

## **Final Report**

# **Laguna Beach Heisler Park ASBS Protection Preservation Project Phase II Clean Beaches Initiative Grant**

Proposition No. 50  
Grant Agreement No. 07-572-550-1

Clean Beaches Initiative Program

Prepared by:  
Will Holoman, Senior Water Quality Analyst  
Water Quality Department  
City of Laguna Beach  
505 Forest Avenue  
Laguna Beach, California  
92651  
wholoman@lagunabeachcity.net

April 2010

***Contents***

B – Introduction..... 4

C – Construction Details..... 6

D – Monitoring Plan..... 13

    Table 1: Bacteria Methods ..... 14

    Table 2: Monitoring Site Locations (GPS):..... 15

    Map 3: Monitoring Site Locations ..... 16

E – Discussion ..... 17

    Graph 1 ..... 17

    Graph 2 ..... 18

    Graph 3 ..... 18

    Graph 4 ..... 19

    Graph 5 ..... 20

    Graph 6 ..... 21

    Graph 7 ..... 22

    Graph 8 ..... 23

E – Conclusion ..... 23

G – Additional Data..... 24

## A – Executive Summary

Funding for this project has been provided in full or in part through an agreement with the State Water Resources Control Board. The contents of this document do not necessarily reflect the views and policies of the State Water Resources Control Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

Heisler Park is the most popular public park in Laguna Beach due to its blufftop location adjacent to Main Beach in downtown. Heisler Park was originally designed to drain directly to the ocean through its subterranean storm drains and sheet flows on the surface. The objective of the original design was to capture runoff and move it offsite (to the beach) as quickly as possible. Drainage systems of this sort not only move water but also pollutants such as fertilizer, pesticides, trash, sediment and hydrocarbons directly to receiving waters.

Heisler Park also had two aging public restroom facilities, one of which was located at a lower elevation than the connected sewer main and therefore housed a lift station. Because of their outdated mechanical equipment and pumps, these restrooms represented a threat to public health as a source of human sewage discharge to the ocean when the sewer main overflowed.

The objective of the Heisler Park Project is to reduce the amount of bacteria reaching the adjacent ocean by promoting infiltration through Low Impact Development (LID) design principles, routing dry weather nuisance flows and flows from small storm events through treatment control Best Management Practices (BMPs) and diverting any remaining nuisance flows to the sanitary sewer system. Nuisance flows are reduced by incorporating Smarttimers, low flow sprinkler heads and irrigation system improvements throughout the project area. The aging restroom facilities and integrated lift station have been replaced entirely to preclude sewer spills. The predicted outcome of this project is the reduction of bacteria levels in the ocean by the reduction of flow from the project area to the receiving waters during non-storm and small storm conditions.

The Heisler Park Project is expected to produce long-term positive impacts in the adjacent waters of the Pacific Ocean. The data analyzed for the Phase II final report spans only one year after construction. This report is the first of three reports which will look at the long term benefits of the park improvements. The other two reports will be produced for Phases I and III, funded by the IRWM and ASBS Grant programs, respectively, as these grants are completed over the next one to five years. The long term study of the positive impacts of the improvements to the park will better characterize the overall effectiveness of Phase II combined with the other two construction phases.

The completion of the Heisler Park Protection and Preservation Project Phase II in Laguna Beach using CBI funds has had tangible positive effects on ocean water quality, sewer spill prevention, beach closure prevention and water use. The project has met the goals of reducing bacteria levels in the receiving waters and reducing water use in the landscaped areas of the Park. The reconstruction of the restrooms has resulted in no sewer spills being reported in the Park and no beach closures attributable to the Park

since project completion. All conclusions reached within this report are based on one year's data. The monitoring program for this project will continue into the foreseeable future.

## ***B – Introduction***

Laguna Beach, CA is a world renowned tourist destination which offers incredible opportunities for water and land based recreation. Popular aquatic activities include diving, surfing, tidepool exploring and swimming. Picnicking, wedding ceremonies, walking, photography and painting are but a few of the land based activities indulged in by residents and tourists.

Heisler Park is the most popular public park in Laguna Beach due to its blufftop location adjacent to Main Beach in downtown. The ocean fronting Heisler Park has been designated an Area of Special Biological Significance (ASBS) by the State Water Resources Control Board due to the abundance of life in the tidepools and nearshore environment. ASBS require the highest level of protection from pollutants discharged from inland sources through storm drains and non-point sources.

The baseline conditions in the Heisler Park ASBS are of elevated bacteria levels partially attributable to anthropogenic sources. The ocean at this location is on the Environmental Protection Agency's 303(d) list of impaired water bodies for elevated bacteria levels. A likely source of bacteria along the coastline is drainage from adjacent developed areas.

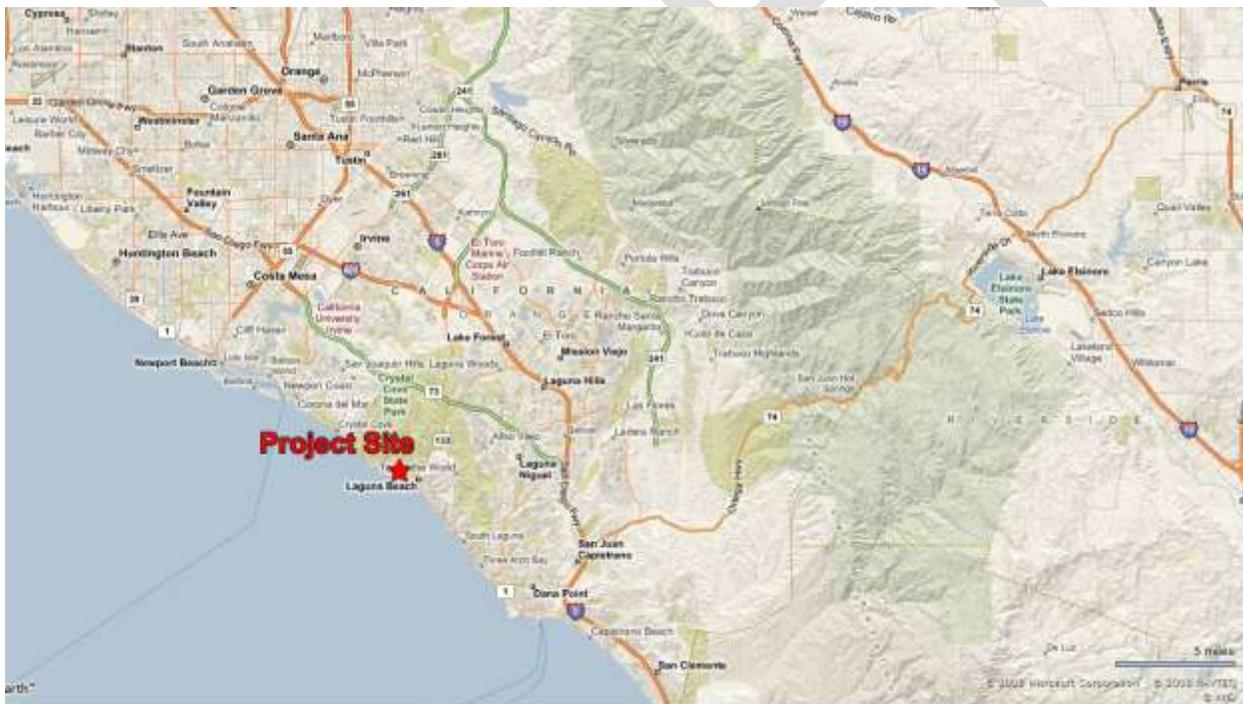
Heisler Park was originally designed to drain directly to the ocean through its subterranean storm drains and sheet flows on the surface. The objective of the original design was to capture runoff and move it offsite (to the beach) as quickly as possible. Drainage systems of this sort not only move water but also pollutants such as fertilizer, pesticides, trash, sediment and hydrocarbons directly to receiving waters. Nutrients contained in runoff may spawn algal and bacterial blooms in the ASBS. Runoff was allowed to uncontrollably flow over the cliff face causing severe erosion in some areas which deposited sediment on sensitive marine organisms living in adjacent tidepools. Landslides and rockfalls were commonplace along the bluffs of Heisler Park. Nuisance flows generated during dry weather by human activities such as irrigation general park use were conveyed directly to the ocean by storm drains.

Heisler Park also had two aging public restroom facilities, one of which was located at a lower elevation than the connected sewer main and therefore housed a lift station. Because of their outdated mechanical equipment and pumps, these restrooms represented a threat to public health as a source of human sewage discharge to the ocean when the sewer main overflowed.

The objective of the Heisler Park Project is to reduce the amount of bacteria reaching the adjacent ASBS by promoting infiltration through Low Impact Development (LID) design principles, routing dry weather nuisance flows and flows from small storm events through treatment control Best Management Practices (BMPs) and diverting any remaining nuisance flows to the sanitary sewer system. Nuisance flows are reduced by incorporating Smarttimers, low flow sprinkler heads and irrigation system improvements throughout the project area. The aging restroom facilities and integrated lift station have been replaced entirely to preclude sewer spills. The predicted outcome of this project is the reduction

of bacteria levels in the ocean by the reduction of flow from the project area to the receiving waters during non-storm and small storm conditions.

The BMPs and LID principles implemented include site design, treatment and diversion. The site design BMP is the regrading and recontouring of the land within the project boundaries to direct storm flows away from the beach. The innovative site design includes tilted pathways, contoured swales and terraces built with retaining walls and curbs to contain sediments and push surface flows into the treatment control BMPs. Smarttimers, water efficient sprinkler heads and drought tolerant vegetation reduce nuisance flows by reducing on-site water waste. The treatment control BMPs are vegetated areas where flows will infiltrate for plant use and be filtered through vegetation to remove nutrients, trash and bacteria. A sump and pump are built into the collector storm drain at Picnic Beach to divert nuisance flows into the diversion unit at Myrtle Street where flows enter the sewer system. Flows which overwhelm the capacity of the treatment control BMPs will enter the subterranean drain system, then flow into a sump where a pump will divert the water to the wet well in the Picnic Beach restroom. The combination of BMPs and the diversion should be adequate to handle all flows but major rain events.



Map 1 – Location Map



Map 2 – Site Maps

The CBI Project’s budget totaled \$2,100,000 of which \$1,000,000 was provided through the CBI grant program. The City of Laguna Beach committed over \$1,100,000 in matching cash and in-kind labor. Project construction took place in the winter of 2007-2008. The rededication ceremony for Heisler Park was held on July 1, 2008.

### ***C – Construction Details***

The CBI funded project is Phase II of a three phase project which completely renovates Heisler Park from Main Beach to Fisherman’s Cove. Phase I was completed using grant funding from the Integrated Regional Water Management Program and included improvements in the Rockpile Beach area of the Park (refer to Map 2). CBI funded Phase II included improvements in the Picnic Beach area of the Park and the construction of two restroom facilities, one at Picnic Beach and one at Rockpile Beach. Improvements fall into 5 basic categories:

- 1) Restroom/lift station rebuild.

The two public restrooms at Heisler Park were rebuilt to replace aging existing facilities which posed a significant threat of failure and subsequent sewer spillage. A sewer spill in this heavily used beach area could have major impacts on human health due to elevated bacteria levels in the ocean. The marine habitat could also be negatively affected by the influx of organics and nutrients found in sewage. Clean and sanitary public restrooms may prevent individuals from using the ocean or surrounding park areas as toilets. The Picnic Beach restroom also contains a small lift station which pumps uphill to the main line. Rebuilding this lift station to provide more reliable service and adding fail-safe’s to prevent backflow from the main further mitigates the risk of spills.



Photo 1 – Rockpile restroom before construction.



Photo 2 – Rockpile restroom after construction.



Photo 3 – Picnic Beach restroom and lift station before construction.



Photo 4 – Picnic Beach restroom and lift station after construction.

## 2) Low Impact Design (LID) site design BMPs.

Phase II implemented a number of LID site design BMPs including bioswales, disconnection of storm drains, tilted pathways and infiltration zones to give both nuisance water flows and storm water flows a chance to infiltrate on site prior to entering the storm drain system. The benefits of this approach to drainage include elimination of trickling dry weather flows into the storm drains, maximization of onsite capture of storm water flows prior to discharge, biofiltration of all flows and utilization of flows to optimize irrigation efficiency.



Photo 5 – Bioswale terraces capture flow for biofiltration and infiltration.



Photo 6 – Pathways and surrounding terrain are tilted toward a depressed bioswale for infiltration.



Photo 7 – All Storm Drain inlets are disconnected from other hardscape to promote infiltration.

### 3) Smarttimer, irrigation and landscaping.

Phase II landscaping improvements include replacing all irrigation lines and heads within the project area with new equipment, converting the existing timer clocks to satellite controlled Smarttimer irrigation clocks and replanting graded areas with water-wise and native plants where appropriate. The improvements to the irrigation and landscaping help prevent excess runoff by reducing water waste through leaks and over irrigation.



Photo 8 – SmartTimer irrigation controller with antennae on top, water-wise plants in landscaped area.

### 4) Bluff erosion control and drainage improvements.

The bluffs along the coast of Heisler Park were eroding rapidly due to increased sheet flows and point source discharges from both paved and landscaped areas. Wet weather events caused rapid erosion but nuisance dry-weather flows also contributed to the problem. Besides acute dangers from collapsing hillsides and rockfalls, the long term effects of sedimentation in the ASBS could be profound. Phase II addresses excess erosion of the bluffs by redirecting surface flows into bioswales for infiltration using a curb and walkway along the blufftop for conveyance.



Photo 9 – Curb and tilted pathway push sheet flows to the grassy area for infiltration.



Photo 10 – The curb and pathway prevent sheet flows from eroding the blufftop.

#### 5) Park drainage diversion.

The final safety net for nuisance flows and small storm events is the diversion unit built into the storm drain system for the park. Water which enters the hard lines flows down to a sump located on the Picnic Beach ramp. The sump is then pumped to the diversion unit at Myrtle Street where the nuisance storm flows are sent to the sanitary sewer system. Storm drain diversions are likely the single most effective method of keeping polluted water from entering the ocean.



Photo 11 – The sump and diversion pump reside under this metal lid on the Picnic Beach ramp.

### ***D – Monitoring Plan***

The goal of the monitoring program is to quantify the amount of bacteria and water treated through the BMPs and diverted from the beach. The method utilized to meet the monitoring goal is the analysis of bacteria data in the adjacent receiving waters of the Pacific Ocean. Site water consumption may also be assessed with water meter data from meters serving the park.

#### Sampling Information

The City of Laguna Beach coordinated all monitoring activities for this project. Water meter, bacteriological and beach closure data are of primary interest in the assessment of the project due to data collection limitations. Post-construction data was compared to five years of pre-construction ocean bacteria and water flow data to form a comprehensive picture of pre- and post-construction conditions.

Monitoring was scheduled to take place at the diversion unit located just upstream of the Fisherman’s Cove storm drain outlet. This diversion unit was not installed as part of the Phase I project as intended, therefore, the monitoring did not take place.

Bacteriological and flow monitoring scheduled to take place in the sump located at the top of the ramp to Picnic Beach was likewise unavailable due to unforeseen conditions. This sump represents the culmination of all subterranean drain lines within the northern section of the project prior to discharge onto the beach and is the point at which flows are diverted to the sewer. The plan to put a counter on the pump to record pump cycles was not feasible once the installation was completed and inadequate water was found in the sump for bacteriological sampling. The inherent dryness of the sump to some degree speaks to the effectiveness of BMPs and irrigation improvements upstream.

Because the benefits of infiltration and site design BMPs are difficult to assess using typical flow and sampling techniques, and the benefits of Smarttimers and irrigation improvements must be quantified, the water meter data for Heisler Park will be used to compare water usage pre- and post-construction. Water meter data at Heisler is collected annually and must be reduced to daily averages.

Rainfall data was collected and compared to bacteria levels in the receiving waters.

All data were taken over a period of one year post-construction, then analyzed with the goal of assessing the overall bacteria reduction realized in the receiving waters with Park improvements. The focus of the Monitoring Plan has shifted to the receiving waters based on data availability and quality as well as regional implementation goals.

Pre- and post-construction water samples use the following methods to determine bacteria levels:

Table 1: Bacteria Methods

Parameter	Method/range	Units	Detection Limit*
Total coliform – water matrix	SM 9222-B	CFU/100 ml	1
Fecal coliform – water matrix	SM 9222-D	CFU/100 ml	1
Enterococcus – water matrix	SM 9230-C	CFU/100 ml	1

The County of Orange monitors the bacteria levels in the ocean at key locations adjacent to the park. Data from these ongoing monitoring efforts, as well as beach closure data, were analyzed for one to five years prior to and one year post-construction.

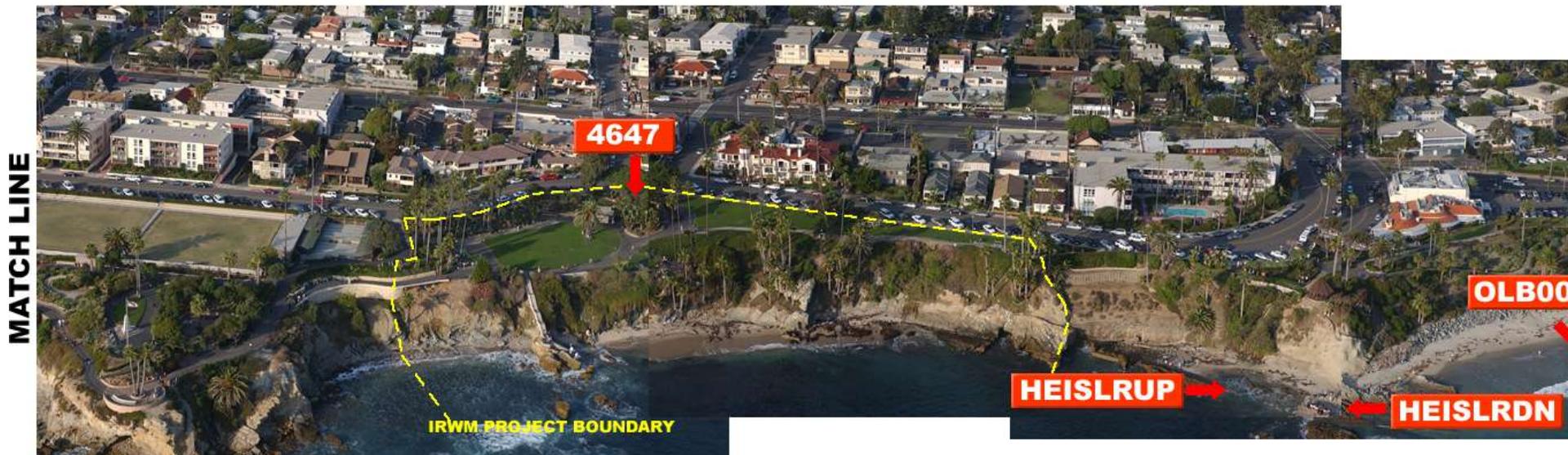
Geographical Information

Heisler Park is located along the Pacific Ocean shoreline immediately northwest of Main Beach in Laguna Beach. The coordinates for the project site are approximately: 33d32’38”N, 117d47’32”W.

Table 2: Monitoring Site Locations (GPS):

Site ID	Site Name	Parameters	Latitude	Longitude
OLB00	Main Beach	Bacteria	33d32'31.97"N	117d47'11.77"W
OLB05	Heisler Park North	Bacteria	33d32'42.85"N	117d47'45.39"W
HEISLRUP	Heisler Upcoast	Bacteria	33d32'33.78"N	117d47'20.88"W
HEISLRDN	Heisler Downcoast	Bacteria	33d32'32.57"N	117d47'21.80"W
4636	Heisler Water Meter – Restroom 1	Flow	33d32'42.16"N	117d47'35.52"W
4647	Heisler Water Meter – Restroom 2, Irrigation 1	Flow	33d32'38.10"N	117d47'26.27"W
10066	Heisler Water Meter – Irrigation 2	Flow	N/A	N/A
8125	Heisler Water Meter – Irrigation 3	Flow	N/A	N/A

Map 3: Monitoring Site Locations



## Resource and Time Constraints

The Heisler Park Project is expected to produce long-term positive impacts in the adjacent waters of the Pacific Ocean, but the data analyzed for the Phase II final report spans only one year after construction. This report is the first of three reports which will look at the long term benefits of the park improvements. The other two reports will be produced for Phases I and III, funded by the IRWM and ASBS Grant programs, respectively, as these grants are closed out over the next one to five years. The long term study of the positive impacts of the improvements to the park will better characterize the overall effectiveness of Phase II combined with the other two construction phases.

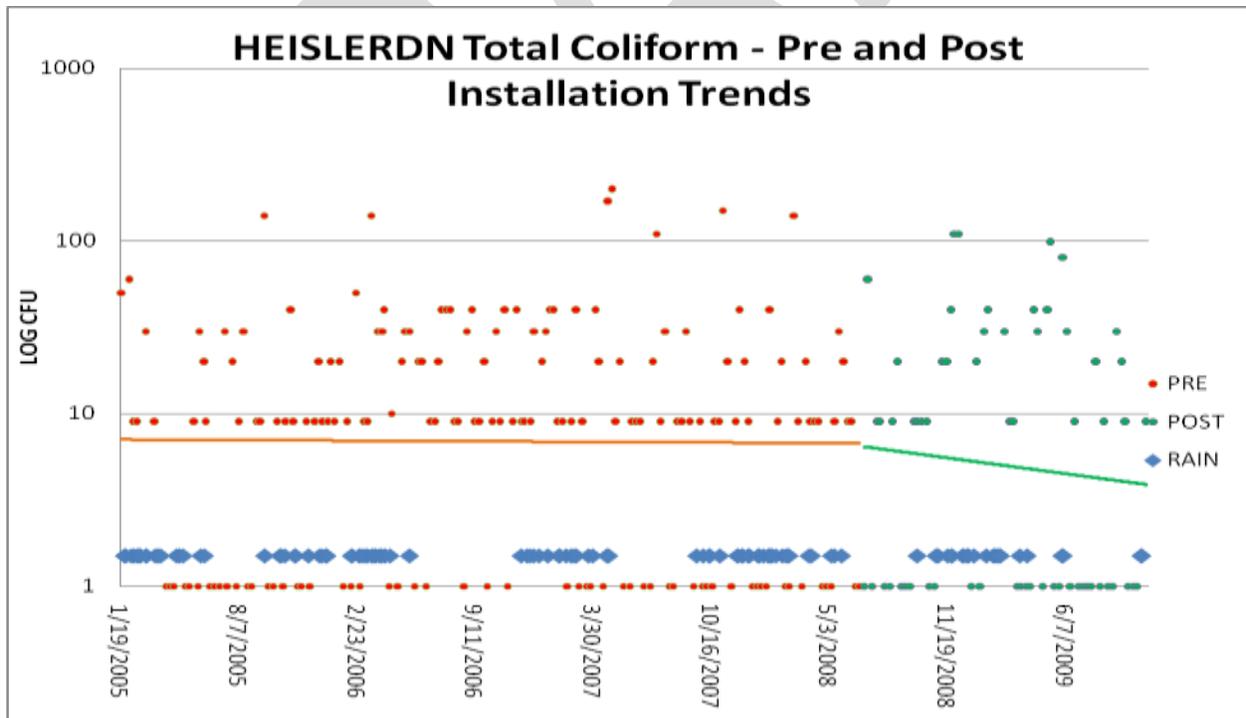
## *E - Discussion*

The completion of the Heisler Park Protection and Preservation Project Phase II in Laguna Beach using CBI funds has had tangible positive effects on ocean water quality, sewer spill prevention, beach closure prevention and water use.

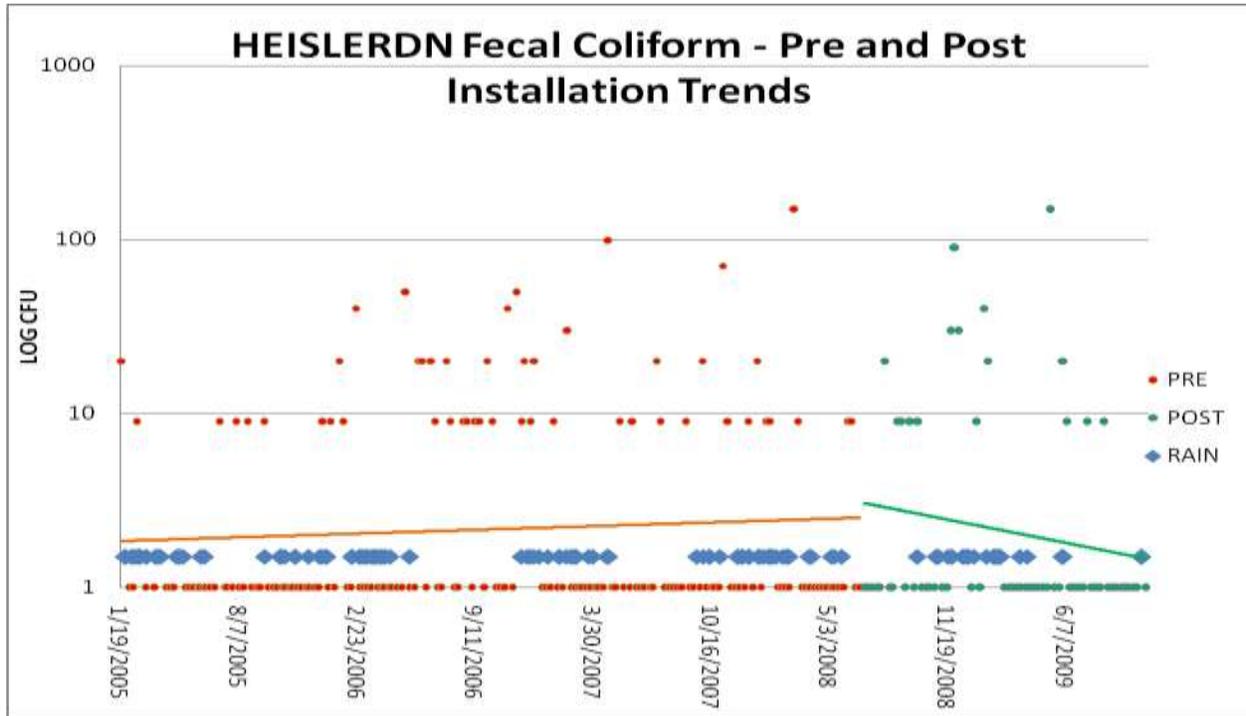
### Receiving Water Bacteria Analysis

The most dramatic data collected for receiving water bacteria was at the sampling point Heislerdn located at the southeastern-most boundary of the project. This sampling point showed dramatic decreases in bacteria levels after project completion as shown in the following graphs:

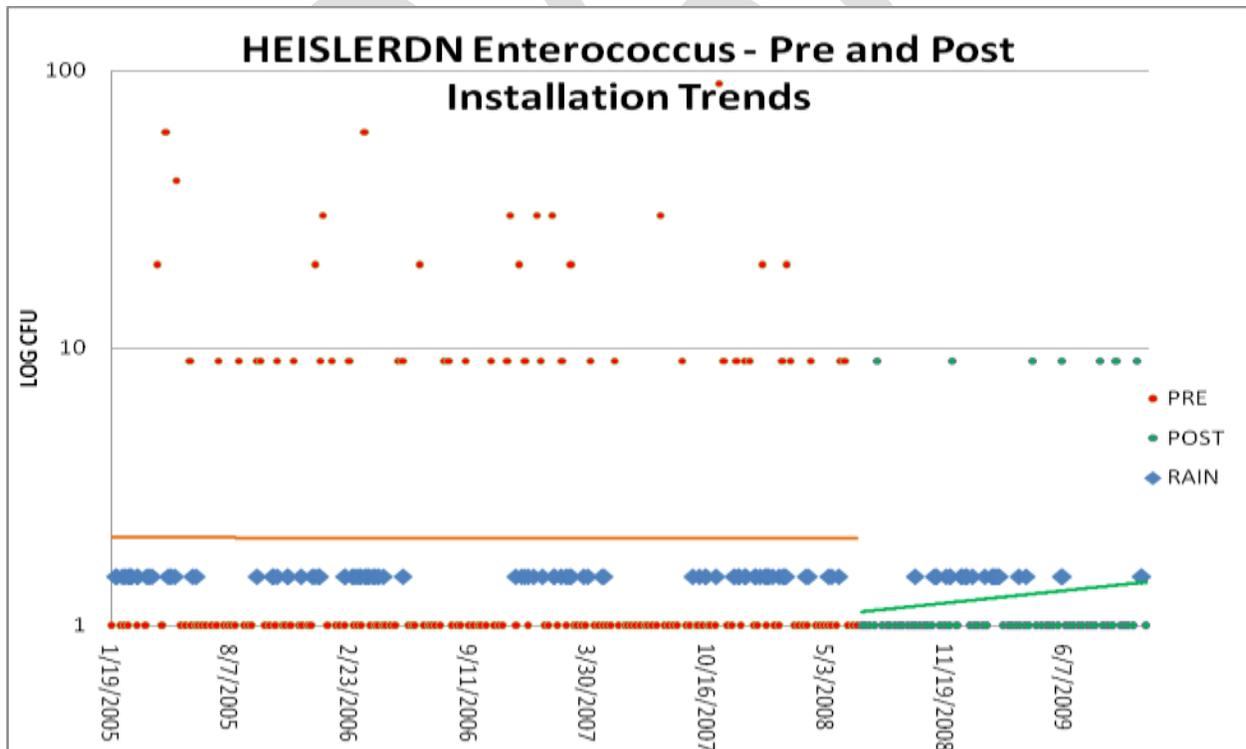
Graph 1



Graph 2



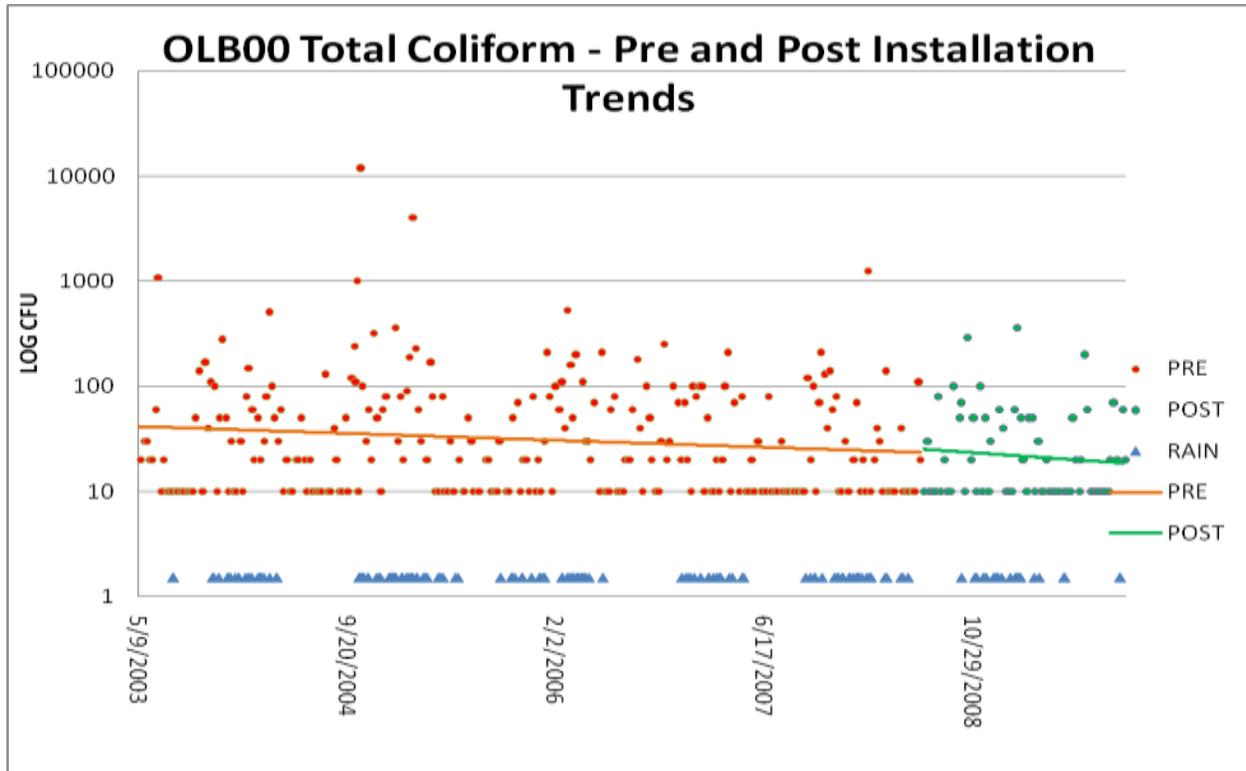
Graph 3



The bacteria levels during rain events were also lower post-construction. It is important to note that these data represent only one year post-construction and drawing conclusions about long-term project performance is premature, however, the early results at this site are very encouraging.

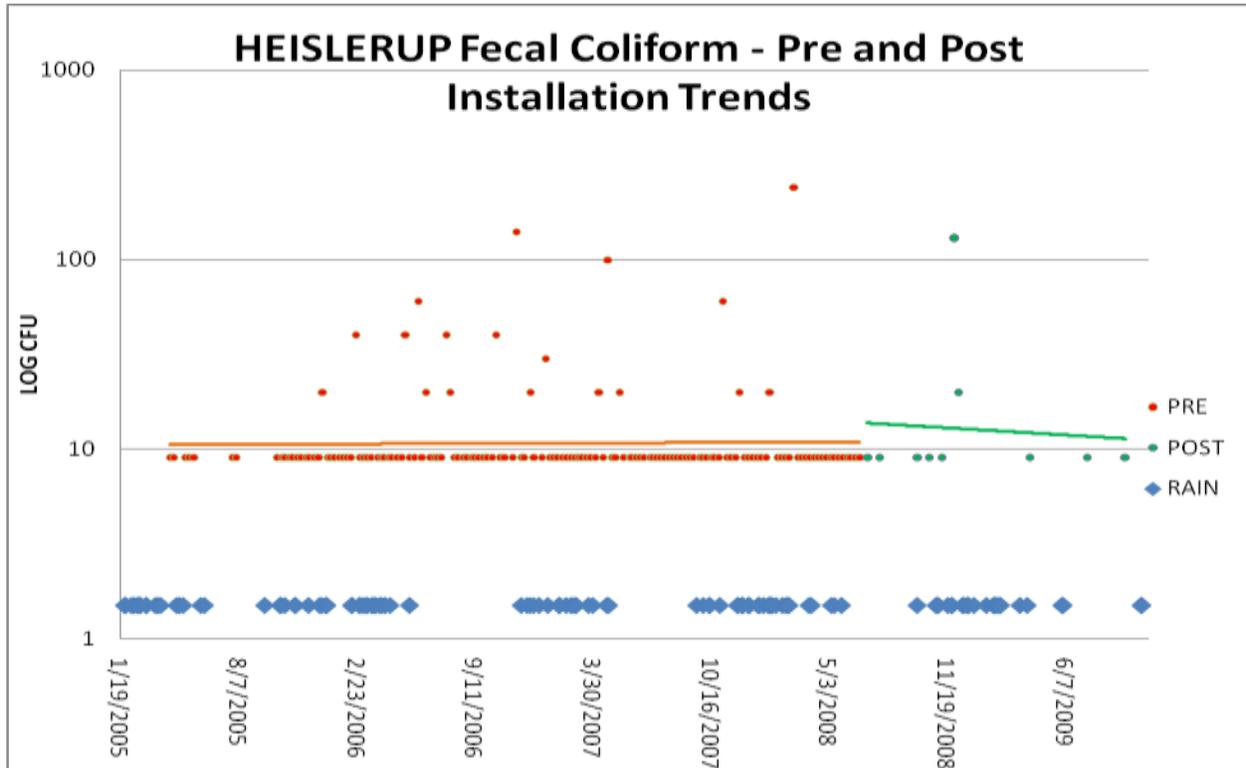
Other sites showed more stability with regard to bacteria levels. Graph 4 is typical of most of the data gathered:

Graph 4



Interestingly, Heislerup, located just 100 feet upcoast from Heislerdn, showed a slight increase in bacteria levels post-project:

Graph 5

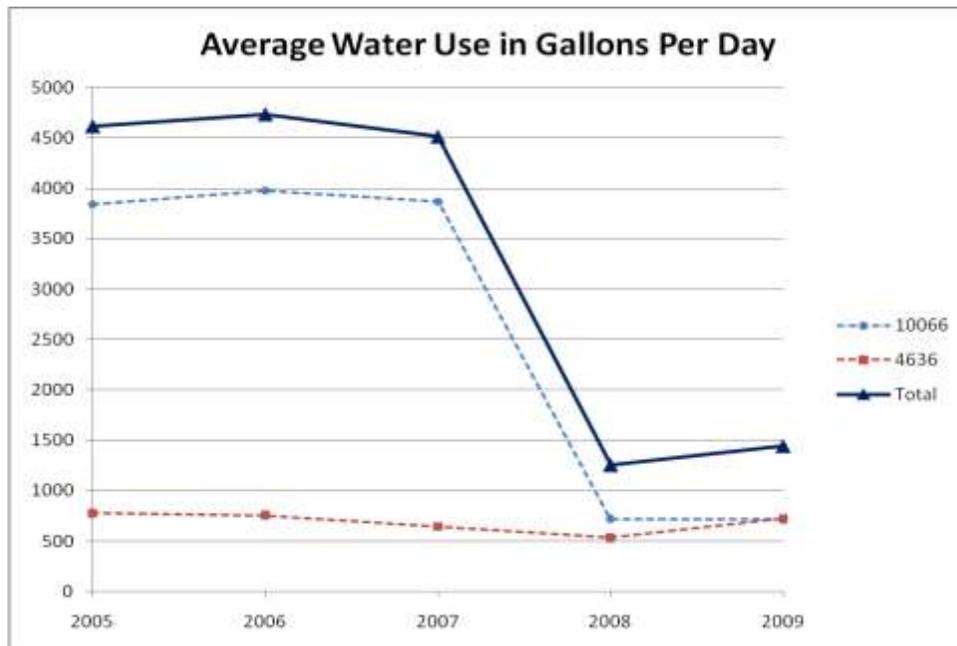


Note that the sampling frequency post-project is reduced. This certainly affects the trendlines. Bacteria data is often highly variable within short time and space frames so the value of this analysis will continuously be enhanced as more data is added in the coming years. All remaining bacteria graphs are included in Section G.

### Water Use Analysis

Water meter data for meter numbers 10066 and 4636 were available for 5 years from 2005 to 2009. The water meter data provides insight into the effectiveness of the irrigation improvements and replanting of drought tolerant species throughout the park. Water use was reduced dramatically for these meters upon project completion:

Graph 6



Water meter data for meter numbers 4647 and 8125 were available for only 1.5 years from 2008 to 2009. Meter problems prevented earlier data from being recorded. Average daily water use for meters 4647 and 8125 was reduced over 50% from 13,249 gallons per day between July 3, 2008 and November 5, 2008 to 6,455 gallons per day for 2009. Future data will continue to be collected for later reports.

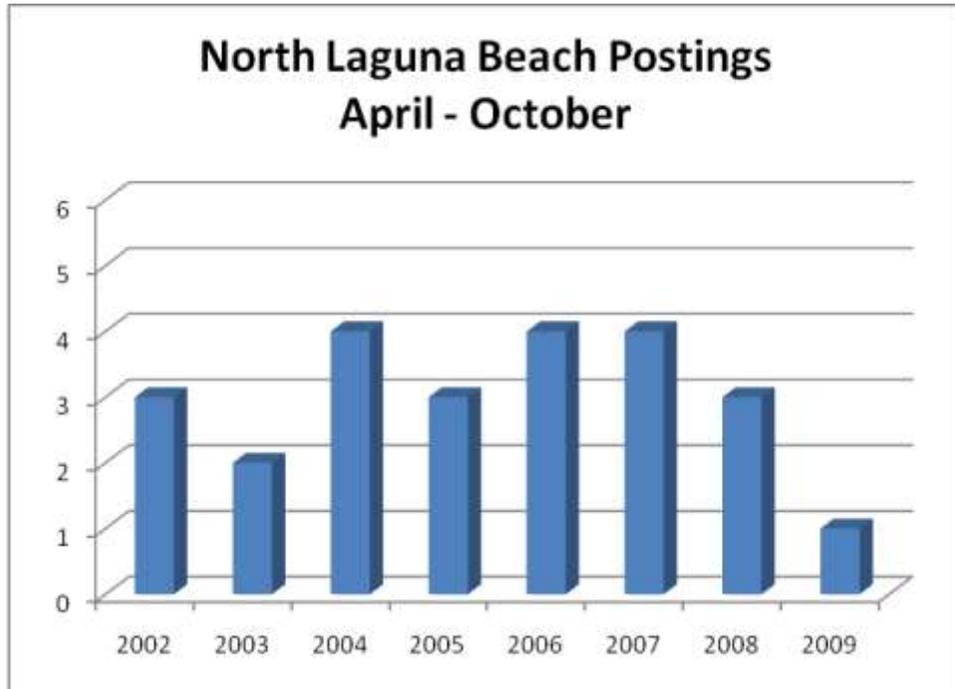
Future data should reflect even more dramatic reductions in water use as water-wise plants get established, irrigation systems are fine tuned and SmartTimers continue to operate.

### Beach Closures

The reconstruction of the restrooms at Heisler Park is intended to reduce the risk of sewer spills from the park contaminating the receiving waters. Because no spills have originated in Heisler Park since completion of the project, the project met the stated goal. Another benefit of the new restrooms is a perceived reduction in the frequency of public urination and defecation on Park grounds.

When receiving waters are contaminated by sewage, they are posted closed to recreation by the Orange County Health Care Agency. Beach postings are tabulated each year for beaches north of Aliso Creek including Heisler Park. The latest data from the Health Care Agency shows that beach postings have declined significantly since project completion:

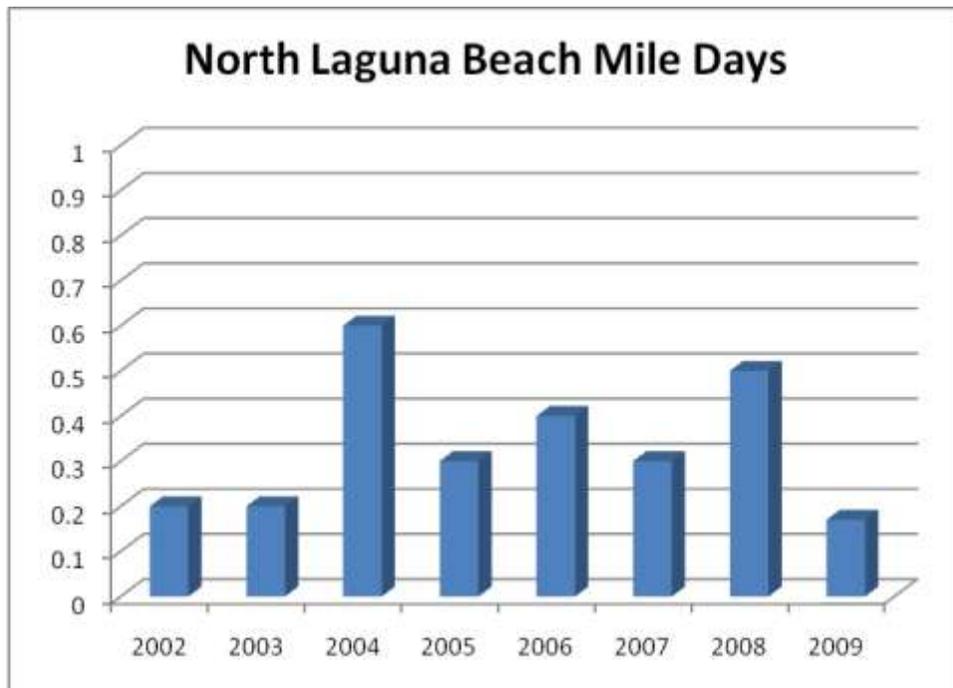
Graph 7



Two beach postings occurred in 2008 prior to project completion. Both originated in areas far south of the project. A 30 gallon spill attributed to a line blockage in the main uphill and northeast of the project affected Picnic Beach as it flowed through a preexisting storm drain under Heisler Park. The park was not the origin, and this was the only posting in Laguna Beach for 2009.

Beach Mile Days, a measure of postings in terms of the length of beach and amount of time they were closed, also declined significantly since project completion:

Graph 8



2009 Beach Mile Days are at 0.17, the lowest level in at least nine years. The improvements to Heisler Park, combined with other efforts within the City’s sewer department, are designed bring the closures down to zero. Beach closure monitoring will continue into the future.

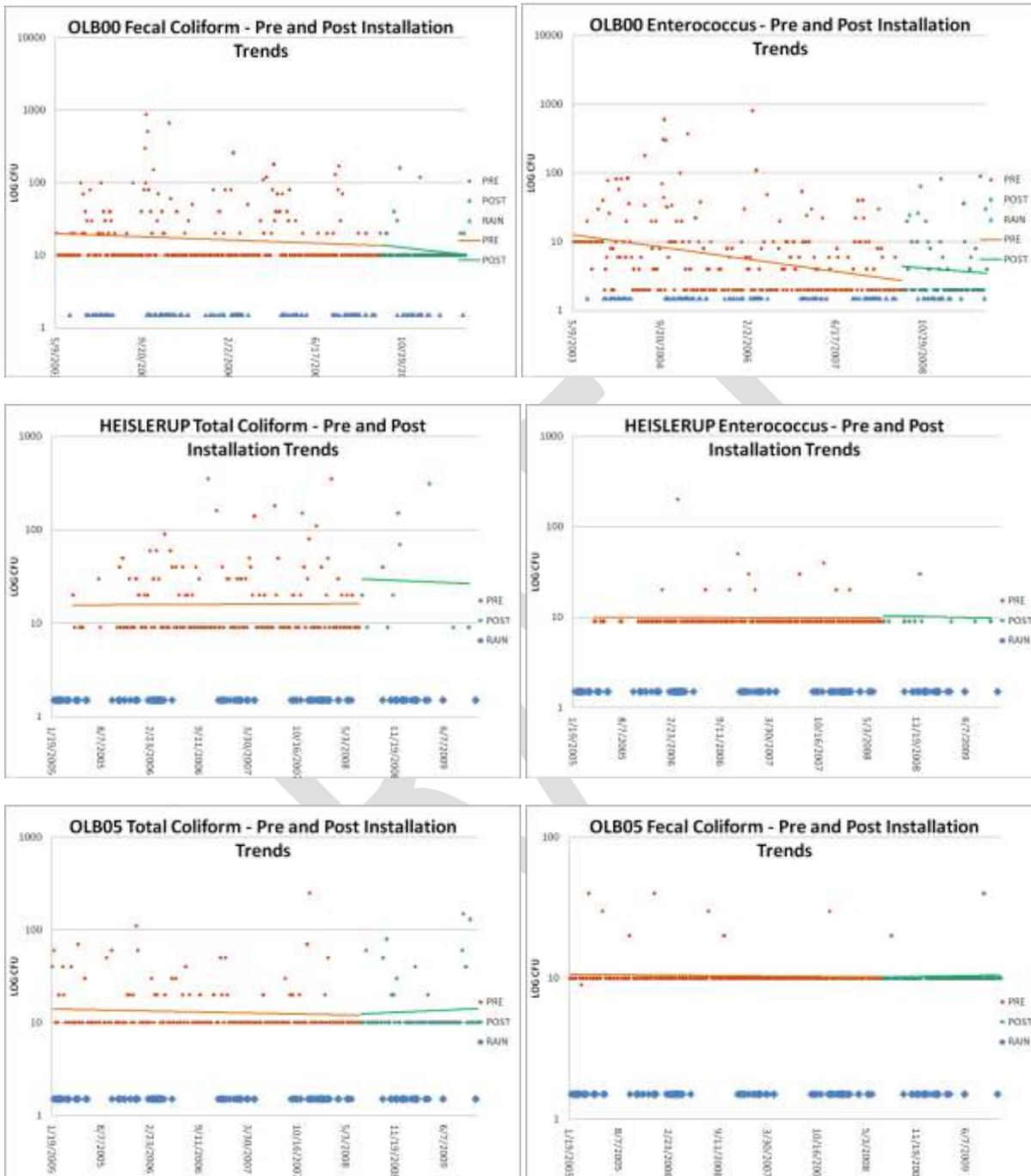
### ***E – Conclusion***

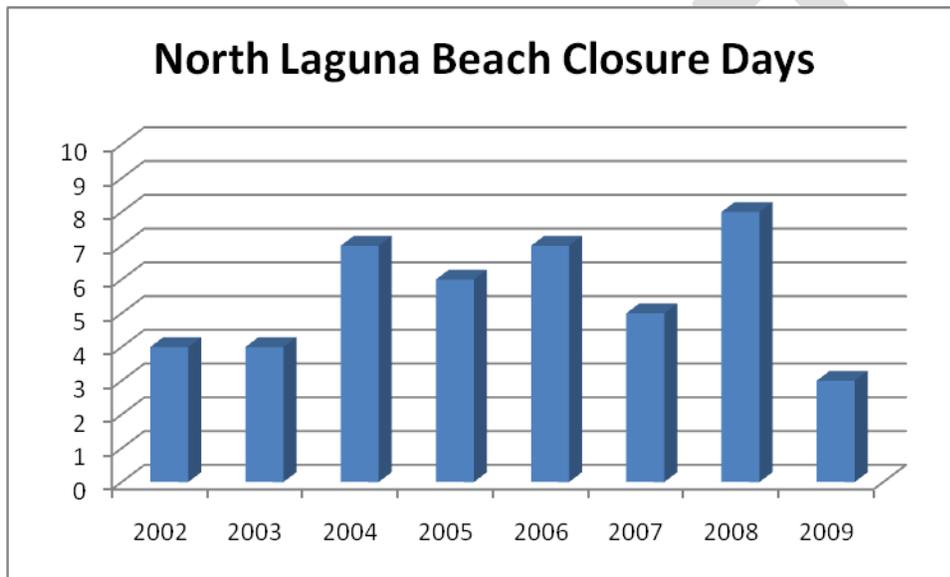
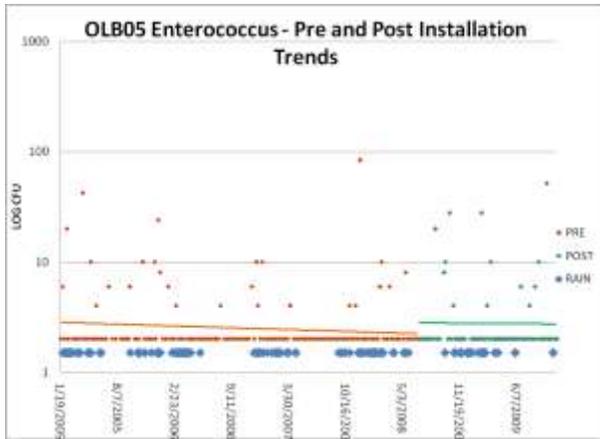
The Heisler Park Protection and Preservation Project Phase II has met the goals of reducing bacteria levels in the receiving waters and reducing water use in the landscaped areas of the Park. The reconstruction of the restrooms has resulted in no sewer spills being reported in the Park within the past year. No beach closures attributable to the Park as a source have occurred in Laguna Beach since Project completion.

All conclusions reached within this report are based on one year’s data. The monitoring program for this project will continue into the foreseeable future. It is anticipated that the benefits will continue to accrue as improvements to the park mature. Two additional reports will be written in subsequent years which will paint a more complete picture of the performance of the improvements to the Park. With this additional data, substantial insight into the long-term performance of Low Impact Development, diversions, structural and site-design BMPs in a park setting, and Ahwahnee Principles will be gained which may then be applied to future project design.

The City of Laguna Beach extends gratitude to the State Water Board’s Clean Beaches Initiative program for making one of the most beautiful parks in California more friendly to the natural environment, for helping the City keep the ocean clean and healthy for all to enjoy and for assisting in the creation of a functional model for sustainable development practices.

## G – Additional Data





Raw data is available by contacting Will Holoman: [wholoman@lagunabeachcity.net](mailto:wholoman@lagunabeachcity.net)