

Citizen Watershed Monitors of Orange County

Water Monitoring Snapshot Day 2005 Report

Produced By
Orange County Coastkeeper

Executive Summary





On May 7th 2005, citizens from all over Orange County banded together to collect water samples for every major stream in Orange County to create a “Snapshot” of water quality in our county. During the 24 hours allotted for the sample collection samples were collected from twenty three sites on thirteen streams plus three ocean sites. All of the samplers were trained in collecting samples and used analytical methods approved by the state to assure data accuracy. Some of the tests were conducted on site, with the rest being done at the O.C. Coastkeeper laboratory in Newport Beach. The event featured a Hub location at the Back Bay Science Center on Shellmaker Island in Newport Beach. Volunteers could pick up testing equipment, receive training, and see displays on water quality issues at booths set up by participating members. Dr. Peter Bowler of the University of California, Irvine gave a presentation on the water quality of Newport Bay and the effect of urban runoff. After the event, all of the samples were analyzed and the data collected to produce this report. As expected, water quality in the county’s streams is poor. All streams suffer from an excess of nutrients and high bacteria counts are common. While the poor water quality of our streams is no surprise to water quality experts the fact that it is not improving over the years is cause for concern. The data from this event will be used to continue the efforts to improve the water quality in our county’s streams by raising public awareness and increasing personal involvement by citizens.

Snapshot Day is a Coast Wide event seeking to answer the question:

What is the quality of water flowing to the coast?

Volunteers who participated in this event are from non-profit environmental organizations, along with interested individuals, hoping to promote citizen monitoring of the watersheds in Orange County. Areas of interest include wetlands, rivers, streams, and oceans. A snapshot event is characterized by having all of the samples collected during a single day; this provides a “Snapshot” of water quality for that day. California Coastwide Snapshot Day 2005 was May 7th. For more information on water monitoring in Orange County see the Citizen Watershed Monitors of Orange County website at www.cwmoc.org

Many thanks to the non-profit and public organizations which participated:

-  D.I.V.E.R.S – Divers Involved Voluntarily Environmental Rehabilitation Safety.
-  Orange County Coastkeeper (OCCK) – “Our mission is to protect and preserve Orange County’s marine habitats and watersheds through education, advocacy, restoration, and enforcement.”
-  Surfrider Foundation Huntington Beach and Seal Beach – “a non-profit environmental organization working to preserve our oceans, waves, and beaches.”
-  Earth Resource Foundation (ERF) – “Teaching environmental responsibility

- where you live, work, and play.”
- ✚ Bolsa Chica Conservancy – “We restore. We educate. We advocate.”
- ✚ USDA Forest Service – “100 years of caring for land and serving people.”

Special thanks to the California Fish and Game Department for hosting the event at the Back Bay Science Center.

Tests conducted include:

Bacteria Tests:

- E. Coli (EC)
- Total Coliform (TC)

Chemical Tests:

- Phosphate
- Ammonia
- Nitrate
- Dissolved Oxygen
- pH

Physical Tests:

- Water temperature
- Air temperature
- Conductivity
- Turbidity

To ensure accuracy for all tests, all groups used the same methodology to collect water samples. Orange County Coastkeeper took samples and ran quality-controlled tests meeting state standards. All tests were conducted within approved time frames to ensure high quality data.

Results:

- ✚ **Water Temperature** – The temperature of water affects aquatic life because most species can only thrive within a certain temperature range. Other factors, such as dissolved oxygen, can be affected by the temperature, which in turn, affects the rate of photosynthesis in aquatic plants. Human interventions can affect temperature by removing canopy cover and building or removing water diversions along the stream or in the stream, causing a rise in water temperature. The acceptable level for Cold Water Fish is 20°C maximum. Three of the sites, Santa Ana River, Big Canyon Creek, and Wintersberg Channel 1, exceeded this level and are considered to be warm water (See Table 1).
- ✚ **Dissolved Oxygen** – Oxygen is needed for respiration, movement, feeding, and growth. Therefore the amount of oxygen in the water affects not only the number of aquatic animals and plants, but also the amount of bacteria in the water. The minimum acceptable level of dissolved oxygen, as stated by the General Basin Plan Objective, is 5mg/L. Six of our monitored sites fall below this level. These sites are Seal Beach, Cerritos Channel, Peter’s Landing, Santa Ana River, San Diego Creek, and Bolsa Channel 1. These sites are sampled by Surf Riders, Divers and Orange County Coastkeeper respectively (See Table 1 and Figure 1).
- ✚ **Conductivity** – By measuring conductivity, we can gauge the amount of dissolved

- solids in the water. Dissolved solids include, acids, minerals, salts, and metals. Conductivity varies from river to river. By collecting this data we can compare it to past results and determine whether there is a sudden increase in conductivity that may be a signal to a bigger problem. We did not find any exceedences in conductivity on Snapshot Day (See Table 1).
- ✚ pH – This is a measure of hydrogen ions that controls the acidity and the alkalinity of the water. Most aquatic life can only survive within a narrow range of pH, thus it is important to monitor. The acceptable level for pH is between 6.5 and 8.5. All of all sites had pH levels within this range (See Table 1).
 - ✚ Phosphate –Phosphates most commonly enter the river system through lawn and garden fertilizer with run-off or soil erosion. Increased phosphate concentrations can lead to increased growth of algae and plants, which then depletes dissolved oxygen in the water. Only two of our monitored sites reached acceptable levels of lower than 0.1 mg/L. Sites that exceed this value were: San Mateo, Aliso Creek, San Mateo, Christianitos, San Juan, Santa Ana River, San Diego Creek 1 and 2, Wintersberg Channel 1 and 2, Bolsa Channel 1, Buck Gully 2, Morning Canyon 2, Delhi Channel 1 and 2, and Peters Canyon 2. The highest amount of phosphate was at Peters Canyon with 1.375 mg/L, more than thirteen times the accepted level (See Table 1 and Figure 2).
 - ✚ Nitrate-Nitrogen – Similar to phosphate, nitrate usually enters through the river system via fertilizer. Thus, it also promotes algae blooms and excessive aquatic plant life that can suffocate other life. Excess levels of nitrates in drinking water can cause methemoglobinemia or “blue baby” disease. All monitored sites are within acceptable levels of 10mg/L (See Table 1).
 - ✚ Ammonia-Nitrogen – Excess ammonia can cause harm by accumulating to toxic levels and affecting their metabolism. This toxic affect can then harm organisms higher up in the food chain. Half of all sites exceed the accepted level of ammonia (See Table 1 and Figure 3).
 - ✚ Turbidity – High turbidity levels indicate a large amount of suspended particles in the water. Natural turbidity varies from site to site. By comparing results from past data, we can determine whether turbidity is above average, as this may indicate erosion, nutrient loading, or excessive algae growth. No site exceeded historic levels of turbidity.
 - ✚ E. Coli and Total Coliform – Having high amounts of bacteria present indicates a high probability of pathogens in the water. Total Coliform usually comes from a broad range of environmental sources. The presence of E.coli indicates recent fecal contamination and can cause severe illness. 71% of our samples exceeded the acceptable levels of Total Coliform. In particular, Delhi Channel 2, Bolsa Channel 1, San Diego Creek, and Peters Canyon 2 have more than 241920MNP/100ml. For E. Coli, 71% of our sites exceed acceptable levels with Aliso Creek at the highest level of 21420MNP/100ml and San Diego Creek with

10170 MNP/100ml. (See Table 2, Figure 4 and 5).

Summary:

- ✚ Phosphate – 88% of the sites exceed acceptable levels of 0.1mg/L.
- ✚ Ammonia – 50% of the sites exceed acceptable levels of 0.09mg/L.
- ✚ Dissolved Oxygen – 43% of the sites exceed acceptable levels.
- ✚ Total Coliform – 71% the sites exceed acceptable levels. Four of these sites, Del2, BC1, PC2, and San Diego Creek have more than 241920MNP/100ml.
- ✚ E. Coli. – 71% of the sites exceed acceptable levels. Aliso Creek with the highest level at 21420MNP/100ml, followed by San Diego Creek with 10170MNP/100ml.

Conclusion:

- ✚ Phosphates have been found to exceed acceptable levels in most of the sites. This is contributing to increased algal blooms and depleted dissolved oxygen.
- ✚ Ammonia-Nitrogen levels are high in too many of our streams.
- ✚ High bacteria levels are a major problem in many sites. This problem may be rooted in the large amounts of urban runoff from local communities.
- ✚ It should be noted this is only a snapshot of the water quality in Orange County, thus the results may not represent long term conditions. However, exceedences should be noted for future analysis.
- ✚ This is the third annual snapshot day event and a comparison with previous Snapshot Day events shows that the water quality of the monitored streams has not seen improvement.
- ✚ This report demonstrates that overall, water quality in Orange County remains poor and needs improvement.
- ✚ This event has helped in raising awareness of the water quality in Orange County and also provided data to the public and local agencies.
- ✚ A digital copy of this data along with data from past years is available at www.cwmoc.org

As outlined in the summary above and presented in detail in the tables and graphs on the following pages, water quality in Orange Countys creeks has a long way to go before we can realize the beneficial uses we expect and deserve from our local waterways. This report is intended to inform the public at large of the problems we face as a community in regards to water quality. Since the results here are well known to water quality professionals in the region, it is important that the public make it known to local and regional officials that improving water quality in our creeks is important enough that the resources necessary to improve water quality are allocated. Water quality needs to be improved to the point that we can use our creeks for the recreation and wildlife habitat uses we expect from them.

Reference:

<http://www.ext.colostate.edu/ptlk/1620.html>

<http://www.dnr.state.wi.us/org/water/dwg/nitrate.htm>

<http://www.water.ncsu.edu/watershedss/info/nh3.html>

<http://www.doh.wa.gov/ehp/dw/Programs/coliform.htm>

<http://www.coastkeeper.org/>

<http://www.surfrider.org/>

<http://bolsachica.org/>

<http://www.earthresource.org/>

Table 1: Table of Results in Snapshot Day 2005. Values in orange exceed in acceptable levels.

Site	Group	Type	Instrument ID: Water Temp. (celcius)	Instrument ID: Air Temp. (celcius)	Instrument ID: PO4(mg/l)	Instrument ID: NO3(mg/l)	Instrument ID: NH3(mg/l)	Instrument ID: PH	Instrument ID: DO(mg/l)	Instrument ID: EC(ms/us)	Instrument ID: Turbidity
Seal Beach	Surf Riders	cold	TB-SCM1-01: 19	TB-SCM1-01: 19.5, 20	DR#3 0.39	DR#3 0.17		PHEL-SCM-07:	L536691: 4.6, 4.7	EC-SCM1-05:	2238-0501: 5.7, 6.2
Cerritos Channel	Surf Riders	cold	TB-SCM1-01: 18	TB-SCM1-01: 18.5	DR#3 4.48	DR#3 0.17		PHEL-SCM-07:	L536691: 4.6, 4.0	EC-SCM1-05:	2238-0501: 15, 17
Peter's Landing	Surf Riders	cold	TB-SCM1-01: 19, 19.5	TB-SCM1-01 22, 22.5	DR#3 0.22	DR#3 0.22		PHEL-SCM-07:	L536691: 4.8, 4.9	EC-SCM1-05:	2238-0501: 3.9, 4
San Mateo	Hazzard/Schlegele	cold	17.4, 17.5	55			0				HAZ#1: 1
Poche Creek	Hazzard/Schlegele	cold	16.7	60	DR#3: .09, 0.1	DR#3: 4.3, 4.2	DR#3: 0				HAZ #1: 1.2
San Mateo xIS	Hazzard/Schlegele	cold	17.3	53	DR#3: 0.29	DR#3: 0.6, 0.5	DR#3: 0				1.2
Aliso Creek	Hazzard/Schlegele	cold	19.5	66	DR#3: .55, .56	DR#3: 1.3	DR#3 0.08				HAZ#1: 0.15
San Mateo Christianitos	Hazzard/Schlegele	cold	17.3	53	DR#3: 0.34	DR#3: 1.9, 1.8	DR#3 0.01				HAZ#1 1.2
San Juan	Hazzard/Schlegele	cold	19.8	60	DR#3: 0.34	DR#3: 1.6	DR#3: 0				HAZ#1: 0.43
Santa Ana River	DIVERS	warm	TB-SCMI-12: 20	TB-SCMI-12: 19	COL-SCMI-03: 0.46	LAMOTTE CA KIT: 0	COL-SCMI-03: 0.13	PHEL-SCMI-09: 8	COL-SCE-03: 5.7, 5.6	EC-SCMI-02: OR	TUN-SCMI-02: 6.5, 6.7
San Diego Creek	DIVERS	cold	TB-SCMI-12: 19	TB-SCMI-12: 16	COL-SCMI-03: 0.75	LAMOTTE CA KIT: 0	COL-SCMI-03: 0.51	PHEL-SCMI-09: 7.6	3.8	1190, 1170uS	75, 70
San Diego Creek #2	DIVERS				DR#3: 1.12	DR#3: 0 (limit)	DR#3: 0.14				61
Big Canyon Creek	DIVERS	warm	TB-SCMI-12: 20	TB-SCMI-12: 19.5	COL-SCMI-03: 1.13	LAMOTTE CA KIT: 0	COL-SCMI-03: .41, .40	PHEL-SCMI-09: 7.5, 7.6	COL-SCE-03: 6.7	EC-SCMI-02: 3.5, 3.57mS	TUN-SCMI-02: 2.1, 2

Big Canyon Creek #2	DIVERS					3.8, 3.5	0.04				9
Upper wintersberg channel	OCCK	warm	DO#3: 21.2, 22		DR#3: .12	DR#3: 4, 3.9	DR#3: .22	Fran1: 8.10	DO#3: 9.98	EC3: 720uS	DR#3: 13
Upper Bolsa Chaic Channel	OCCK	cold	DO#3: 17.1		DR#3: .43	DR#3: 3.2	DR#3: limit, limit, .10	Fran1: 7.87	DO#3: 5.67	EC3: 1870uS	DR#3: 6
Lower Peters Canyon Channell	OCCK	cold	Therm1: 16.11		DR#3: 1.37, 1.38	DR#3: 8, 8.1	DR#3: limit, limit, .17	PH6: 8.14	K7512: 7	ECH5: 2.1mS	DR#3: 33, 32
Lower Morning Canyon Channel	OCCK	cold	Temp1: 17.22		DR#3: .39, .39	DR#3: 1.5, 1.4	DR#3: .02, .02	PH6: 7.78	K7512: 7	ECH5: 10.5mS	DR#3: 6
Lower Bolsa Chica Canyon	OCCK	cold	Fran1: 19.1		DR#3: .07, .06	DR#3: 2.4	DR#3: .15	Fran1: 8.07	DO#3:	EC3: 1180uS	DR#3: 24,25
Upper Delhi Channel	OCCK	cold	Temp1: 16.11		DR#3: .35	DR#3: 2.0, 1.9, 1.8	DR#3: .07	PH6: 7.84	K7512: 7	ECH5: 2.9mS	DR#3: 7
Lower Delhi channel	OCCK	cold	Temp1: 18.33		DR#3: .16, .15	DR#3: 3.2,3.2, 3.1	DR#3: .30, .30, .30	PH6: 8.0	K7512: 11	ECH5: 2mS	DR#3:
Lower Wintersberg Channel	OCCK	cold	DO#3: 19.9		DR#3: .44, .43	DR#3: 3.6,3.0, 2.8	DR#3: .16	Fran1: 7.74	DO#3: 8.87	EC3: 870uS	DR#3: 14
Lower Buck Gully	OCCK	cold	Temp1: 17.77		DR#3: .25, .25	DR#3:	DR#3: .06, .06	PH6: 8.05	K7512: 9	ECH5: 5.5mS	DR#3: 10, 10

Table 2: Table of Results from Snapshot Day 2005. Values in orange exceed acceptable levels.

Site	Transparency	Instrument ID: Salinity (ppt)	Total Coliform: (MPN/100ml)	Total E. Coli: (MPN/100ml)
Seal Beach		UC6688: 35/1.027	1220	100
Cerritos Channel		UC6688: 35/1.026	11060	310
Peter's Landing		UC6688: 33/1.023	22470	200
San Mateo			6770	200
Poche Creek			>241920	1100
San Mateo xIS			4430	100
Aliso Creek			155310	21420
San Mateo Christianitos			2310	100
San Juan			9600	740
Santa Ana River	52		17260	410
San Diego Creek	8		>241920	10170
San Diego Creek #2				
Big Canyon Creek	>120		9090	100
Big Canyon Creek #2				
Upper Wintersberg Channel			57940	2160
Upper Bolsa Chica Channel			>241920	7030
Lower Peters Canyon Channel			>241920	2750
Lower Morning Canyon Channel			35550	100
Lower Bolsa Chica Channel			196630	6950
Upper Delhi Channel			173290	4130
Lower Delhi Channel			>241920	5610
Lower wintersberg Channel			92080	2180
Lower Buck Gully			13960	410

Figure 1 – Chart of Dissolved Oxygen Levels at Different Locations. Red columns is below acceptable levels; green is acceptable.

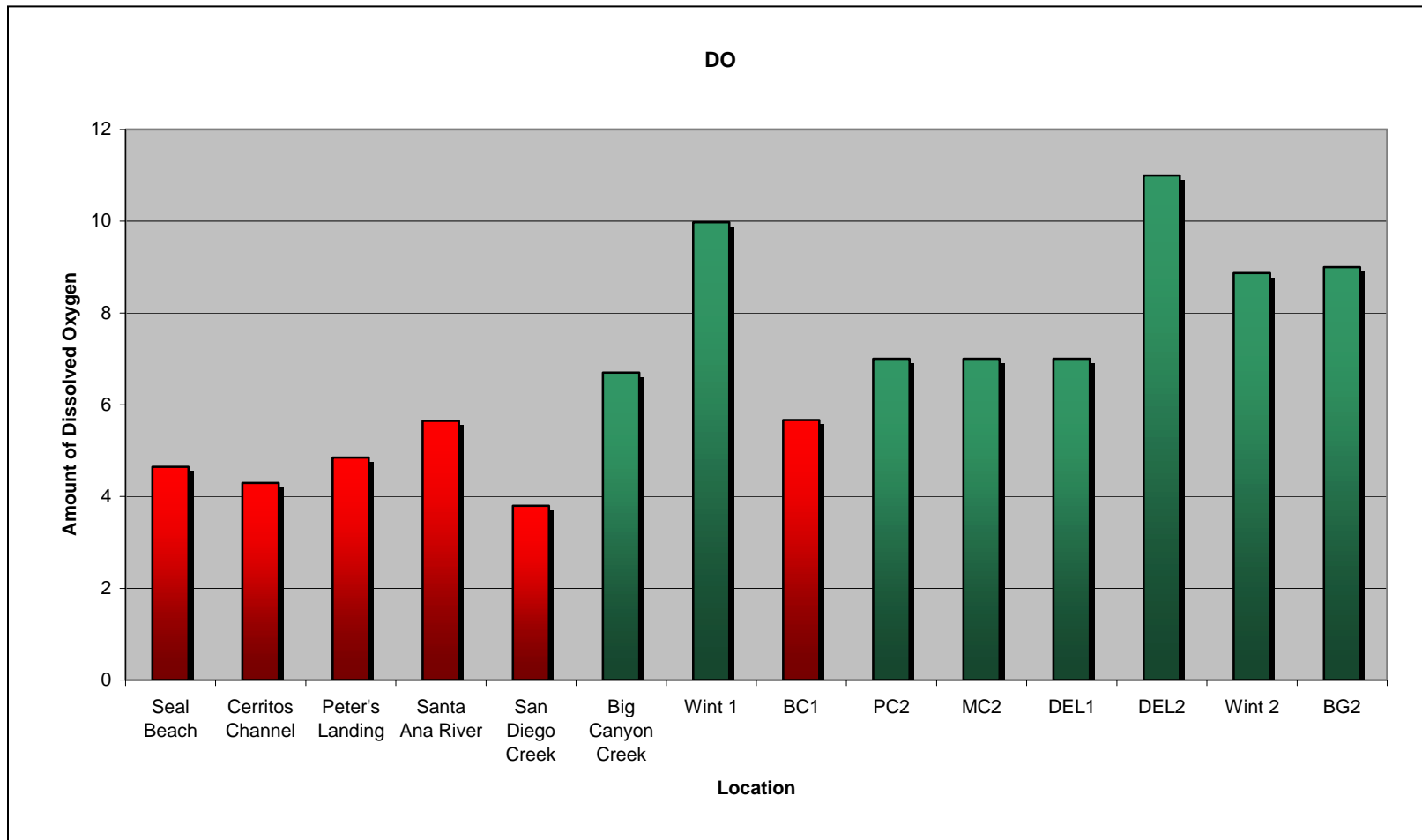


Figure 2 – Amount of Phosphate in Different Locations. Red is exceedence; green is acceptable.

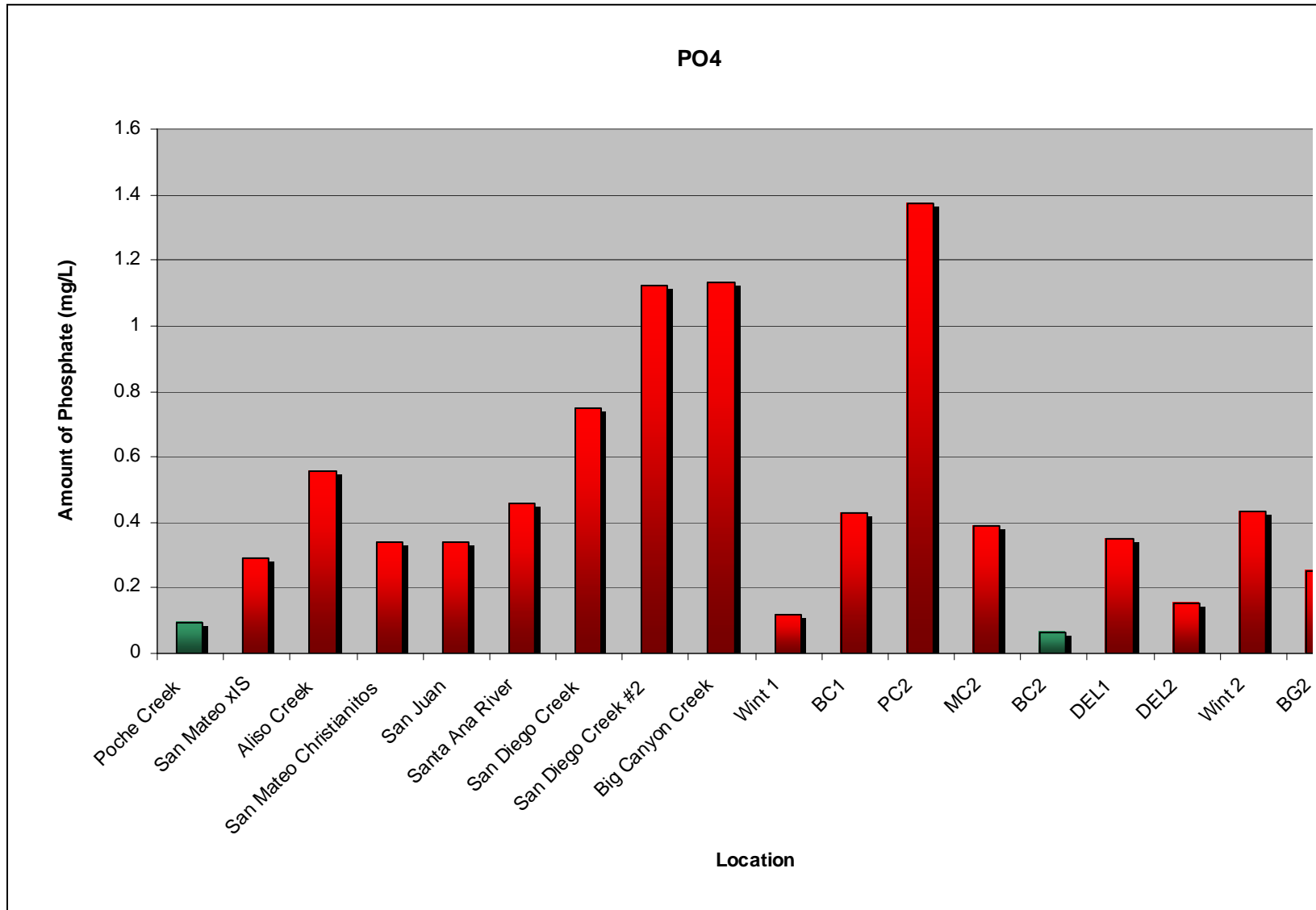


Figure 3 – Ammonia Levels in Different Locations. Red is exceedence; green is acceptable.

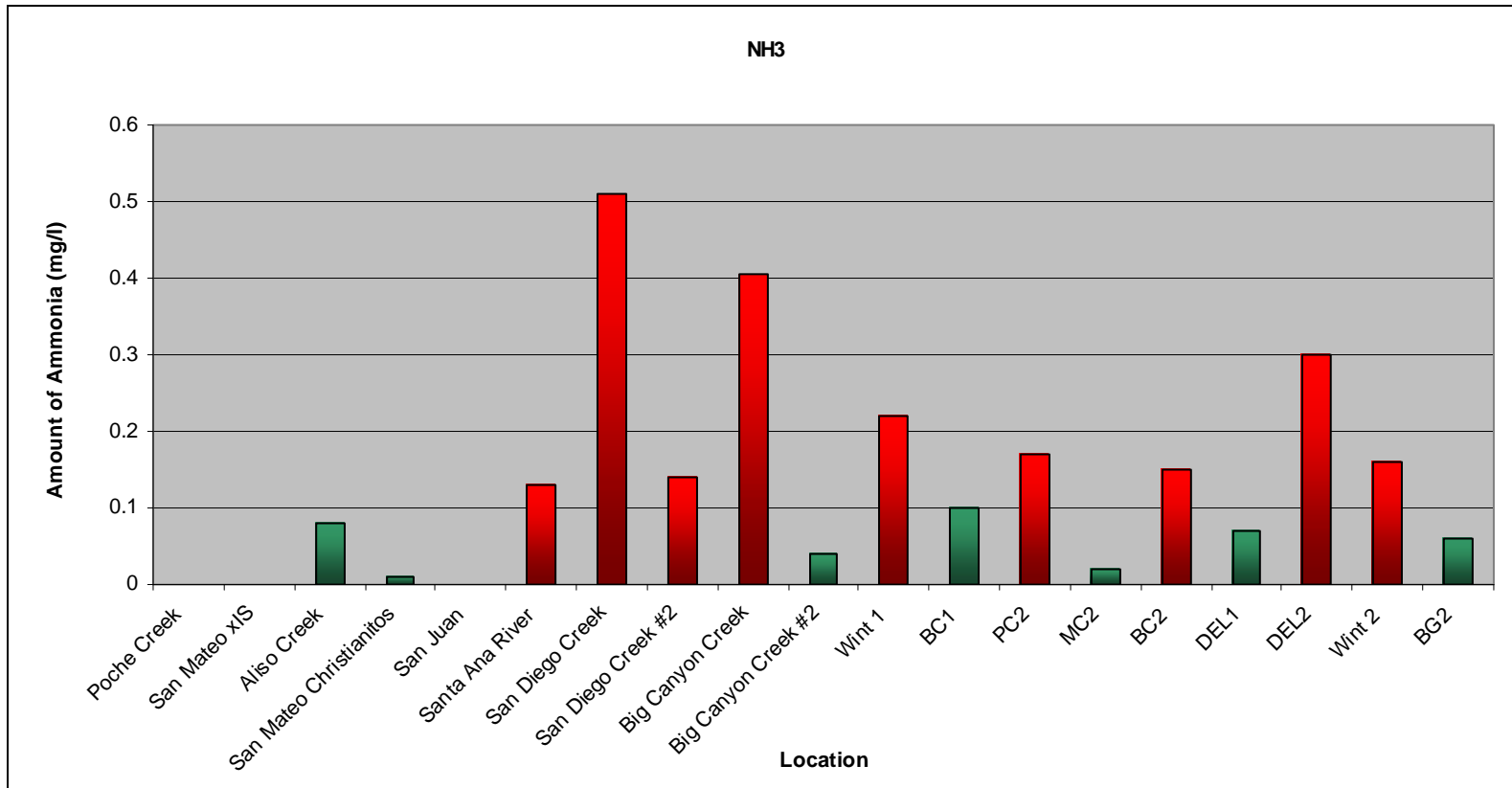


Figure 4 – Amount of E. Coli present in different locations. Red is exceedence; green is acceptable.

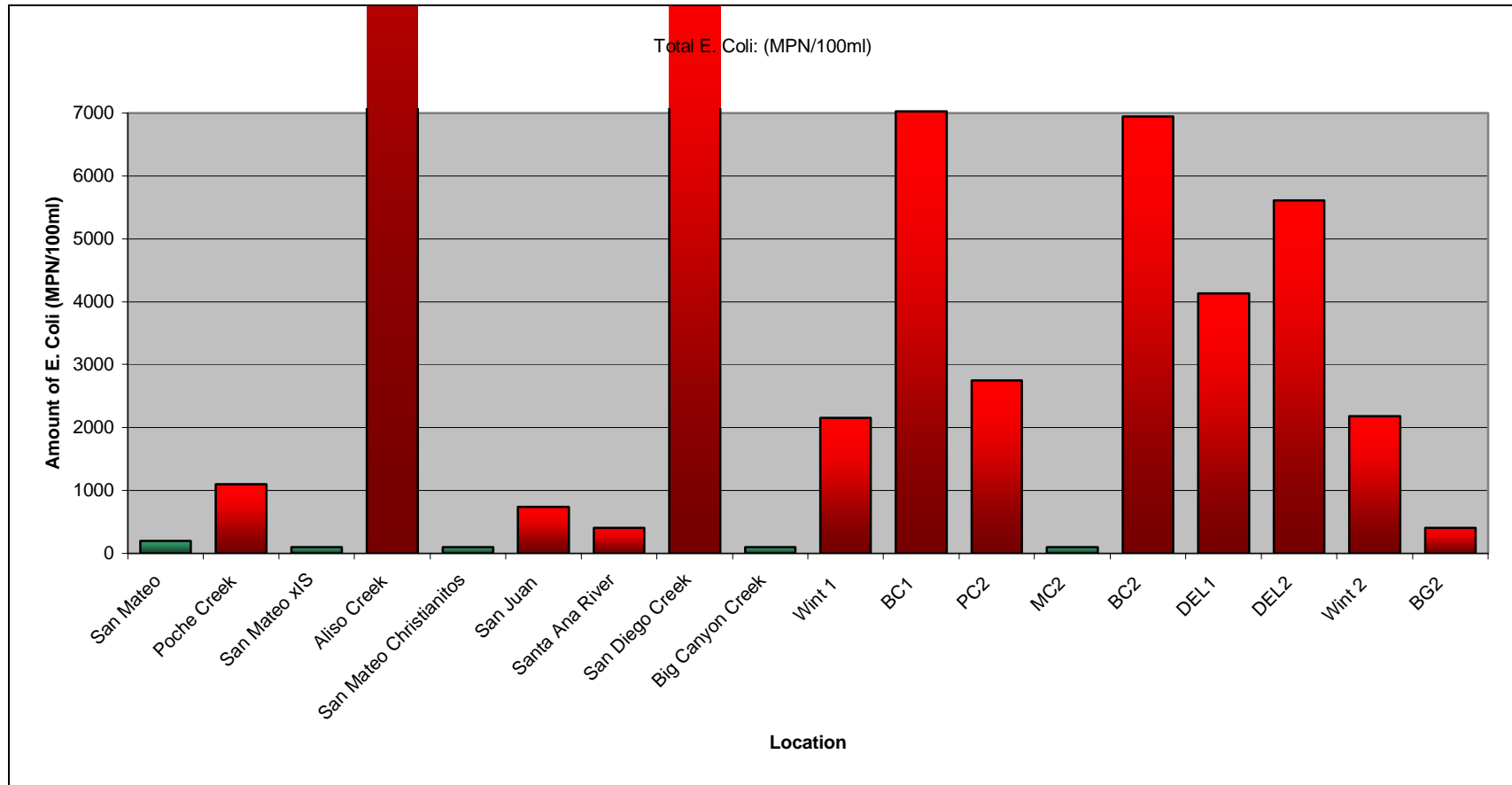


Figure 5 – Total Coliform in different sampling locations. Red is exceedence; green is acceptable.

