform (F. Coliform /100ml)							
						07/31/08		
250 SD						>2000		
218 SD						460		
182 SD						90		
75 TLW						1340		
Lake Shore						30		

2008 - Tonetta Tributary: Total Coliform Results (Total Coliform / 100ml)

Sample Type		Grab	Grab	Grab	Grab	Grab	Grab	
	Total Coliform (T. Coliform /100ml)							
						07/31/08		
250 SD						>1000		
218 SD						>1000		
182 SD						>1000		
75 TLW						>1000		
Lake Shore						>1000		

According to Section 6-2.15 of the New York State Sanitary Code, Fecal Coliform levels must be < 1000 / 100ml , for single sample results.

2008 - Tonetta Lake Synoptic Fish Survey Data

Lake Fisherman	**xx**
Shore Fisherman	

Species						
White Perch	**x**					
Yellow Perch						
Pickerel						
Sun Fish/Crappies	**x**					
Large Mouth Bass						
Small Mouth Bass	**x**					
Catfish	**x**					