Citizen Watershed Monitors of Orange County

Water Monitoring Snapshot Days 2006 Report

Produced By
Orange County Coastkeeper
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Executive Summary

On May 20, 2006, citizens from all over Orange County and the Inland Empire banded together to collect water samples to create a "Snapshot" of water quality in our watershed. During the 24 hours allotted for the sample collection, samples were collected from twenty-four sites on sixteen streams plus three ocean sites. All of the samplers were trained in collecting samples to assure data accuracy. Some of the tests were conducted on site, with the rest being done at the O.C. Coastkeeper laboratory in Costa Mesa. The May event featured a hub location at the Muth Interpretive Center on Upper Newport Bay in Newport Beach. At the hub, volunteers could pick up testing equipment, receive training, and see displays on water quality issues at booths set up by participating members. Guest speaker, Steve Creech, is the coauthor of Wyland's new book "Hold Your Water! 68 Things You Need to Know to Keep Our Planet Blue." After the event the data was analyzed to produce this report. For the event, the samples were collected by members of the Citizen Watershed Monitors of Orange County (CWMOC). 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 has not improved over the years is a 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.

This years monitoring data is different from previous years data in two respects. First this year includes many sites in the Inland Empire along with Orange County sites; previously only Orange County sites were included. Second, in previous years all data reported met state quality control standards. This year, while the bacteria results and the three sites monitored by D.I.V.E.R.S. meet those standards, the rest of the data collected does not meet the quality control the requirements of the State Water Resources Control Board. This is due to the fact that most of the data was analyzed by volunteers using education level monitoring kits produced by Lamotte rather than the more accurate equipment used in previous years. However the data is still representative of the conditions found in the streams monitored and is useful for locating areas for additional monitoring. All groups used the same methodology to collect water samples. Orange County Coastkeeper ran all bacteria tests using quality control methods meeting state SWAMP standards. All tests were conducted within approved time frames to ensure highest possible data quality.

California Snapshot Day and World Monitoring Day are events 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 and the Inland Empire. 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. For more information on water monitoring in Orange County see the Citizen Watershed Monitors of Orange County website at www.cwmoc.org for more information on the Inland Empire monitoring see www.iewaterkeeper.org

Many thanks to the non-profit organizations and local agencies that participated:

- D.I.V.E.R.S. – Divers Involved Voluntarily Environmental Rehabilitation and 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."
- Riverside-Corona Resource Conservation District
- Inland Empire Water Keeper
- Wyland Foundation
- County of Orange (Resource Development and Management Department)
- City of Newport Beach
- City of Costa Mesa

Special thanks to the County of Orange for hosting the California Snapshot Day event at the Muth Interpretive 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

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.

- 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. 63% of the sampled sites tested lower than the minimum acceptable limit for dissolved oxygen.

- 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. The acceptable limit of conductivity is 1000 ms/cm$^{3.}$ all of the samples taken were within the acceptable levels of conductivity.

- 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. 79% of the sampled sites were within the acceptable range of pH. The other 21% exceeded the upper limit.

- 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. All of the sampled sites exceeded the limit of 0.1mg/L.

- Nitrate-Nitrogen – Similar to phosphate, nitrate usually enters through the river system via fertilizer. Thus, it also promotes algae blooms and excessive aquatic plant growth that can suffocate other life. Excess levels of nitrates in drinking water can cause methemoglobinemia or “blue baby” disease. All of the sampled sites are within the acceptable levels of 10mg/L.

- Ammonia-Nitrogen – Excess ammonia can cause harm by accumulating to toxic levels and affecting metabolism. This toxic affect can then harm organisms higher up in the food chain. The acceptable limit of Ammonia- Nitrogen is 0.09 mg/L. 100% of the sites sampled for Ammonia-Nitrogen exceeded the acceptable limit.

- Turbidity – High turbidity levels indicate a large amount of suspended particles in the water. High levels of turbidity create concern since suspended particles are found to carry pollutants. 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. Levels exceeding 100 FAU in fresh water would be considered unusual and would be a level of concern. Only one sampled site exceeded the limit for turbidity.

- *E. Coli* and Total Coliform – High levels of these indicator bacteria imply a high probability of pathogens in the water. Total Coliform comes from a broad range of environmental sources. The presence of *E.coli* indicates recent fecal contamination and can cause severe illness. The acceptable single sample level for *E. Coli* is 236MPN/100ml and the limit of Total Coliform is 10,000 mpn/100ml. 41% of the sampled sites exceeded the limit for *E. coli*. Total Coliform levels which exceeded 10,000MPN/100ml (most probable number) were found at 61% of the sites sampled.

Conclusion:

- Phosphates have been found to exceed acceptable levels in all of the sites. This is contributing to increased algal blooms and depleted dissolved oxygen.
- Ammonia-Nitrogen levels were high at the three sites tested.
- Sampled Nitrate-Nitrogen was within the acceptable level.
- pH tests indicated that pH levels of the majority of sampled sites were within the acceptable limits.
- High bacteria levels are a major problem in many sites. This problem may be rooted in the large amounts of urban runoff form 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 was the fourth 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. These events have 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 and www.coastkeeper.org.

As outlined in the summary above and presented in detail in the tables and graphs on the following pages, the water quality in Orange County's creeks has a long way to go before we can achieve the maximum 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/

Table 1: Table of Results for Snapshot Day May 20, 2006. (Values in orange exceed in acceptable levels.)

Site	Group	Instrument ID: Water Temp. (Celsius)	Instrument ID: Air Temp. (Celsius)	Instrument ID: PO4(mg/l)	PO4 average (mg/L)	Instrument ID: NO3(mg/l)	NO3 Average (mg/L)	Instrument ID: NH3(mg/l)	NH3 average (mg/l)	Instrument ID: pH
SARV 1 (SAR @ Pueblo St.)	SARV	22.2	26.6		4		< 5			8
SARV 2 (SAR @ Market St.)	SARV	24.4	26.1		2		< 5			8
SARV 3 (Springbrook Wash @ Market St.)	SARV	26.1	26.1		4		< 5			9
SARV 4 (University Wash @ Orange St.)	SARV	22.2	21.1		3		< 5			9
SARV 17 (SAR @ Prado)	SARV	25	26.1		4		< 5			8
SARV 18 (Railroad Canyon)	SARV	22.7	30.5		2		< 5			8
SARV 6 (Sycamore Creek @ Castleview Park)	Inland Empire Water Keeper (IEWK)	21	28		2		< 5			8
SARV 7 (Sycamore Creek @ Andulka Park)	IEWK	22	27		2		< 5			8
SARV8 (Allessandro Arroyo @ Corinthian and Barry Rd.)	IEWK	20	24		2		2.5			8

Site	Group	Instrument ID: Water Temp. (Celsius)	Instrument ID: Air Temp. (Celsius)	Instrument ID: PO4(mg/l)	PO4 average (mg/L)	Instrument ID: NO3(mg/l)	NO3 Average (mg/L)	Instrument ID: NH3(mg/l)	NH3 average (mg/l)	Instrument ID: pH
SARV 16 (Temescal Wash @ Lincoln)	IEWK	28	36		2		5			10
SARV 9 (Prenda @ Bradly and West Park)	RCRCD	22	25		4					8.5
SARV 11 (Mockingbird Canyon)	RCRCD,	24	26.1		3					8.5
SARV 13 (La Sierra Creek @ Lion Ave.)	RCRCD	22	26.6		3					8.5
SARV 19 (SAR @ Anza Narrows Outfall, Martha McClain Park by railroad bridge)	RCRCD	20	20.5		3					8
SARV 20 (Van Buren Outfall, believed to be multiple creeks: Allessandro, Prenda, Mockingbird)	RCRCD	22	23.8		2					8
23RD St. Storm Drain	Aloha Team				2		<5			8
Del High	Serrano Water / Wave Watcher Team David	27			1.5		2			PH 6 7.7
Lower Aliso Creek	Valerie Risner	20			2					8
Strands Beach	Valerie Risner	20			2					8

Site	Group	Instrument ID: Water Temp. (Celsius)	Instrument ID: Air Temp. (Celsius)	Instrument ID: PO4(mg/l)	PO4 average (mg/L)	Instrument ID: NO3(mg/l)	NO3 Average (mg/L)	Instrument ID: NH3(mg/l)	NH3 average (mg/l)	Instrument ID: pH
San Diego Creek	Divers	TB-SCMI-19 22	TB-SCMI-19 18	COL-SCMI-03	0.21	LAMOTTE Kit	1.5	COL-SCMI-03	0.54	PHEL-SCMI-19 8.0
Big Canyon Creek	Divers	TB-SCMI-19 19.5	TB-SCMI-19 21	COL-SCMI-03	1.24	LAMOTTE Kit		COL-SCMI-03	0.21	PHEL-SCMI-19 7.6
Santa Ana River	Divers	TB-SCMI-19 22.0	TB-SCMI-19 19	COL-SCMI-03	1.76	LAMOTTE Kit	1	COL-SCMI-03	0.4	PHEL-SCMI-19 8.8
Upper Aliso Creek	Valerie Risner									

Table 2: Table of Results from Snapshot Day May 2006. (Values in orange exceed acceptable levels.)

Site	Instrument ID: DO(mg/l)	Average DO (mg/l)	Instrument ID: EC(ms/us)	Average EC (uS)	Instrument ID: Turbidity	Transparency	Instrument ID: Salinity (ppt)	Total Coliform: (MPN/100ml)	*Total E. Coli*: (MPN/100ml)
SARV 1		8						2650	100
SARV 2		8		600				7980	300
SARV 3		4		530		0		141360	13500
SARV 4	Field Trip Kit	8	Oakton Probe	520				241920	1200
SARV 17		8		900				8820	100
SARV 18		8		880				5390	<100
SARV 6		0-4			0 JTU			15390	100
SARV 7		0-4			40 JTU			30760	100
SARV8		4			0 JTU	0		26020	410
SARV 15		0			40 JTU			3890	100
SARV 16		0			100 JTU			<100	<100
SARV 9		2			20 JTU			41060	4100
SARV 11		8						23590	100
SARV 13		2			0 JTU			111990	3320
SARV 19		2			10 JTU			26130	310
SARV 20		2			40 JTU			29090	200
23RD St. Storm Drain		1			40 + JTU			no data	no data
Del High		7.84						no data	no data
Lower Aliso Creek		4						1780	3100
Strands Beach		2			20 JTU 100 + JTU			>241920	12200
Salt Creek		4			0 JTU			5200	<100
San Diego Creek	COL-SCMI- 03	6.4			TUN-SCMI-02 7.2 NTU	48.25	SPER 30001115	27550	<100
Big Canyon Creek	COL-SCMI- 03	4.5			TUN-SCMI-02 1.6 NTU	>120	SPER 300011 4	<100	<100
Santa Ana River	COL-SCMI- 03	10.65			TUN-SCMI-02 5.55	61	SPER 300011 5	34480	0
Upper Aliso Creek		8						29870	No data

Figure 1 – Amount of *E. Coli* present in different locations, from Snapshot Day May 2006.
(Orange is exceedence; blue is acceptable.)

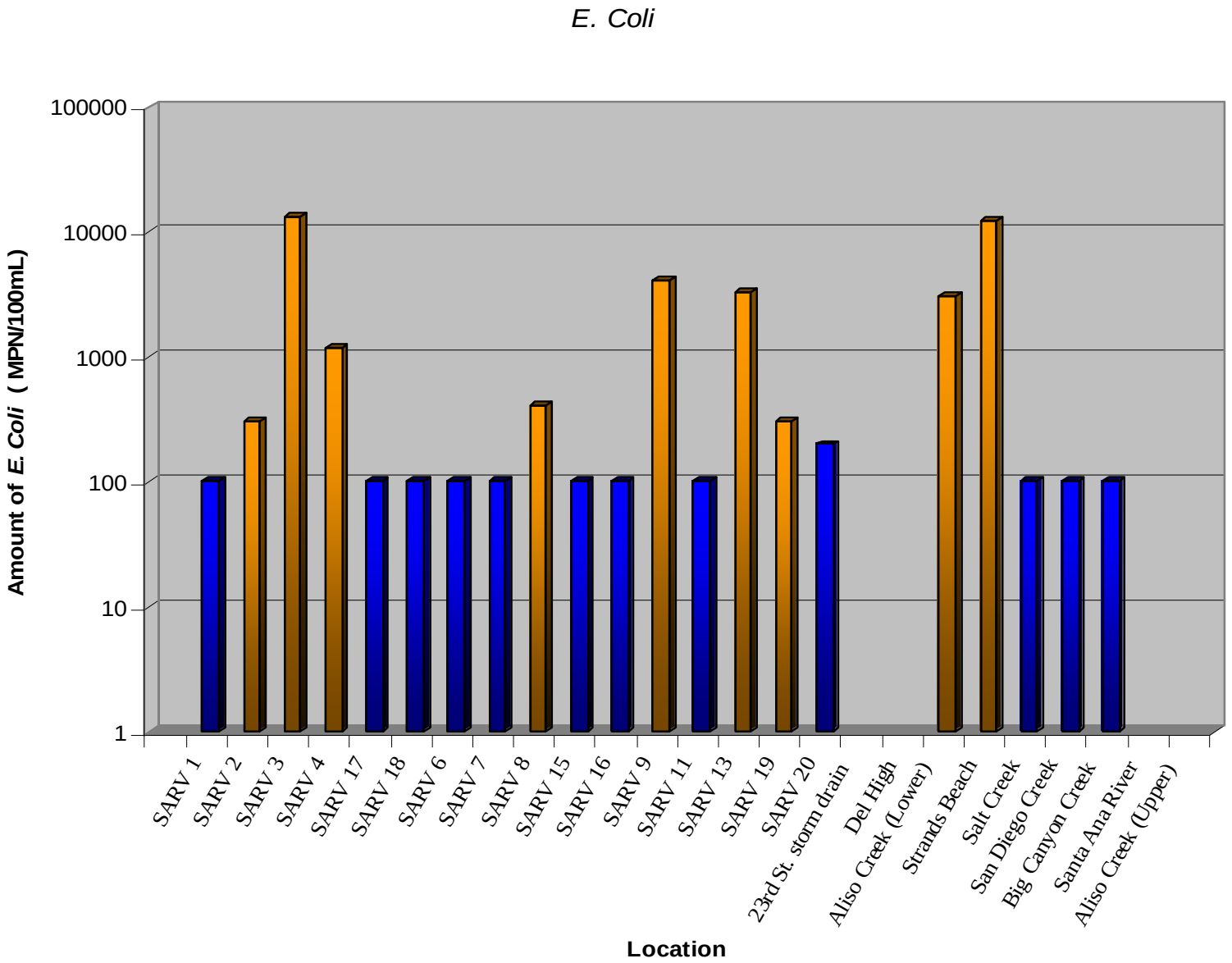

Figure 2 – Total Coliform in different sampling locations. Figures from Snapshot Day May 2006. (Orange is exceedence; blue is acceptable.)