THE URBAN RUNOFF BATTLE
READY, FIRE, AIM!

SUMMARY

Urban runoff that drains from all over Orange County into our harbors and ocean waters has received increasing public attention in recent years. Every day, health advisory warnings are posted on our beaches; 3877 total days of postings in 2000 alone. The County, cities, environmental groups and volunteer groups are conducting many worthwhile activities to mitigate this problem. While these efforts are commendable, it still appears to be a shotgun approach.

The 2000–2001 Orange County Grand Jury conducted an extensive study of urban runoff management practices, public health hazards, warning procedures and public awareness. Progress is being made and there is significant cooperation among all those involved. In fact, Orange County may be one of the most active communities in the United States seeking solutions to urban runoff problems.

To further advance the County's ability to manage urban runoff and protect our ocean water recreation environment, the Grand Jury recommends the following:

- Conduct additional research to confirm that current water quality standards are appropriate for public health concerns and for more direct and rapid water testing procedures
- Formulate Management Teams for each County watershed to ensure cooperation of coastal and inland cities to develop the most effective urban runoff management practices
- Develop a Countywide Water Quality Strategic Plan with watershed priorities and time-phased goals.
- Leverage the increasing interest of our community for cleaner beaches and ocean water by actively promoting and coordinating public awareness, education and volunteer programs

PURPOSE/INTRODUCTION

In Orange County, the surface water drainage system is totally separate from the sewer system. The vast network of storm drains empties into waterways and flood control channels on the way to the harbors and ocean waters. During dry seasons almost all urban runoff is the result of human activities such as landscape watering and cleaning of streets, sidewalks and automobiles. As water flows into the drainage system it picks up numerous contaminants such as pesticides, fertilizer, oil and animal waste matter, which may contain harmful bacteria and micro-organisms that end up in ocean water.

California's public health standards for beaches and waterways are among the most stringent in the world. Enforcement of these regulations has resulted in thousands of health advisory warning signs posted on beaches each year. This frequency of advisories is unacceptable to everyone and County and local jurisdictions have undertaken many projects and studies to reduce untreated runoff from reaching our coastal waters. However, there is no consensus that the sources, treatment and actual health hazards are fully understood.

The purpose of this study was to evaluate County and local urban runoff management activities and make recommendations for improvement. The study addressed four major questions:

1) How well known are the human health hazards of urban runoff?
2) How effective are water testing and advisory warning posting procedures?
3) What are the best management practices to divert and treat urban runoff in a growing Orange County?
4) How aware, educated and involved is the public regarding sources and hazards of urban runoff?

HISTORY/BACKGROUND

Orange County has 13 distinct watersheds containing rivers, creeks, tributaries and flood control channels that flow into harbors and ocean waters. From San Gabriel River in the north to San Juan Creek in the south, watersheds empty over 100 million gallons of urban runoff per day during dry seasons and 10 to 20 times that amount during rainstorms. The Lower Santa Ana River Watershed is the largest, extending from San Bernardino and Riverside Counties to the Pacific Ocean, covering about 25% of Orange County.

Orange County Watersheds

Watershed	Acreage	Termination
San Gabriel River/Coyote Creek	**31,952**	**Seal Beach**
Carbon Creek	**16,534**	**Seal Beach**
Los Alamitos/Bolsa Chica	**57,421**	**Huntington Harbor**
Talbert	**16,575**	**Huntington Beach**
Lower Santa Ana	**118,611**	**Newport Beach**
San Diego Creek	**86,881**	**Newport Bay**
East Costa Mesa/Newport Beach	**10,258**	**Newport Beach**
Los Trancos/Muddy Creek	**8,639**	**Corona del Mar**
Laguna Canyon Creek	**8,136**	**Laguna Beach**
Aliso Creek	**23,517**	**Aliso Beach**
Salt Creek	**4,741**	**Salt Creek Beach**
San Juan Creek	**103,684**	**Dana Point/Doheny**
Prima Desheca/Segunda Desheca	**24,602**	**San Clemente**

Source: Data Obtained from Orange County Public Facilities & Resources Department

Since 1999, the Orange County Health Care Agency has been responsible for enforcement of the amendment to the California State Health and Safety Code (AB411) to ensure that all public recreational ocean waters meet bacteriological water quality standards for swimming. When water fails to meet specific test standards the Agency will post advisory signs on the beach. Since this enforcement started, the Agency has had to post short-term and long-term warning signs at an average of ten beach locations each day. Many of these warnings may be attributed to the results of urban runoff. The media has given increased attention to this situation as newspaper articles on water quality in Orange County have increased from one or two per month in 1998 to ten per month in 1999 and 2000.

In 2000, the Orange County Board of Supervisors declared improved water quality a top priority for the County and designated the County's Public Facilities & Resources Department (PFRD) as the lead department for all water quality activities. In coordination with two State Regional Water Quality Control Boards, PFRD oversees the efforts of some 50 separate entities including cities, sanitation districts and water districts. The County Executive Officer also established a Watershed & Environmental Programs Office to provide a Countywide perspective on water quality programs. Significant accomplishments toward urban runoff management are shown below:

Recent Accomplishments to Improve Water Quality in Orange County

Board of Supervisors	**Designated Public Facilities & Resources Department (PFRD) as County Lead for Water Quality**
PFRD	**Formed a Watershed & Coastal Resources Division to Implement Responsibility as County Lead**
County Executive Officer	**Established a Watershed & Environmental Programs Office to Provide Countywide Perspective & Co-ordinated Policy on Programs**
PFRD	**Submitted National Pollutant Discharge Elimination System (NPDES) Permit Applications to San Diego & Santa Ana Regional Water Quality Control Boards**
PFRD, et al	**Completed Huntington Beach Water Quality Investigations, Phases I & II**
PFRD, et al	**Formed Aliso Creek Watershed Management Team to Include All Cities, Water Districts and Sanitation Districts in Watershed**
Board of Supervisors	**Allocated $250K FY2000 Matching Funds for Coastal Cities Urban Runoff Treatment and Diversion Programs**
Board of Supervisors	**Allocated $1M FY2001 Matching Funds for All Cities Urban Runoff Treatment and Diversion Programs**
Orange County Sanitation District	**Adopted New Dry Weather Urban Runoff Diversion Policy to Receive and Treat Urban Runoff**
Health Care Agency	**Established 24-hour Ocean & Bay Posting and Closure Hotline & Web Page**
OC Coastal Coalition	**Conducts Monthly Meetings and Special Working Groups with Representatives of All Public and Private Agencies Involved in Water Quality**

The Need for Additional Epidemiological Studies

The amendment to the California State Health and Safety Code (AB411), which was enacted in 1997, significantly changed the way ocean water is tested in California. The new law requires more stringent water testing. Lower counts of specified “indicator” bacteria in the water trigger warning or closure signs on adjoining beaches with public access. County health officials indicate that the law was passed largely on the strength and findings of a single epidemiological study and subsequent report conducted by the Santa Monica Bay Restoration Project in 1995. The study entitled *An Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa Monica Bay* sought to answer the frequently asked question, “How safe is it to swim in Santa Monica Bay?”

The study attempted to confirm a statistically significant increase in illness directly associated with swimming in ocean waters contaminated by urban runoff. These maladies included both gastrointestinal and upper respiratory illness. The study conducted in-person interviews with ocean bathers followed by telephone inquiries several days later.

As credible as the study appears to be, it would seem prudent, from a fiscal as well as scientific perspective, to complete and analyze epidemiological studies in Orange County coastal areas to confirm the findings shown in the Santa Monica Bay study. As millions of public dollars may be spent to correct deleterious effects of urban runoff, there should be no question of real public health risk.

Because of the importance of any new epidemiological studies, it is vital that the Health Care Agency coordinate with universities and other research organizations and individuals to post results of their studies on a common, well-advertised internet web site available to a wide audience. Faculty members at California State University, Fullerton and University of California, Irvine have expressed interest in creating such a site.

Water Testing and Enforcement

The Orange County Health Care Agency has the primary responsibility to implement the ocean water monitoring standards. The Orange County Health Care Agency is required to test water and enforce standards for total coliform, fecal coliform and enterococcus bacteria in waters adjacent to public beaches. Water samples are collected and tested from 150 points within the County by four agencies:

1. Orange County Health Care Agency (HCA)
2. Orange County Sanitation District (OCSD)
3. Aliso Water Management Agency (AWMA)
4. South East Regional Reclamation Authority (SERRA)

For years, the OCSD, AWMA and SERRA have been collecting and testing water samples at beach areas adjacent to their treated wastewater outfall pipes. They now also forward test results to the Health Care Agency which adds test results from its sampling locations and logs the combined results for the County.

The Health Care Agency and sanitation district laboratories do not directly test swimming waters for several medically important viruses. The laboratories do, however, test for water borne pathogens. These tests are easier to perform and less expensive than tests for viruses. Certain bacteria are considered good indicators of the potential presence of viruses that can cause human illness.

Once the water is sampled, results are reviewed by the Health Care Agency's Ocean Recreational Water Protection staff to ensure that all public recreational ocean water meets bacteriological water quality standards for swimming. HCA program specialists protect public health and safety along the entire Orange County coastline, including the harbors and bays by performing the following activities:

- Respond on a 24-hour basis to investigate reports of sewage or toxic contamination incidents affecting use of ocean or bay waters
- Initiate ocean and bay closure procedures following sewage or toxic releases. Sample and monitor affected areas until water conditions return to safe levels
- Initiate enforcement or quarantine actions when water samples fail to meet established standards
- Participate in special studies with other public agencies to identify and eliminate sources of water pollution
- Investigate reports of illness and complaints received from the public regarding ocean and bay water, public beaches, and other public recreational waters
- Maintain a 24-hour Ocean/Bay Posting and Closure Hotline and Web Page with the latest closure, posting or advisory status for all of Orange County
- Prepare Beach Advisory press releases following significant rainfall events advising the public to avoid storm drain outlet areas for 72 hours

The affected beach Marine Safety or Lifeguard Department posts and removes the signs upon notification from HCA by telephone, E-mail and Fax. The lifeguards also enforce the warnings using public address announcements and beach patrols. Enforcement appears to be consistent at all beaches and lifeguards report that the public is generally aware and cooperative. Lifeguards also note that some bathers ignore or do not appear to see the posted signs and this was also witnessed by Grand Jury members during site tours. It would be more effective if all signs were posted in English and other languages.

Closure and Advisory Warning Signs Posted by Health Care Agency

	Ocean or bay water advisories are issued to alert the public of possible elevated bacteria levels associated with urban runoff and storm runoff at storm drains, creeks and rivers that can impact ocean and bay waters
	Ocean and bay waters are posted when bacterial levels in water exceed health standards
	Ocean and bay waters are closed when an immediate health hazard is identified such as a sewage spill. (Sign is also posted in Spanish)
	Long term postings occur at locations where bacteria levels consistently exceed health standards, usually from the impact of urban runoff

Source: Orange County Health Care Agency

Water samples are collected at least once per week but since tests take 24 hours, warning signs are usually posted the following day. By the time the warning signs are posted, the water is often already clear of bacteria. This is because most samples are taken in the morning and sunlight ultraviolet destroys bacteria during the day. Ocean tides and currents may also move or dilute the contamination by that time. More rapid test technology and techniques must be

developed to ensure the public is advised while an area is contaminated and not after the fact.

The HCA has maintained a log of all health advisory warnings since July 1999. The table below summarizes all beach advisory warnings for the past year. All beaches in the County had postings except Sunset Beach. The three most chronic areas for number of postings are Newport Bay, Huntington State Beach and Laguna Beach. In terms of total days posted, the South County beaches appear to have the most advisories that last more than a couple of days. Newport Bay had three locations posted for the entire year and Dana Point had two.

The Grand Jury also examined the posting logs for 1999. For a comparable period (July through December) the total number of postings is nearly identical in 1999 and 2000. Virtually no improvement has occurred.

Orange County Beach Health Advisory Warnings Posted for 2000

Posting Location	Number of Postings	Total Days Posted
Seal Beach/Surfside	**8**	**109**
Sunset Beach	**0**	**0**
Huntington Harbour	**27**	**196**
Bolsa Chica State Beach	**5**	**11**
Huntington City Beach	**7**	**13**
Huntington State Beach	**38**	**259**
Newport Beach	**17**	**42**
Newport Bay*	**73**	**1,476***
Crystal Cove State Park	**9**	**23**
Laguna Beach	**32**	**77**
Aliso Beach	**13**	**23**
Monarch Beach	**5**	**49**
Salt Creek Beach	**3**	**4**
Dana Point Harbor**	**12**	**739****
Doheny State Beach Park	**9**	**315**
Capistrano County Beach	**6**	**248**
Capistrano Bay District	**7**	**107**
Poche Beach	**5**	**163**
San Clemente City Beach	**8**	**20**
San Clemente State Beach	**1**	**3**
County Total	**285**	**3,877**

***Includes 3 long term postings totaling 1095 days**

****Includes 2 long term postings totaling 569 days**

Source: Data Obtained from Orange County Health Care Agency

Watershed Management Practices

The federal Clean Water Act and the Environmental Protection Agency require all county and city entities have a National Pollutant Discharge Elimination System (NPDES) Permit. These are five-year permits issued by the Santa Ana Regional Water Quality Control Board for North County areas and the San Diego Regional Water Quality Control Board for South County areas. The permits are issued to the County with the cities as co-permittees. All municipalities are thus required to control pollutants entering the storm drain system and to have the legal authority to prohibit illicit discharges. Many cities use their NPDES permit application as an opportunity to adopt a Water Quality Master Plan.

Various urban runoff management practices are being applied throughout the County:

- Many watersheds have some natural biofiltration through wetlands and catch basins
- All cities are required to stencil storm drains that empty into the ocean
- Some cities and CALTRANS have installed storm drain filters
- Street sweeping has been increased, particularly in commercial areas
- Sanitation agencies are accepting some runoff diversion during dry weather
- Municipalities have implemented administrative citation programs

However, urban runoff needs be addressed as a watershed or regional issue rather than a local municipality issue. A good example is the Aliso Creek Watershed.

The Aliso Creek Watershed is 35 square miles of hilly terrain descending 2,400 feet from the crest in Cleveland National Forest 20 miles to the beach. The creek has no natural water sources. During dry weather the entire flow is from urban runoff accumulating to about 4 million gallons per day (MGD) until it empties into the ocean at Aliso Beach. When it rains, the creek is a major storm channel sending as much as 100 MGD through its steep terrain. Erosion concerns and environmental restoration interest first led the U.S. Army Corps of Engineers to conduct a Reconnaissance Study in 1996. The Corps' resulting multi-phase project plan formulated the basis to create what is now a comprehensive Aliso Creek Watershed Management Team with local entity participation.

The Aliso Creek Watershed is a classic case for urban runoff management practices. A local Water Quality Study completed in 1998 showed an unacceptable level of contamination throughout the watershed and resulted in a Cleanup and Abatement Order from the San Diego Regional Water Quality Control Board. There are three "hot spots" that consistently fail to meet standards.

- The J03P02 storm drain is the most nagging. Located at the base of a Laguna Niguel residential area, two years of studies have not determined the

source of alarmingly high levels of fecal coliform. Diverting its flow through the Moulton Niguel Water District collection system for treatment at the AWMA regional plant has temporarily prevented the contaminated water from entering Aliso Creek. The City of Laguna Niguel has recently constructed a biofiltration wetland along Alicia Parkway and plans to filter the entire residential drainage area with additional wetlands in the next year.

- Munger storm drain in the upper watershed has a similar but not as severe contamination problem. By the summer of 2002, the County plans to install a rock filtration box at the drain outlet to mitigate this problem.

- Dairy Fork storm drain in Aliso Viejo is the third hot spot. Its outlet is within a park area but is currently fenced off from the public. A major wetlands construction project is scheduled to filter the stormwater in a natural setting.

To keep Aliso Beach open, the County built a sand berm at the mouth of Aliso Creek and diverted the water, untreated, through the Aliso Water Management Agency outfall pipe, which terminates two miles offshore. The berm is only in operation from May to October and requires Coastal Commission approval. The Aliso Creek Watershed Management Team in conjuction with the U.S. Army Corps of Engineers has initiated a multi-phase program plan to address these and other issues at a cost more than $16 million over the next eight years.

Aliso Creek Watershed Management Team Programs

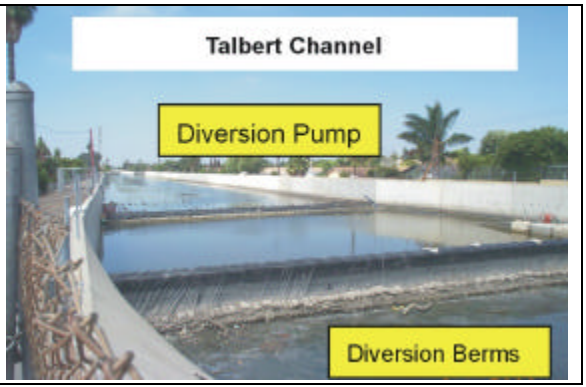
Date	Program	Participant(s)
1996-1997	Reconnaissance Study	U.S. Army Corp of Engineers
1997-1998	Water Quality Study	PFRD, et al
1998-1999	Feasibility Study	PFRD & 12 Local Agencies/Cities
Dec. 1999	Cleanup & Abatement Order	San Diego Regional Water Quality Control Board
July 2000	J03P02 Diversion	Moulton Niguel Water District, AWMA & City of Laguna Niguel
July 2000	Clear Creek Pilot Test	South Coast Water District & Moulton Niguel Water District
Summer 2000	Aliso Creek Diversion Berm	PFRD, City of Laguna Beach & AWMA
2000-2001	Short Term Strategies Diversion & Mobile Filtration	Aliso Creek Watershed Management Team
2002-2004	Medium Term Strategies ($3.3M) Landscape Controls Rubber Dam Biofiltration Basins Bacteria Transport Model	Aliso Creek Watershed Management Team
2003-2008	Long Range Strategies ($13M) Stream Stabilization Wetlands Restoration Wetlands Construction Lake Management	Aliso Creek Watershed Management Team

Source: Data Obtained from Orange County Public Facilities & Resources Department

There are currently two other watersheds with management teams in place: San Diego Creek/Newport Bay and San Juan Creek. Watershed teams like these are a true partnership whereby beach and inland cities and water agencies commit to programs and projects to benefit the entire watershed. The commitment includes financial contributions and services under a predetermined formula that accounts for population and land area of each entity.

Several jurisdictions have implemented dry weather urban runoff diversion programs. The 1999 Huntington Beach closure investigation suggested that runoff to the Pacific Ocean from the Talbert Channel may have contributed to the shoreline contamination. This single event triggered the Orange County Sanitation District to institutionally move in a new direction. Historically, OCSD prevented runoff and storm water from entering the sewer system to avoid overflow and exceeding its wastewater treatment capacity. A closer look at the situation by OCSD allowed it to adopt a new policy whereby it will now accept up to 10 MGD of dry weather urban runoff year-round with no charge for the first 4 MGD. The benefit is that runoff is treated as wastewater and discharged through the District's outfall pipe four miles offshore, away from local beaches. Cities can set up diversion by pumping from a stormwater well into a diversion pipe, which taps into the sewer line. The pump is then shut off during storms.

Huntington Beach has nine such diversions totaling close to 1 MGD. Seven more are proposed in Newport Beach, Huntington Beach and the Santa Ana River for Summer 2001 to bring total diversion to OCSD to 2.3 MGD. In South County there are low-flow diversion projects that total about 0.5 MGD. The City of Dana Point now diverts runoff from Pacific Coast Highway to the SERRA treatment plant. Several diversions are installed in Laguna Beach and Emerald Bay.



Photos Courtesy of Orange County Sanitation District

Another treatment option is on-site mobile filtration. In July 2000, the South Coast Water District and the Moulton Niguel Water District tested this technique at Aliso Creek. Pilot tests showed that a multi-stage combination of filtration, reverse osmosis and ultraviolet light is an effective method of treating urban runoff for the removal of total coliform and fecal coliform. These are generally low-flow units (<1MGD) but offer the opportunity to clean creek water at several locations and bring it to recreational standards throughout the watershed. In March 2001, the

City of Laguna Niguel began a six-month demonstration project of a mobile filtration system to treat the J03P02 contaminated water. It appears that mobile filtration could effectively supplement natural wetland filtration.

The Grand Jury's assessment of these watershed management practices reveals several issues. There is no centralized data base for the effectiveness of the various urban runoff treatment options that watershed management teams can use to efficiently apply public funds. The science is still in its infancy and projects are highly customized and fragmented. There is a tendency to do anything and everything and hope the right choices are made.

There is also some question of how best to measure progress. The number of health advisory warnings is currently the only real measure. Much money can be spent on projects over the next few years before determining any real progress. Toward this end the State Regional Water Quality Control Boards have started to impose Total Maximum Daily Load (TMDL) standards for waterways. These come in several categories like sediment, nutrients, chemicals and even trash, as well as bacteria. This process will require more water sampling, testing, recording and analysis but it will provide an intermediate measure of progress specific to each waterway.

Orange County does not have an overall strategic plan to manage urban runoff. Such a plan should establish watershed priorities, set time-phased goals, match funds with measurable progress and provide better aim to the current shotgun approach. A Water Quality Strategic Plan should get immediate attention from the County's Watershed & Environmental Programs Office and PFRD.

Public Awareness and Education

There has been considerable public outreach from a variety of sources on the subject of beach water quality and closures. Several non-profit organizations actively inform the public about practices that contribute to the problem of beach water closures. The Orange County Health Care Agency's web site lists current beach water closures, and the Orange County Register publishes this information daily in its newspaper. The Orange County Sanitation District distributes brochures and pamphlets during plant tours, the Orange County Fair, beach cleanup gatherings and other public functions.

As part of the NPDES 2000 permit renewal application, the County and all co-permittees have committed to participate in joint outreach efforts to ensure a consistent message to the general public about water quality. Plans include a Public Education Committee, public surveys, residential mailings and displays at community events. These efforts will educate the public on the fact that the County stormwater drainage system is separate from the sewer system and that anything put into a storm drain will end up in the ocean. A Countywide program,

The Ocean Begins at Your Front Door, has been promoted in recent years and will now be greatly expanded.

Non-profit organizations such as the Surfrider Foundation and Orange County Coastkeeper have successful outreach programs not only for the general public but also to assist school districts with programs to educate children regarding the importance of clean beaches and clean water. Although there are state standards for science that must be met, there is no mandate to specifically teach water ecology. Each local school district has discretion to select subject matter. Many beach area school districts have existing programs but there is a need to expand water quality school education to the inland areas.

Ecology clubs, scouting programs, and beach and waterway volunteer clean-up events are promoted through local government, schools, private organizations and non-profit groups. However, there is no central location to promote and coordinate activities for volunteers, sponsors or community groups.

The Grand Jury attended the open house for the recent relocation of the Orange County High School of the Arts. The school administration expressed a desire to support public education by having their students participate in the production of public service announcements, videos and other artistic endeavors.

Internet web sites are very effective for communicating information to the public. The Grand Jury observed that the County web site has not been updated to reflect the recent organizational revisions in PFRD nor the addition of the Watershed & Environmental Programs Office. There is a link on the County web site for volunteer opportunities but it is limited and not current.

METHOD OF STUDY

The Grand Jury interviewed the Orange County CEO's Watershed & Environmental Programs Office, the Public Facilities & Resources Department and its Watershed and Coastal Resources Division. To gather information on the processes and procedures for water testing, the Grand Jury visited and interviewed all pertinent Orange County Health Care Agency divisions including Regulatory Health Services, Environmental Health Services, Public Health Services, Epidemiology and Disease Control and the Public Health Laboratory.

The Grand Jury visited major sanitation and water agencies in the County, including the Orange County Sanitation District, the Orange County Water District, the Irvine Ranch Water District, the Aliso Water Management Agency and the South East Regional Reclamation Authority. Ground and aerial tours of the Aliso Creek and the Lower Santa River watersheds were conducted. The Grand Jury visited the San Joaquin Freshwater Marsh, inspected long-term warning locations in Newport Bay and Dana Point and interviewed lifeguards from Seal Beach, Huntington Beach, San Clemente and Laguna Beach.

A number of environmental groups including the Surfrider Foundation, Orange County Coastkeeper, Orange County Clean Water Now and the Seal Beach Chamber of Commerce made presentations to the Grand Jury. Committee members also regularly attended the monthly meetings of the Orange County Coastal Coalition, attended a water quality conference at California State University, Fullerton and interviewed researchers from University of California, Irvine. The Grand Jury also interviewed representatives from the San Diego Regional Water Quality Control Board.

FINDINGS

Under California Penal Code § 933 and § 933.05, responses are required to all findings. The 2000–2001 Orange County Grand Jury arrived at the following 14 findings:

1. The Santa Monica Bay epidemiology study that formed the basis of Health Care Agency testing standards for advisory warnings has not been replicated in Orange County coastal areas.

2. The scientific community conducts much worthwhile research on health and environmental impacts of urban runoff but there is no centralized County data base for sharing results.

3. Current Health Care Agency water test techniques take 24 hours before advisory warnings can be posted or removed.

4. Current state standards used by the Health Care Agency are based on indicator bacteria as opposed to actual presence of other pathogens.

5. Beachgoers often ignore or are oblivious to the Health Care Agency warning and closure signs as currently posted.

6. Watershed management teams have been formed for the Aliso Creek, San Diego Creek/Newport Bay and San Juan Creek Watersheds.

7. There is no County centralized data base of urban runoff treatment options and their effectiveness that could be used by local Orange County agencies.

8. There is no Strategic Plan for Orange County urban runoff management.

9. Local volunteer efforts are growing, contributing several thousand hours of manpower each year to County efforts toward cleaner watersheds, beaches and ocean water.

10. The Orange County web site does not reflect current PFRD organizational structure.

11. The Health Care Agency issues a daily press release regarding beach closures and advisory warnings.

12. Dry weather runoff diversion for treatment is limited to ten million gallons per day (MGD) at the Orange County Sanitation District and about 1MGD at AWMA and SERRA, less than 10% of the total County runoff flow.

13. Under the NPDES permit, Orange County PFRD and its co-permitees have committed to expanding their current outreach programs to educate the public regarding the pollution caused by urban runoff.

14. Water quality education is at the discretion of each local school district.

Responses to Findings 1-13 are required from the Orange County Board of Supervisors.

Responses to Findings 1-5, and 11 are requested from the Orange County Health Care Agency.

Responses to Findings 6-10 and 13 are requested from the Orange County Public Facilities and Resources Department.

Responses to Findings 6-9 are requested from the County Executive Office.

A Response to Finding 12 is required from the Orange County Sanitation District, Aliso Water Management Agency and the South East Regional Reclamation Authority.

A Response to Finding 14 is required from the Orange County Superintendent of Schools.

RECOMMENDATIONS

In accordance with California Penal Code § 933 and § 933.05, each recommendation requires a response from the government entity to which it is addressed. These responses are submitted to the Presiding Judge of the Superior Court. Based upon the findings, the 2000–2001 Orange County Grand Jury recommends:

1. The Orange County Health Care Agency should develop and institute a plan to conduct Countywide epidemiological research to validate present water quality standards and identify priorities based on health effects. (Finding 1)

2. The Orange County Health Care Agency should develop a computer data base library of water quality health and environmental research. (Finding 2)

3. The Orange County Health Care Agency should support the development of rapid and more direct test procedures to determine indicators of bacterial contamination. (Findings 3 & 4)

4. The Orange County Health Care Agency should post all advisory warning and beach closure signs in both English and Spanish. (Finding 5)

5. The County Executive Office should organize a formal Watershed Management Team for each recognized watershed in the County. (Finding 6)

6. The Orange County Public Facilities and Resources Department should develop a computer data base library of urban runoff projects, treatment options and their effectiveness to facilitate implementation of best management practices. (Finding 7)

7. The County Executive Office and the Orange County Public Facilities and Resources Department should develop a Water Quality Strategic Plan for Orange County. (Finding 8)

8. The County Executive Office should establish a Community Programs Specialist position to coordinate and promote volunteer and sponsorship programs, establish a speakers bureau, develop and distribute brochures and Public Service Announcements, issue press releases, and establish and maintain a page on the Orange County web site devoted to the environment. (Finding 9)

9. The Orange County Public Facilities and Resources Department should update its web site to reflect current PFRD organizational structure and provide links to research studies database, urban runoff treatment projects database and volunteer programs database. (Finding 10)

10. The Orange County Health Care Agency issues daily press releases about current beach water closures, and should use the opportunity to give a daily tip about practices that could curtail contributing to the problem. (Finding 11)

11. The Orange County Sanitation District, Aliso Water Management Agency and the Southeast Regional Reclamation Authority should develop and institute a plan to divert dry weather water flows from all storm drains in chronic areas of concern. (Finding 12)

12. The Superintendent of Schools should develop water quality education curricula, instruction materials and in-service opportunities for use in all school districts. (Finding 14)

Responses to Recommendations 1-10 are required from the Orange County Board of Supervisors.

Responses to Recommendations 1-4 and 10 are requested from the Orange County Health Care Agency.

Responses to Recommendations 6,7 and 9 are requested from the Orange County Public Facilities and Resources Department.

Responses to Recommendations 5-8 are requested from the County Executive Office.

A Response to Recommendation 11 is required from the Orange County Sanitation District, Aliso Water Management Agency and the South East Regional Reclamation Authority.

A Response to Recommendation 12 is required from the Orange County Superintendent of Schools.

COMMENDATIONS

The 2000–2001 Orange County Grand Jury recognizes and commends the Orange County Coastal Coalition for its continued search for solutions to ocean water pollution, beach deterioration and marine wildlife preservation. The coalition's informal monthly meetings are an excellent forum for bringing together representatives of public agencies, environmental groups and private citizens involved in Orange County coastal water quality.

APPENDIX

U.S. Army Corps of Engineers, *Aliso Creek Watershed Management Study*, May 1999

Orange County Public Facilities & Resources Department, *Aliso Creek Water Quality Planning Study*, June 2000

Orange County Public Facilities & Resources Department, *Aliso Creek Watershed Strategic Plan*, September 2000

Orange County Public Facilities & Resources Department, *Report of Waste Discharge, Second Term NPDES Permit Program Summary (2 volumes)*, September 2000

Santa Monica Bay Restoration Project, *A Health Effects Study of Swimmers in Santa Monica Bay*, May 5, 1996

Orange County Health Care Agency, Environmental Health Services Division, *Ocean Recreational Water Protection Program*, current

Orange County Health Care Agency, Environmental Health Services Division, *AB411 Posting Log for 1999-2001*, March 2001

Orange County Health Care Agency, Environmental Health Division, *Beach Warnings Posted for 2000 Log*, March 2001

Orange County Public Health Laboratory, *Water Quality Protocols*, February 7, 2001

Orange County Sanitation District, *Dry Weather Urban Runoff Diversion Program*, March 2001

AWMA/SERRA, *Water Diversion Fact Sheets,* March 19, 2001

Clear Creek Systems, Inc., *Aliso Creek Pilot Test Urban Runoff Treatment System*, August 22, 2000

City of Seal Beach, *Master Plan of Drainage*, May 1999

City of Seal Beach, *Storm Water Quality Management Plan*, February 2001

UC Irvine, et al, *Huntington Beach Water Quality Investigation Phase II: An Analysis of Ocean, Surf Zone, Watershed, Sediment and Groundwater Data Collected from June 1998 through September 2000* (Draft), November 15, 2000

City of Newport Beach, *Orange County Coastal Coalition Briefing,* March 22, 2001

City of Dana Point, *Water Quality Briefing*, January 2001

Aliso Creek Termination at Aliso Beach

Munger Storm Drain in Upper Aliso Creek Watershed

Recently Constructed Wetlands in Laguna Niguel to Filter Urban Runoff into J03P02 Storm Drain that Empties into Aliso Creek (View 1)

Recently Constructed Wetlands in Laguna Niguel (View 2)

J03P02 Storm Drain outlet to Aliso Creek