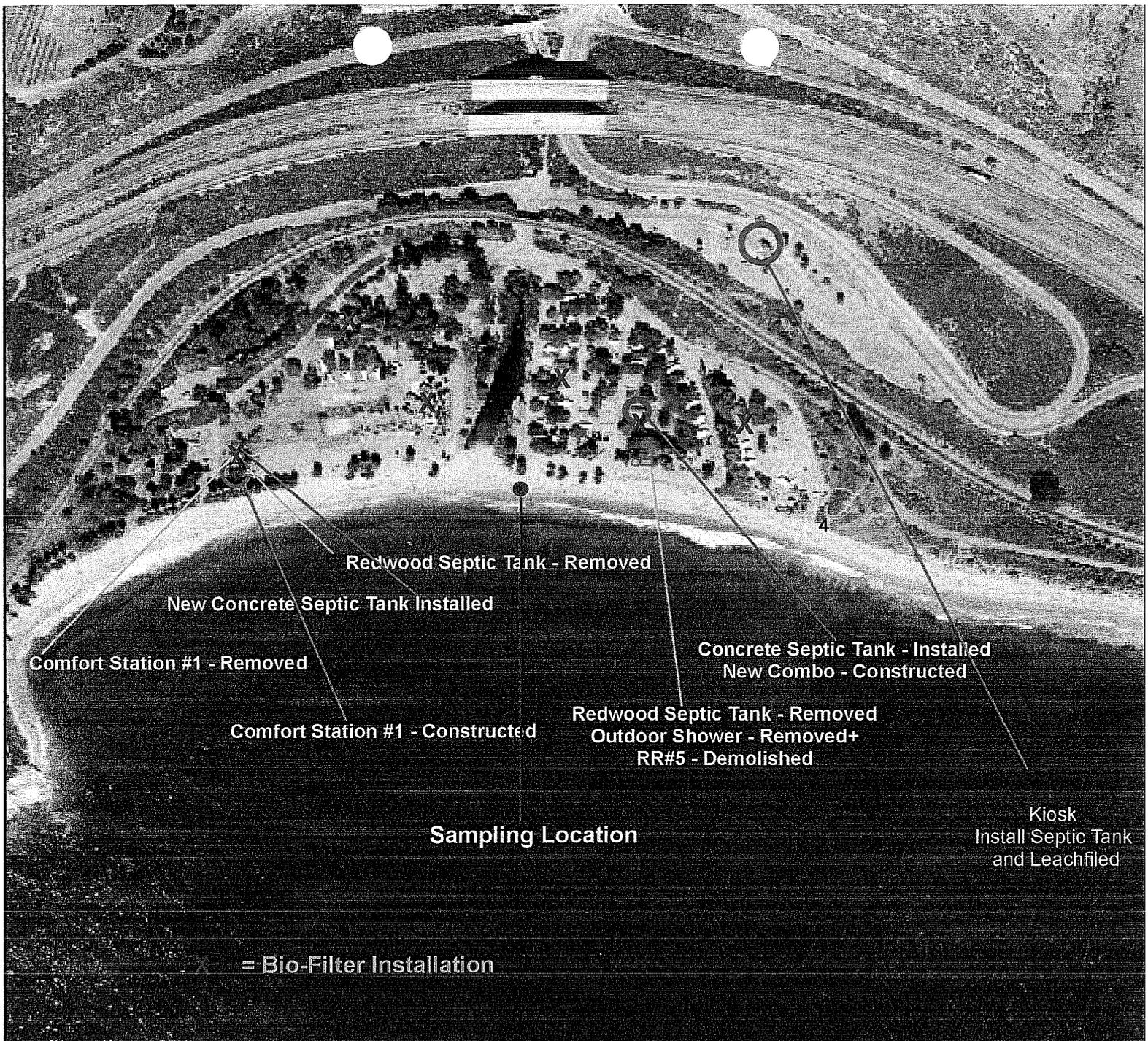




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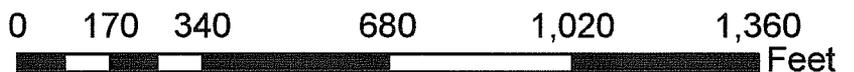
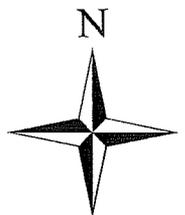
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Contract 01-230-55-0  
Refugio State Beach  
Final Report  
Submitted by California State Parks, Channel Coast District



# Refugio State Beach Clean Beaches Project Map

AirPhoto Imagery 2004



## TABLE OF CONTENTS

Introduction: .....	3
Problem Statement: .....	3
Table 1 - Refugio State Beach Attendance .....	4
Table 2 - Exceedances and Closures – 2002 -2005.....	4
Table 3 - Wet vs. Dry Weather Exceedance.....	5
Background: .....	5
Refugio State Beach – Preliminary Infrastructure Analysis – 2002-2005.....	6
Project Elements and Timetable for Work Completion .....	8
Project Accomplishments.....	11
Combo Building #5:.....	11
Comfort Station #1:.....	11
Kiosk:.....	11
Septic Tanks:.....	11
Passive Treatment Study: .....	11
Water Sampling .....	16
Conclusions .....	17
Appendix A - Photo Gallery.....	18
Appendix B – Annual Summaries .....	26
California Department of Parks and Recreation - Project Contacts.....	30

## **INTRODUCTION:**

Refugio Beach is located 22 miles northwest of Santa Barbara, between Point Conception and Point Arguello. The 90-acre facility offers day use and camping year round in a remote setting. On average 171,700 visitors come to camp or use the day-use facilities at Refugio State Beach (Table 1). Popular recreational activities/beneficial uses include: swimming, diving, kayaking, sun bathing, strolling and other coastal water focused pursuits.

## **PROBLEM STATEMENT:**

Participation in the project was initiated by the County of Santa Barbara and subsequently transferred to California State Parks for execution. The County in their application for grant funds defined the problem in this way:

“Ocean testing by the County Public Health Department has resulted in numerous postings in the last three years. Fecal coliform and enterococcus are possible sources for the water quality problems. Potential sources include the parks septic system and “nuisance” water (minor surface flow) from various sources within the park. The park has developed plans for their septic system to address known capacity problems and upgrade needs as well as begun evaluation of potential runoff control projects to both help address the sources and treat contaminated runoff.”

Refugio Beach was posted with warning signs 18 times in 2002 and 63 times in 2001 warning beach users of the presence of bacterial contamination (Table 2). California State Parks, Channel Coast District responded to this opportunity and undertook the responsibility to upgrade and replace existing sanitary facilities and study the possibilities for construction of a passive treatment system to process parking lot runoff and other park “nuisance flows.”

The grant award provided funding for the construction of two restroom facilities, renovation of park septic systems including the addition of bio-filters to seven septic tanks, installation of a septic tank and leachfield at the entrance kiosk, and where funds available, implementation of passive treatment improvements for nuisance runoff. It is anticipated that implementation of these project elements will be instrumental in reducing or eliminating bacterial sources and reduce pollution entering the ocean and Refugio Creek. The measurable objective is to reduce the number of beach postings due to high levels of indicator organisms measured by the County of Santa Barbara in their Ocean Water Quality Monitoring Program. It is expected that it will take several years of data following the completion of the project to evaluate if there is a statistically valid improvement.

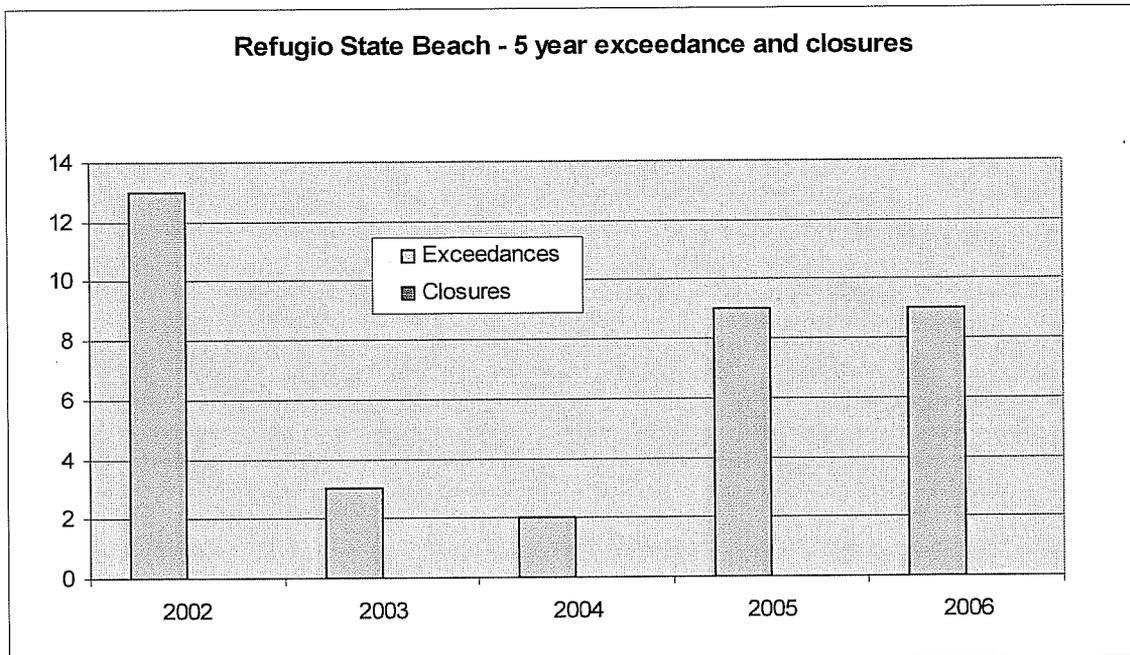
**Table 1**

**Refugio State Beach Attendance**

	<b>Day Use</b>	<b>Overnight Camping</b>	<b>Total Attendance</b>
1996	109,023	84,945	191,972
1997	129,260	94,197	221,460
1998	122,155	81,624	201,781
1999	108,321	92,923	199,245
2000	73,983	49,695	121,678
2001	126,759	94,291	219,049
2002	101,289	85,373	184,660
2003	93,746	62,088	153,831
2004	75,193	63,291	136,480
2005	40,839	47,597	86,431

**Table 2**

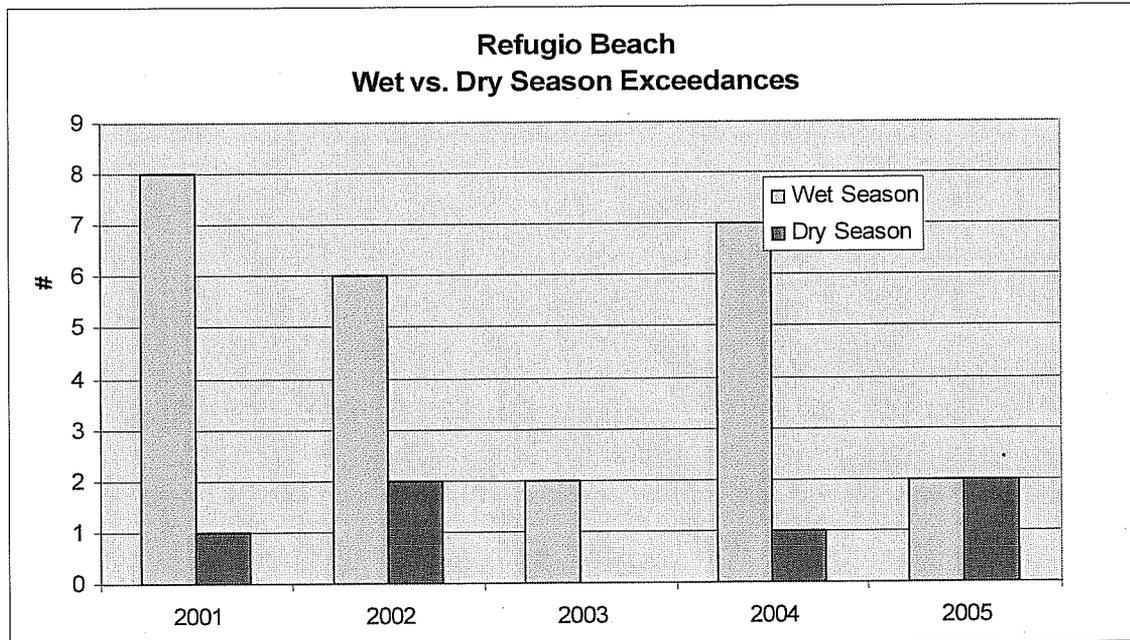
**Exceedances and Closures – 2002 -2005**



In Table 2, “exceedance” is defined as one or more of the analyzed indicator bacteria exceeding State AB411 standards for recreational contact. “Closures” occur only in the event of a sewage spill, or by discretion of the Public Health Officer.

**Table 3**

**Wet vs. Dry Weather Exceedance**



**BACKGROUND:**

In accepting this project from Santa Barbara County we worked from their understanding that there would be a realized benefit from undertaking a series of improvements to our septic system. Investigation of the facilities revealed aged redwood septic tanks at two of the 3 locations closest to the beach. These two “restroom” facilities, serving both day use and camping visitors, had been in use for nearly 45 years and were showing the wear of being in a coastal environment.

For analysis purposes, State Parks identified discrete elements of the park unit’s infrastructure that are believed to be tied to poor water quality conditions. These elements included: restroom facilities, lift stations leachfields, septic tanks and run-off. For each of these elements criteria for evaluation were outlined. The attached matrix provides in summary of the analysis used to select work that would be undertaken with Clean Beaches funding.

REFUGIO STATE BEACH - PRELIMINARY INFRASTRUCTURE ANALYSIS - 2002-2005

Element	Proximity to Water	Built In	Visitor Use	Capacity Evaluation	Compliance with Code	Percolation	Score
	5 pts = Adjacent 1 pt = Distant	1 pt. for each year over 30 years	2pts. due to high demand = Day Use	5 pts = Inadequate Capacity	5 pts = Non-Compliance	No pts Assigned	
Restroom #1	Adjacent (5)	1956 (15)	Day Use (2)	Adequate in Size Remove changing room facility Connect outdoor shower to septic system	NC - Septic Tank (5)		27
Restroom/ Combo #2	Distant (1)	1981	Campground	Adequate in Size	OK		1
Restroom/ Combo #3	Near (3)	1997	Day Use & Campground	Adequate in Size	OK		3
Restroom/ Combo #4	Near (3)	1994	Campground	Adequate in Size	OK		3
Restroom #5	Adjacent (5)	1956 (15)	Day Use & Campground	Add interior showers and connect outdoor shower to septic system (2)	NC - Septic Tank (5)		27
Restroom/ Combo #6	Near (3)	1994	Campground	Adequate in Size	OK		3

Kiosk	Distant (1)	1987	Day Use	Inadequate design to meet current demand (5)	OK	6
Septic Tanks				5 Additional septic Tanks Evaluated	NC thickness of lids and T-valves Missing (5*5)	25
Leachfields				Adequate in Size		
Lift Stations				Adequate in Size Lift Station at Combo Building #5 Replaced due to age and new shower facilities	Good	
Drainage & Runoff	Near			No passive treatment in place		

## PROJECT ELEMENTS AND TIMETABLE FOR WORK COMPLETION

Funding for the project was granted in two phases. The first phase of \$70,000 funded a preliminary site and system investigation, environmental review, permitting and construction drawings for a new Comfort Station#1/Restroom in the day-use area of the park and for septic and leachfield construction at the entrance kiosk (See Preliminary Infrastructure Analysis). The balance of the \$723,000 grant was made available during the second phase. Funding was used to finalize construction drawings, further investigate and develop a plan for and install bio-filters in all existing septic tanks and to demolish the old and construct the new Comfort Station #1, complete the Passive Treatment Study and Kiosk septic improvements.

The match for the SWRCB grant came from the Department of Parks and Recreation (CDPR). CDPR funded environmental review, permitting, project administration, reporting, demolition of the 45 year old Restroom #5-septic tank and outdoor shower and the construction of a new Combo (Restroom and Shower) Building with a new concrete septic tank and lift station.

Project Element	Description	Construction Start Date	Completion Date
Combo Building #5	This project element replaced a restroom changing facility and outdoor beach shower located just yards from the beach with a combination indoor outdoor shower and restroom facility. The new facility is located approximately 150 feet from the beach. An 'antique" root intruded redwood septic tank was abandoned in place per SB County Environmental Health standards and a new septic tank, lift station and sand-trap installed inland of the new facility.	Early 2003	November 2003
Comfort Station #1	This project element replaced a day use/beach restroom	February 2005	November 2005

	changing facility and outdoor beach shower located with a new restroom facility and outdoor shower. An 'antique' root intruded redwood septic tank was abandoned in place per SB County Environmental Health standards and a new septic tank and sand-trap installed inland of the new facility.		
QAPP & Monitoring Plan	Plan prepared and approved by the SWRCB staff.		August 2005
Kiosk Septic System	A holding tank requiring regular pumping was replaced with a septic tank and leachfield.	February 2005	November 2005
Septic Tank Compliance	Septic tanks in the park unit were inspected and deficiencies were addressed. Work included replacement of tops and installation of missing T joints.	January 2006	February 2006
Bio-Filter Installation	Bio-filters and alarms were installed in all septic tanks to further process and control effluent moving from the septic tanks to the leach fields.	January 2006	February 2006
Passive Treatment Study	A site inspection to identify sources of flow onto the beach was conducted. Consultants		October 2005 Draft Submitted for

	were contacted, products reviewed and a draft report proposing possible treatment options was prepared. Funding was not available to implement any alternatives.		review to SWB Staff
Monitoring	Per requirements committed to in the QAPP and Monitoring Plan SB County Environmental Health has under taken the monitoring required for this project.	February 2006	February 2007

## **PROJECT ACCOMPLISHMENTS**

*Environmental review and permits from Santa Barbara County and the California Coastal Commission were obtained for the completion of the funded project elements. A wave run-up study, which identified the zone of wave impact within the park and hence was critical for siting of the restroom and Combo buildings, was completed in order to meet Santa Barbara County permitting requirements.*

### ***Combo Building #5:***

- Demolition of Comfort Station #5, aged redwood septic tank and outdoor shower
- Re-location of facility inland
- Replacement with Combo building including toilet, indoor hot water showers, outdoor “beach” shower, septic tank, bio-filters and sandtrap

### ***Comfort Station #1:***

- Demolition of Comfort Station #1, aged redwood septic tank and outdoor shower
- Facility footprint downsized and septic tank moved inland of facility
- Replacement of comfort station with new building including toilets, outdoor “beach” shower, septic tank, bio-filters and sand-trap

### ***Kiosk:***

- Demolition of holding tank
- Installation of septic tank and leachfield

### ***Septic Tanks:***

- Replaced cracked and thinning covers
- Installed missing T valves
- Installed bio-filters in remaining 5 tanks to process effluent prior to discharge into the leach lines

### ***Passive Treatment Study:***

The grant funded a Passive Treatment Study designed to identify sources of possible contamination and alternative treatments and solutions to reduce impacts. Prior to implementation of any alternative a cost-benefit analysis would need to be conducted and necessary environmental review and permitting completed.

It was hoped that there would be funds remaining to implement some of the recommended solutions. Unfortunately there were no remaining funds to pursue any of the proposed alternatives. A summary of the Study and its recommendations follows.

### ***Areas of Runoff***

#### ***A. Runoff from slopes northwest of the railroad tracks (NW Quadrant) consists of three areas:***

1. **Area NW-A** approximately 14 acres with elevations ranging from 60 feet to 190 feet with mainly 5:1 slopes and some slopes as steep as 2:1. Runoff flows through a box culvert at a 2:1 slope under the railroad berm to a relatively undisturbed, undeveloped section of parkland that is vegetated with native coastal sage scrub.
2. **Area NW-B** approximately 12 acres with elevations ranging from 50 feet to 200 feet with mainly 3:1 slopes with some areas as steep as 1:1. A seasonal spring runs along the north side of the roadway about 0.3 miles up the park service road from the creek bed. The northwest portion of the park has a 6 foot high by 8 foot wide box culvert under the railroad tracks to convey flow from the north side of the railroad tracks to the north side of the roadway behind the Ranger residences in the SW Quadrant. An existing earthen berm channels the water to a 12" Corrugated Metal Pipe (CMP).
3. **Area NW-C** approximately 6 acres with elevations ranging from 20 feet to 135 feet with mainly 2:1 slopes and some slope areas as steep as 1:1. Approximately 2.5 acres of the 2:1 slopes lie along the northern side of the first 800 feet of roadway and are apparently within Caltrans' Right of Way. Slopes are vegetated by native coastal sage scrub. The area also contains the two-lane park service road located parallel with and between the railroad tracks and the highway which accesses several Park structures. Runoff is conveyed from portions of Highway 101 and the steep adjacent parkland with the roadway conducting most of the runoff from the adjacent slopes into the creek bed.

***B. Runoff from slopes northeast of the railroad tracks (NE Quadrant)*** consists of 2 areas, approximately a 3 acre area that drains onto the park entrance road and flows down to the creek from the Park Entrance Kiosk vicinity and the other is approximately 12 acres with a 60" CMP on the eastern side of the park that conveys a large volume of runoff from the north side of the tracks to the southeastern edge of the park adjacent to the group campground.

**C. Runoff from slopes, roads and other paved surfaces (SW Quadrant)** consists of collected stormwater runoff flowing from both the surrounding slopes and the descending existing roadways. Due to specific locations with elevations lower than the surrounding areas this creates the greatest flooding potential within the Park.

**D. Runoff from slopes, roads and other paved surfaces (SE Quadrant)** consists of 10 acre area of the Park also experiences flooding, collecting stormwater runoff from both surrounding slopes and the existing roadways. Runoff is conveyed down the 3:1 slope adjacent to the bike path onto the eastern campground's northernmost roadway. Vegetation consists of invasive and non-native plants

### ***Recommended Treatment to Alleviate Refugio State Beach Passive Runoff***

**A. Runoff from slopes northwest of the railroad tracks (NW Quadrant) consists of three areas:**

1. **Area NW-A** install 12" or larger coir fiber for a minimum of 25 feet along the railroad Right of Way perpendicular to flow. The roll will be entrenched 4" into the ground and staked at maximum 4 feet intervals with the ends turned up slope to prevent runoff from circumventing the roll.
2. **Area NW-B** install a Stormvault unit based on design calculations for a  $Q_{10}$  or flow rate of 11 cfs for a ten year storm and a  $Q_{100}$  or flow rate of 17 cfs for a hundred year storm. After the box culvert where the large and concentrated flow of stormwater exits place the unit above or below ground in order to filter and attenuate the flow prior to conveyance to the existing earthen open channel. The channel will have the majority lined with a three-dimensional woven geo-textile to help promote and establish vegetation and attenuated with sediment catching swales cut perpendicular to flow as it descends to the beach bluff and by widening the last 100 feet of the channel to provide sheet flow onto an existing vegetated area. Intercept any remaining sheet flow by installing a 50 foot line of entrenched square coir logs parallel to and at a minimum of 15 feet back from the bluff above the beach.
3. **Area NW-C** install along and behind the edge of the park service roadway, the highway undercrossing and the railroad underpass, Atlantis D-Raintank Modular Culverts to intercept and filter flow.

Alternatively, conventional drainage inlets and culverts can be installed Silt Sack Catch Basin Sediment Capture Devices.

***B. Runoff from slopes northeast of the railroad tracks (NE Quadrant)***

the same options proposed for Area NW-C can be applied to intercept the runoff of the 3 acres in the Park Entrance Kiosk vicinity. The same options and unit sizing may be based on the same design calculations as Area NW-B for the remaining 12 acre area. The Stormvault is to be placed in similar fashion as proposed in Area NW-B but installed after the 60" CMP where the large and concentrated flow of stormwater exits and then conveyed into the existing 300' earthen channel. This channel will be lined and attenuated as in Area NW-B except the sediment catching swales will be at 50 foot intervals and vegetated with cuttings of willows, mulefat and other appropriate native species as approved by the State biologist. An entrenched coco gabion splashpad will attenuate the outfall as it flows to the beach. The splashpad will be 5' wider than the channel width and entrenched so the top surface is 6 inches above surrounding grade and overlapped by the geotextile channel liner.

***C. Runoff from slopes, roads and other paved surfaces (SW***

***Quadrant)*** install embankment in these earthen low lying areas, graded and seeded with native grasses or other vegetation to blend with existing contours. It appears flooding occurs in lower elevated paved areas mainly from upstream flow. Intercept the large volume of runoff prior to the low point at the foot of the upper western campground service road and along the north side of the campground's northernmost road. Replace existing castor and other invasive and non-native plants vegetation with willow, mule fat and more appropriate vegetation. Also install a minimum of 2 rows of straw wattles (entrenchment is optional) 15 feet apart and extending 300 feet long along the slope and parallel with the roadway to attenuate flow. Trench approximately 3' wide and 4' deep (trench work may vary per needed design) and install Atlantis D-Raintank Modular Culverts along the edge of the roadway above the west campground to intercept, filter and remove runoff from the upper campground service road. Addition of a culvert attached to the modules will convey the filtered runoff into the creek. An alternate is to trench 2' wide and 18" deep and install an Atlantis Underdrain to intercept and filter smaller volumes of flow. The underdrain application can be applied along the park roads running along both sides of the creek. The underdrain application or the installation of 1'x1'x10' Coir Square Logs in 1' wide by 6" deep trenches and secured with flat top wooden stakes can be used to intercept and filter low flows of runoff broadcast from the 650 LF Day Use parking lot adjacent to the beach.

Install a drainage inlet box with a Sediment Capture Device over the existing exposed culvert inlet on the west side of the creek to filter the run off before it enters the creek and reduce the hazardous condition from the exposed inlet.

Construct adjacent to and along the length of the creekbed, parabolic bed shaped drought tolerant vegetation swales that meander around existing vegetation and driplines. Swales should be a minimum of 10' wide and 1' deep with a longitudinal slope not to exceed 2.5%.

Existing 18" CMP outlet that empties onto the beach west of the Ranger's Residence should be unplugged and install/connect to the outlet a downdrain with a coir gabions entrenched splash pad in the sand to attenuate the flow. Install a 12" or larger coir fiber roll stretching a minimum of 25 feet along the railroad Right of Way perpendicular to flow. Entrench roll 4" into the ground and staked at a maximum of every 4 feet with the ends of the roll turned up slope to prevent runoff from going around the roll.

***D. Runoff from slopes, roads and other paved surfaces (SE Quadrant)***  
the same options proposed for Area C (SW Quadrant) for vegetation, wattles, underdrains, Coir Logs and swales can be utilized. However, extend wattles 400 feet long along the slope and parallel with the roadway to attenuate the flow. Install similar underdrains or Coir Square Logs along the edge of the beach as far as the outfall from the 60" drainage culvert to intercept and filter low flows of runoff broadcast from the 800 LF of roadway and soil adjacent to the beach. Earthen areas of the campsites facilities can be raised and re-graded to drain by the addition of clean fill material if improvements do not cause impacts. Swales should be constructed adjacent to and along the length of the creekbed.

## WATER SAMPLING

The goal of this project was to lower indicator bacteria levels in the surrounding beach area. General goals included:

- Remove sources of fecal contamination
- Reduce SBCEHS beach closures and postings
- Reduce the health threat to swimmers, divers, kayakers, surfers and other recreational beach users

The sampling data will be used by Santa Barbara County Environmental Health Services (SBCEHS) as a tool to track sources of fecal contamination. The data is made available to the public as well as Regional and State Boards for their use.

SBCEHS staff compiles data and an electronic database continues to be maintained at SBCEHS.

The method used for sampling ocean water was developed and agreed upon by Environmental Health representatives from five southern California counties (San Diego, Orange, Los Angeles, Ventura and Santa Barbara) in 1998.

Sample collection methods meet EPA guidelines for saltwater sampling (or modified for the situation). All samples are analyzed by SBCPHL via Colilert and Enterolert testing protocols, Colilert™ 18 Medium (IDEXX) (Quanti-Tray™) and Enterolert™ Medium (IDEXX) (Quanti-Tray™).

The sample site was located via GPS (Global Positioning System) so its actual location can be mapped and compared to other features (e.g. targeted waste disposal areas) as appropriate. The sampling addresses only data quality objectives for the following parameters:

- *E. coli* Bacteria
- Total Coliform bacteria
- Enterococci Bacteria

Bacterial parameters are monitored using protocols outlined in Standard Methods for the Examination of Water and Wastewater 20<sup>th</sup> Edition, or in instruction manuals for specific tests (e.g. Colilert and Enterolert tests, manufactured by IDEXX Corporation).

Several graphs are provided in Appendix A showing results of each of these parameters tested at Refugio State Beach. Raw data can be provided upon request.

## CONCLUSIONS

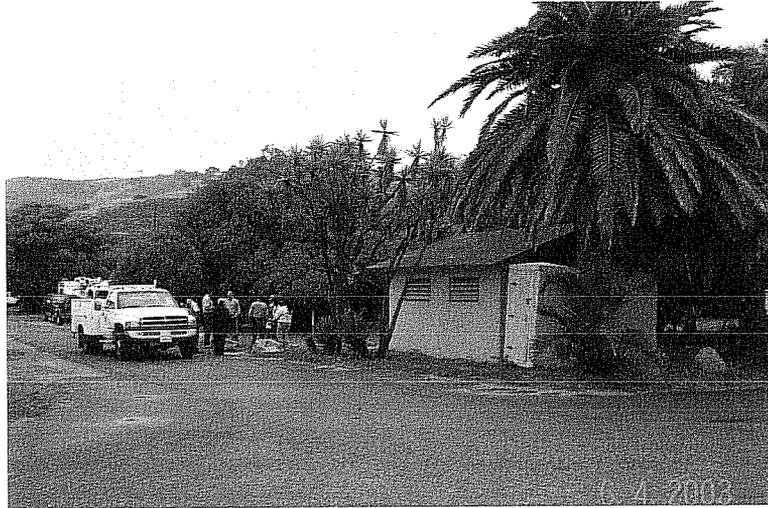
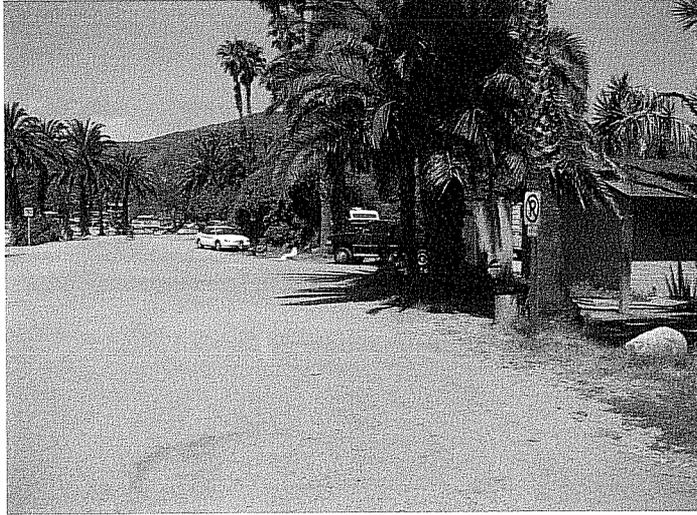
The projects completed at Refugio State Beach under Clean Beaches Grant Contract # 01-230-55-0 improved conditions and infrastructure. It is reasonable to believe that monitoring will reveal a statistically valid data demonstrating that improvements completed with this grant funding have delivered a measurable benefit to ocean water quality. Initial monitoring, required by this grant tells us that the number of exceedances in 2006 were 18. The average number of exceedances per year 1998-2006 was 21.6. It remains difficult to assess the real and long-term contribution of the project to improved ocean water quality only one year out from full project completion. It appears there may be the start of a trend indicating improvement.

The Passive Treatment Study revealed significant wet weather impacts to the park and beach coming from both Caltrans and the UP Railroad. In addition, the Refugio Watershed up creek from the park and above the railroad track and HWY 101 include within it a variety of ranch and agricultural properties. Without a more inclusive approach in viewing the watershed and strategies to address wet weather flows from culverts draining into the park a substantial solution to drop occurrences of standard exceedance will likely remain beyond our grasp. Future funding and grant proposals should focus in two areas:

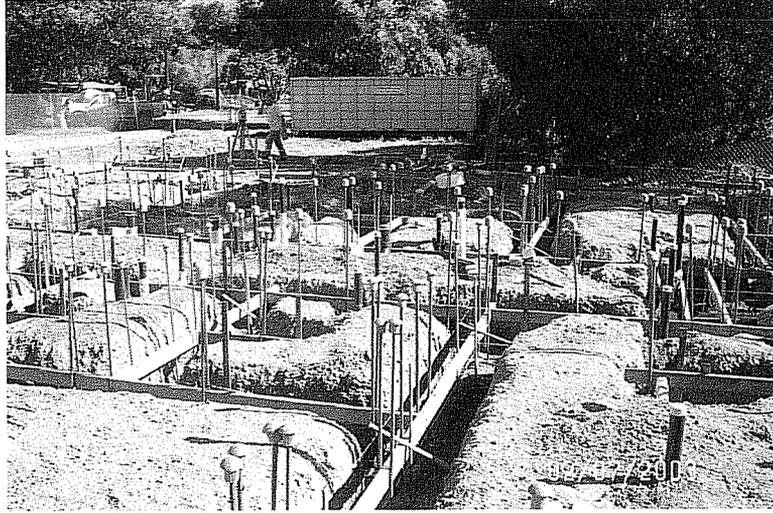
1. Collaborative planning between Caltrans, UP Railroad and CDPR to design solutions and BMP's handling runoff entering the park from non-park facilities.
2. Develop a comprehensive watershed plan for Refugio Creek that includes BMP and strategic solutions to protect habitat and improve ocean water quality while ensuring the operational needs of ranchers and other up creek land owners are respected.

# **APPENDIX A**

## **PHOTO GALLERY**



**Original Location Restroom #5**



**Footings Set-up Combo #5**



**Block Wall and Roof Framing #5  
Completed Building**



**Trenching at Kiosk for Septic Tank and Leachfield**



**Site of Restroom #1 – Day Use**



**Completed Restroom #1**



**Trenching for Bio-Tube Alarms**

# **APPENDIX B**

## **ANNUAL SUMMARIES**

## Refugio State Beach

### Septic System Improvements & Passive Treatment for Park Runoff



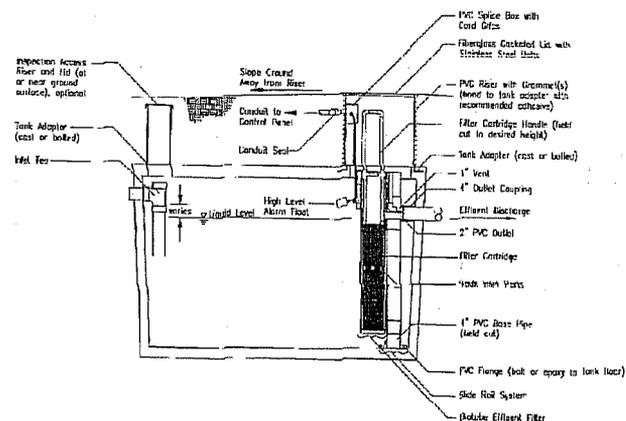
*Refugio Beach State Park is located 22 miles northwest of Santa Barbara, between Point Conception and Point Arguello. The 90-acre facility offers day use and camping year round in a remote setting.*

Refugio State Beach was developed in the 1950's. The facilities and infrastructure targeted for upgrade were constructed in that era. Ocean testing by the Santa Barbara County Public Health Department has resulted in numerous postings in the last three years. Potential sources include the parks septic system and "nuisance" water (minor surface flow) from various sources within the park. The park has developed plans for the septic system to address known capacity problems and upgrade needs as well as begun evaluation of potential runoff control projects to both help address the sources and treat-contaminated runoff.

The project scope includes replacement of the two restrooms located closest to the beach. Septic tanks will be abandoned per Santa Barbara County Environmental Health requirements. New tanks will be located landward of the replacement facilities. An outdoor shower adjacent to the day use area on the east side of the beach will be removed and outdoor showers will be incorporated into both new buildings.

The entrance kiosk currently uses an approximately 1,000-gallon holding tank for wastewater. This tank is not connected to the park leach field system and must be pumped out regularly. This element of the project will abandon the existing holding tank per Santa Barbara County Environmental Health requirements and install a new 1,000 gallon septic tank and a new leach field in the adjacent parking median at the park entrance. A biofiltering system designed to reduce solids from the effluent will be added to all 7 septic tanks within the park. This addition is expected deliver a clearer product to the leach fields.

The project also includes the investigation/study and possible design and construction of passive treatment alternatives for processing of parking lot and road runoff within the park and various sources of surface runoff from park facilities. Park users frequently wash off surfboards, wetsuits and pets potentially causing surface flow from the park to enter into the ocean or the adjacent creek. Biologic treatment of surface runoff would be an effective means of reducing pollution to the creek. Alternatives such as mechanical treatment of the surface runoff are not economically feasible and would require physical facilities not compatible with the park's location in the coastal zone. To the extent that bioswale or similar passive treatment is consistent with the operation of the park, offers meaningful and cost effective water quality improvements, environmental analysis, permitting, final design and construction would be undertaken.



## Refugio State Beach

### Septic System Improvements & Passive Treatment for Park Runoff

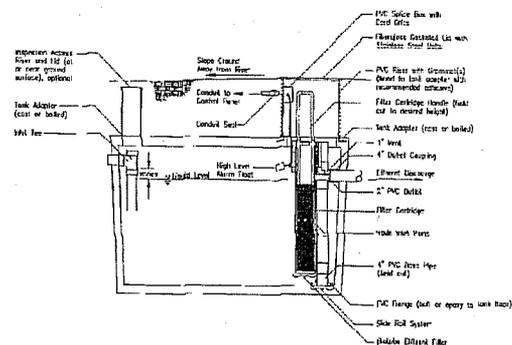


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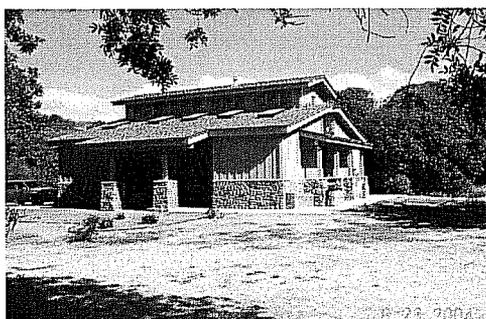
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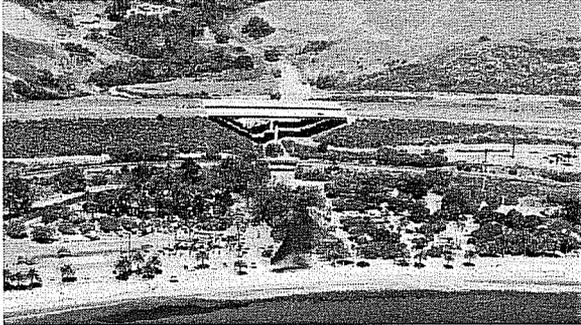
The project also includes the investigation/study and possible design and construction of passive treatment alternatives for processing of parking lot and road runoff within the park and various sources of surface runoff from park facilities.



In November the first of two restroom replacement projects was completed. This facility was removed from its near shore location and set back nearly 200 feet into the campground proper. This facility provides 5 toilets and 5 showers and an outside shower with sand trap for use by campers and beach going visitors. Construction on the balance of the project is expected to begin in early 2005.

## Refugio State Beach

### Septic System Improvements & Passive Treatment for Park Runoff



Refugio Beach State Park is located 22 miles northwest of Santa Barbara, between Point Conception and Point Arguello. The 90-acre facility offers day use and camping

#### BACKGROUND

Refugio State Beach was developed in the 1950's. Ocean testing by the Santa Barbara County Public Health Department has resulted in numerous postings in the last three years. Potential sources include the park's septic system and "nuisance" water (minor surface flow) from various sources within the park. The project scope includes replacement of the two restrooms and septic tanks located closest to the beach, evaluation and improvements to remaining campground septic tanks including the installation in each tank bio-filters designed to reduce solids from the effluent, installation of a leachfield and septic tank at the unit's entry station and completion of a passive treatment study to identify future projects to treat runoff into the creek and onto the beach.

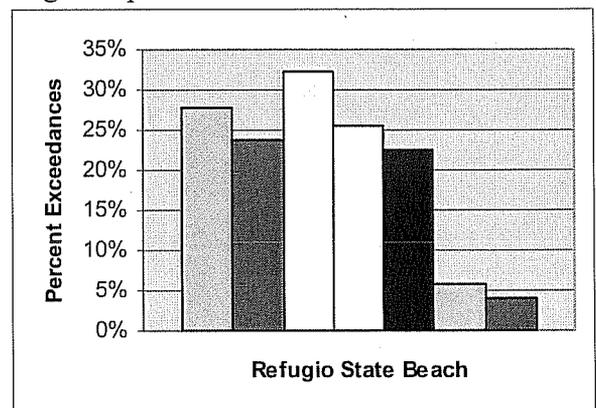
#### PROGRESS

The winter storms of 2005 caused a number of significant delays with project elements and award of contracts. As of this writing work has been completed to replace both restrooms and their respective septic tanks. Installation of the leachfield and septic tank at the entry station is also complete. Bio-filters have been installed in each of the three new tanks. The project's QAPP has been reviewed and accepted by State Water Board staff. A Draft Monitoring Report and Plan has been submitted for review. The Administrative Draft of the Passive Treatment Study has been completed and submitted for review.

Bids have been received to complete work needed to the remaining septic tanks and for the installation of bio-filters in the remaining septic tanks. It is expected that work on the remaining septic tanks will be completed by February 2006. It appears some funds will be remaining to implement lower costs recommendations contained in the Passive Treatment Study. All work is anticipated to be complete prior to the start of the 2006 summer season in the park.

The graph depicts percentage of exceedances for Refugio State Beach. It is too early to be conclusive yet there appears to be a reduction in beach closures that coincide with completed work.

Beaches	1998	1999	2000	2001	2002	2003	2004
Refugio State Beach	28	24	32	25	22	6	4



**CALIFORNIA DEPARTMENT OF PARKS AND RECREATION  
PROJECT CONTACTS:**

**Barbara Fosbrink**  
District Services Manager  
Channel Coast District  
911 San Pedro Street  
Ventura CA 93001  
**(805) 585 1848**

**James Buenviaje**  
Project Manager  
Southern Service Center  
8885 Rio San Diego Drive  
Suite 270  
San Diego CA 92180  
**(805) 220-7389**