

**PERFORMANCE OF A CALIFORNIA
STORMWATER POND
Heron Bay**

By

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PERFORMANCE OF A CALIFORNIA STORMWATER POND 2004

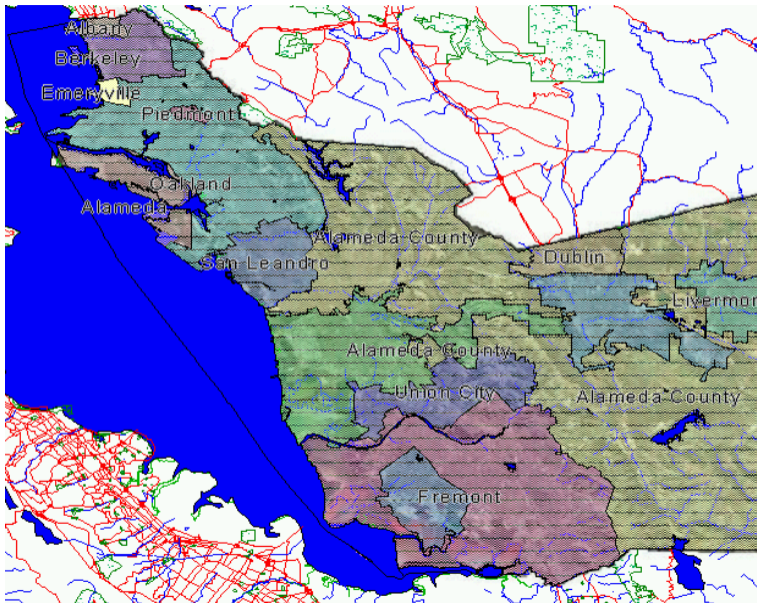
ABSTRACT

- Documentation of the performance of California wet ponds may increase utilization of these systems within semi-arid climates.
- Heron Bay Pond documented ability of a wet pond to remove stormwater pollutants from a new residential development.
- Twenty-eight storms were successfully monitored over two complete wet seasons from September 2002 through August 2004.

Story of the Pond

The following slides tell the HBP story:

1. Site Location & Development
2. Inspection
3. Maintenance
4. Performance Results







STORMWATER POND

This state-of-the-art pond, part of the Alameda County Flood Control District, collects water from urban runoff. The water is retained here, allowing contaminants such as oil, household chemicals and pesticides to filter out before the water is returned to the bay.

YOU CAN HELP

- 1. There are simple steps you can take to help make the bay cleaner.*

06 16 2004



INSPECTION

 NO DUMPING!
DRAINS TO BAY 

11 20 2003











06 18 2003



08 28 2003

MAINTENANCE



12 10 2003

















10 07 2004









The Big QUESTION:

DOES THE POND WORK ?

OR

A BETTER QUESTION

HOW WELL DOES IT WORK ?





PERFORMANCE RESULTS

PERFORMANCE OF A CALIFORNIA STORMWATER POND

ABSTRACT

- Heron Bay Pond showed a statistically significant positive efficiency throughout the observed range of performance for most of the constituents measured.
- Pollutant removal efficiencies were high and comparable to performance reported in other published studies.
- This project documented the value of a wet pond system in a new residential development in a semi-arid climate to reduce stormwater pollution.

PERFORMANCE RESULTS

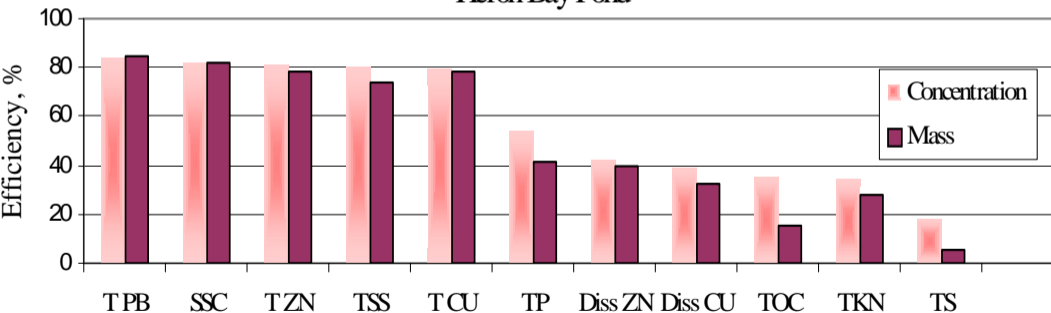
Constituent	Influent Concentration mg/L	Effluent Concentration mg/L	Removal Efficiency %
SSC	196	34	82
TSS	94	19	80
TS	366	299	18
TKN	1.2	0.81	34
NO3	0.56	0.74	-32
TP	0.33	0.15	54
TOC	8.3	5.4	35
T CU	0.0033	0.0007	79
T PB	0.0015	0.0002	84
T ZN	0.0192	0.0036	81
Diss CU	0.0048	0.0029	39
Diss ZN	0.0035	0.00203	42

MASS REMOVAL EFFICIENCY **

Constituent	Influent Lbs	Effluent Lbs	Mass Reduction %
SSC	14,598	2,598	82
TSS	3,323	866	74
TS	25,631	24,331	5
TKN	60.47	43.78	28
NO3	34	52	-53
TP	17	10	41
TOC	127	108	15
T CU	2.7	0.6	78
T PB	1.15	0.16	85
T ZN	15.4	3.4	78
Diss CU	0.36	0.24	32
Diss ZN	2.94	1.76	40

**** Monitored Storms**

Figure 3. Concentration vs Mass Removal Efficiency
Heron Bay Pond



DATA ANALYSIS METHODOLOGY

- Statistical efficiency (SE) has been recommended as a standard rating curve for the stormwater industry
- SE provides the ultimate measure of BMP performance: Effluent Water Quality
- SE fully describes the statistical distribution of water quality Influent AND Effluent; & determines if differences in water quality are statistically significant

Figure 1. Zinc Probability Plot
Heron Bay Pond

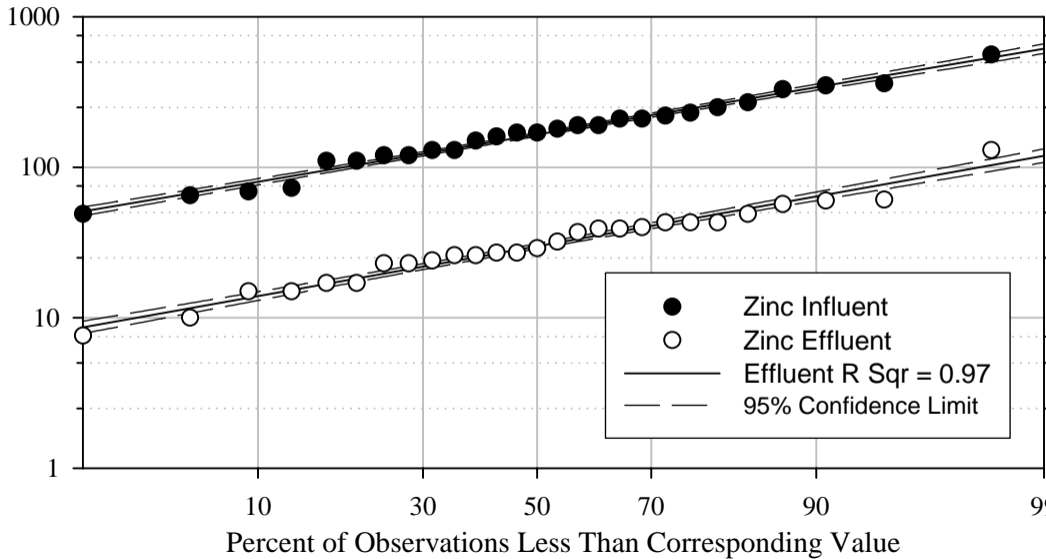


Figure 2.
SSC Probability Plot
Heron Bay Pond

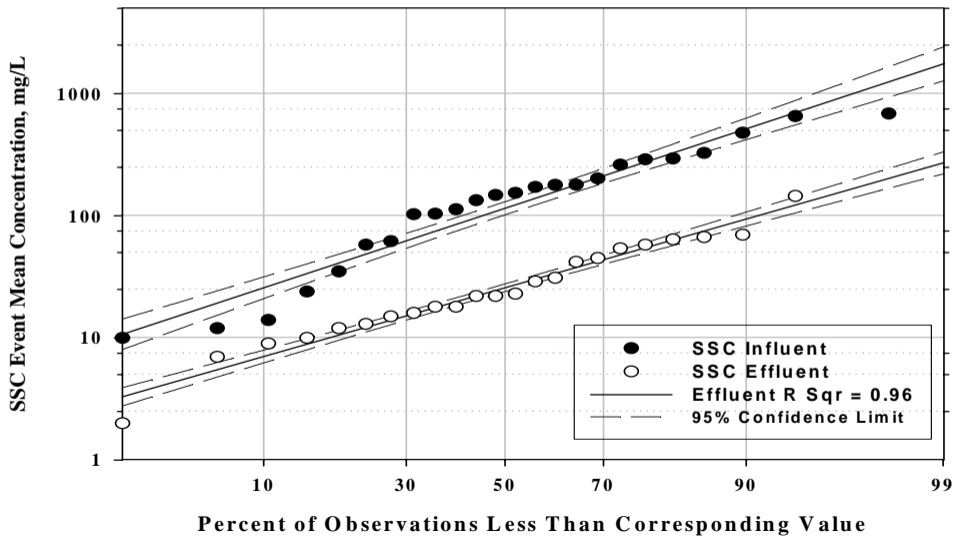
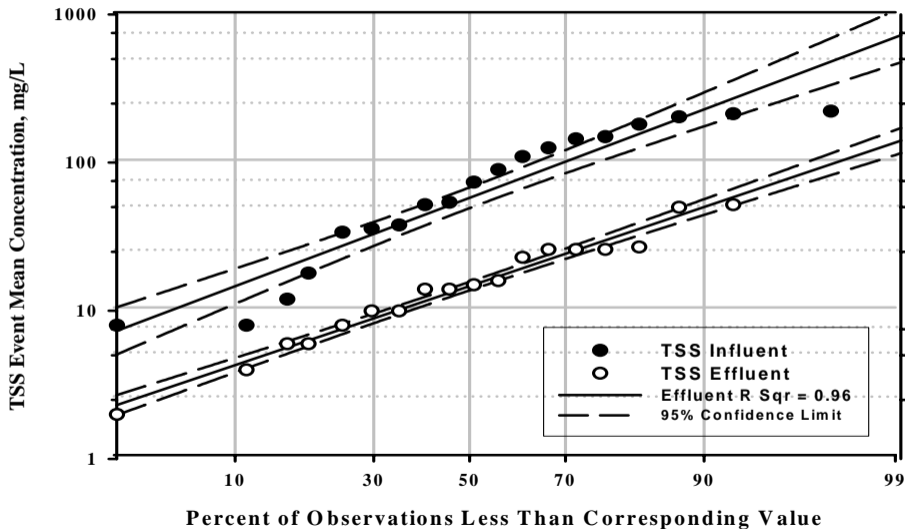
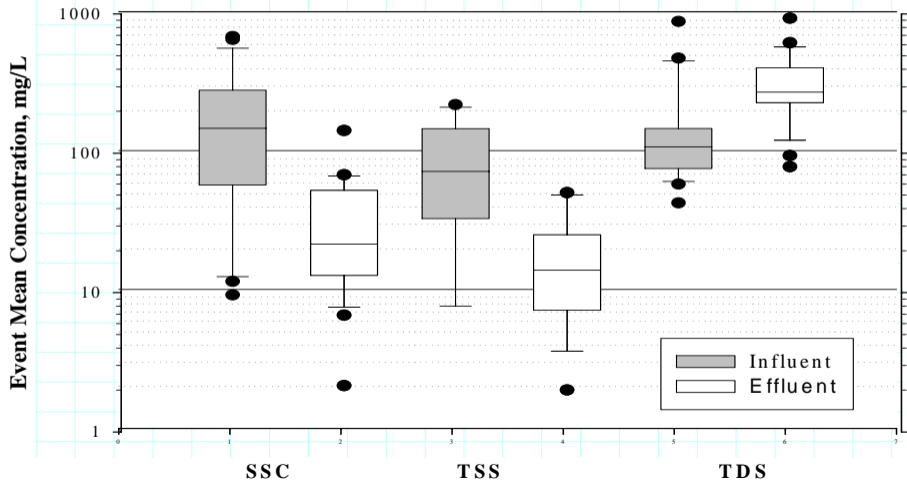


Figure 3. TSS Probability Plot Heron Bay Pond



HERON BAY POND

Box Plot Comparison of Solids Concentration



Dissolved Copper Heron Bay Pond

Dissolved Cu Event Mean Concentration, ug/L

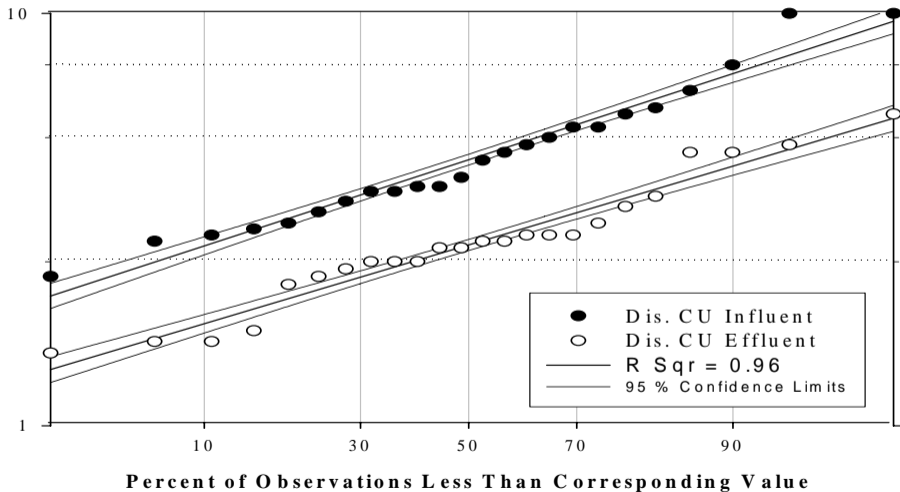
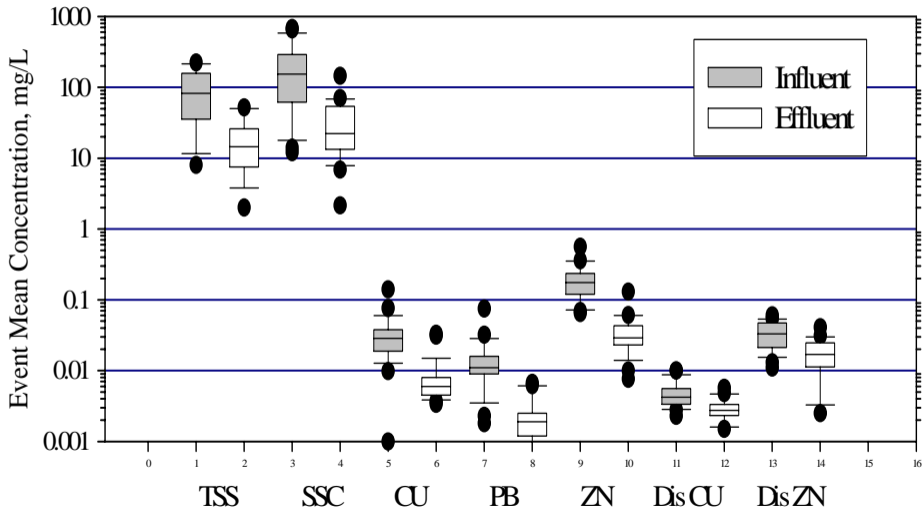
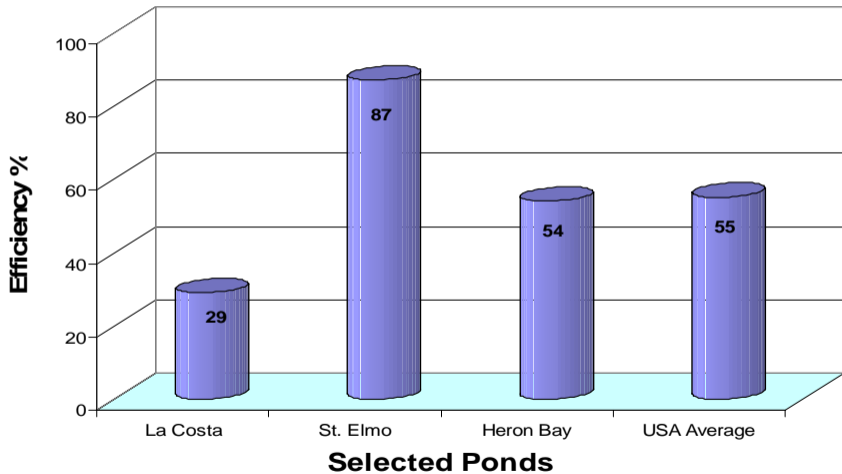


Figure 2. Solids & Metal Removal Efficiency

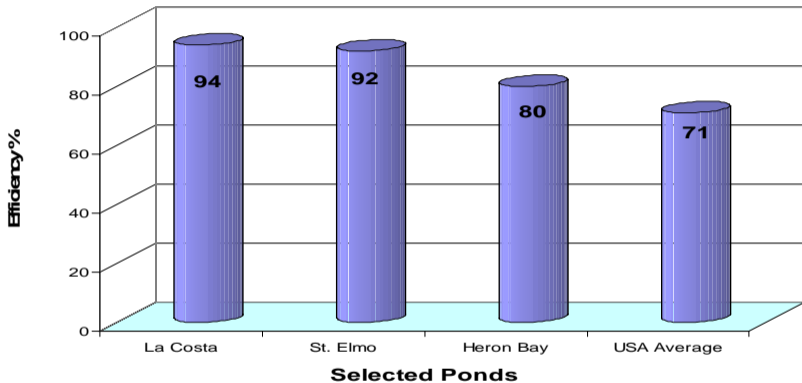
Heron Bay Pond



PERFORMANCE COMPARISON of PONDS Total Phosphorus



PERFORMANCE COMPARISON of PONDS Total Suspended Solids



	La Costa	St. Elmo	Heron Bay
Pond Area as % of Drainage Area	15	6	1





SO, HOW WELL DOES IT WORK?

- By any measure, Heron Bay Pond works quite well
- Well-designed wet ponds in semi-arid climates can significantly reduce stormwater pollution in residential development

FUTURE IMPLICATIONS?

1. Heron Bay Pond has advanced the Scientific State of Knowledge showing that wet ponds can work well in semi-arid climates, e.g. California
2. Developers, regulators & engineers may increasingly be asked to develop capital improvement projects that provide quantifiable pollutant reduction to meet regulatory compliance
3. If environmental controls are to work then Inspection & Maintenance will continue to be necessary