

**ECONOMIC CONSIDERATIONS OF THE
PROPOSED ORDER (February 25, 2008)**

**STATE OF CALIFORNIA
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION**

**ORDER 08-xxx
NPDES PERMIT NO. CAS004002
WASTE DISCHARGE REQUIREMENTS
FOR
STORMWATER (WET WEATHER) AND NON-STORMWATER (DRY WEATHER)
DISCHARGES FROM
THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS WITHIN THE
VENTURA COUNTY WATERSHED PROTECTION DISTRICT, COUNTY OF
VENTURA AND THE INCORPORATED CITIES THEREIN**

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**Final Report
6/18/2008**

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EXECUTIVE SUMMARY

This report considers the economic impacts of not implementing, and implementing, the proposed Ventura County Stormwater Municipal Separate Storm Sewer Systems (MS4) Permit.

By not implementing the permit, stormwater pollution will degrade the water quality of rivers, coastal shorelines, beaches, lakes, reservoirs, bays, harbors, estuaries, groundwater, wildlife habitats and wetlands in Ventura and Los Angeles counties. Many of these waterbodies do not meet established water quality standards and are included on US EPA's 303(d) List of Water Quality Limited Segments. Many of these listed waterbodies are close to developed urban areas that are prone to stormwater pollution that will be the objective of this permit.

The 2006 303(d) list includes 488 miles of rivers and streams, 30 miles of coastal shorelines and beaches, 148,000 acres of bays, harbors, estuaries, lakes and reservoirs, and 12,000 acres of sensitive ocean habitat (Areas of Special Biological Significance). Also, the county overlies 527,000 acres of critical groundwater basins. All of these features and areas are subject to degradation from stormwater pollution that the Stormwater MS4 Permit is designed to reduce. The economic impact of not implementing the Permit was not quantified because the type and amount of stormwater pollution, and the extent and effectiveness of the permit conditions were not known.

The economic considerations of implementing the MS4 Stormwater Permit include the effect on public agencies, residents and commercial interests. This study focused on the economic effects on the public agencies responsible for implementing and complying with the conditions of the Permit. Estimating the economic impacts on residents and commercial interests would require that dischargers be identified and located. Residential and commercial development would also have to be projected to determine the costs of implementing and complying with the Industrial/Commercial Business Program, the Planning and Land Development Program and the Development Construction Program. These tasks were outside of the limits of this study.

Engineers from the California State University, Sacramento (CSUS), University of Southern California (USC), and the University of California at Los Angeles (UCLA) conducted a study funded by the State Water Resources Control Board to estimate the cost of implementing stormwater MS4 permits in six cities. Data from that study was used as a basis for this study. The CSUS study surveyed five municipalities and one metropolitan area that have implemented a MS4 permit. Cost data was collected and organized using a set of programs defined by US EPA that served as a basis for transferring the results to other cities.

Three cost scenarios based on the CSUS survey were selected to estimate the cost of implementing the Ventura County MS4 Stormwater Permit. They ranged from \$27.60 to \$42.00 (2008\$)¹ per household annually. Total annual cost ranged from \$7.1 million to \$10.9 million (2008\$). The Public Agency Program, which includes street cleaning and storm drain cleaning, is projected to comprise 62 percent of the total cost to public agencies for implementing and complying with the proposed permit.

INTRODUCTION

The purpose of this analysis is to consider the economic effects of, not implementing, and implementing, the proposed Ventura County Stormwater permit. Considering economic effects allow evaluation of proposed actions in terms of economic values. This report presents a qualitative, and where possible, a quantitative evaluation of the positive and negative economic effects of the proposed permit.

This report is organized into two sections. The first section identifies the areas and activities that are affected by stormwater pollution if the Permit was not implemented. The second section contains a

¹Indicates the year the dollar value was indexed.

discussion of the data sources and methodology used to estimate the cost of implementing the permit, descriptions of the Principal Permittee and Permittees, and an estimation of the cost of implementing and complying with the proposed permit.

ECONOMIC CONSIDERATIONS OF NOT REGULATING STORMWATER

Not regulating Ventura County stormwater will result in greater contamination of rivers, streams, lakes, reservoirs, bays, harbors, estuaries, groundwater, coastal shorelines and wetlands. The benefit of the Stormwater Permit is to improve water quality, enhance beneficial uses and increase employment, income and satisfaction from environmental amenities. Most of the benefits of the permit can be identified and, in some cases, quantified in monetary terms. Others cannot be expressed in dollar terms and can only be described. This report compiles the information and data that exists on areas and activities that will be covered by the permit. It does not attempt to value the improvements that will result from the permit because activities subject to the permit has not been identified, and the relationship between stormwater discharges and water quality levels is not known.

The Los Angeles Regional Board's Basin Plan designates beneficial uses for surface and groundwater, and sets narrative and numerical objectives that must be attained or maintained to protect the designated use. These data serve to identify the activities that will benefit as a result of pollution reductions but they are not sufficient to estimate economic values.

Waterbodies Affected by Stormwater Pollution

This section contains the identification of waterbodies that exceed established water quality objectives and reduce the value of identified beneficial uses. The quality of these waterbodies will be improved by implementing the Ventura County Stormwater Permit.

Under Section 303(d) of the 1972 Clean Water Act, states are required to develop a list of water quality limited segments. These waters on the list do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution control technology. The law requires that these jurisdictions establish priority rankings for water on the lists and develop action plans, called Total Maximum Daily Loads (TMDL), to improve water quality.

The TMDL is a number that represents the assimilative capacity of receiving waters to absorb a pollutant. The TMDL is the sum of the individual wasteload allocations for point sources, load allocations for nonpoint sources plus an allotment for natural background loading, and a margin of safety. TMDLs can be expressed in terms of mass per time (the traditional approach) or in other ways such as toxicity or a percentage reduction or other appropriate measure relating to a state water quality objective. A TMDL allocates the total allowable pollution among the different pollutant sources (through the permitting process or other regulatory means) to ensure that the water quality objectives are achieved.

On June 28, 2007, USEPA gave final approval to California's 2006 Section 303(d) List of Water Quality Limited Segments. Presented here are the 303(d) listed areas subject to stormwater pollution and will therefore benefit from implementing the Ventura County Stormwater permit.

Rivers and Streams

Beneficial uses of rivers and streams generally include recreation and wildlife habitat and commercial and sport fisheries. In a few cases, they are used as a source of drinking water. Many regional streams are primary sources of replenishment for major groundwater basins that supply water for drinking and other uses, and as such must be protected as groundwater recharge. Improving water quality that enhances beneficial uses is a benefit to the Ventura County Stormwater Permit. Estimating the economic benefit in

monetary terms is only possible after linking discharges and water quality, and determining the extent and effectiveness of the required BMPs.

Under federal law, all surface waters must have water quality standards designated in the Basin Plans. Most of the inland surface waters in the Los Angeles Regional have beneficial uses designated for them. Those waters not listed (generally smaller tributaries) are designated with the same beneficial uses as the streams, lakes, or reservoirs to which they are tributary. This is referred to as the "tributary rule." They do not appear on any of the following maps or included in any of the area totals.

Figure 1 depicts the major watersheds, and the 303(d) listed rivers and streams in Ventura County. Stormwater runoff from developed areas affect, not only waterbodies that are located in Ventura County, but also in Los Angeles County. 303(d) listed rivers originating in southern Ventura County (Santa Monica Bay watershed) flow through the western part of Los Angeles County and into the 303(d) listed Santa Monica Bay.

Table 1 contains the 303(d) listed rivers and streams by major watershed, their lengths, identified pollutant and the sources of pollution. There are 488 miles of rivers and streams that are listed for various pollutants.

Figure 2 includes the urban areas under the Stormwater Permit and indicates their spatial relationship to the 303(d) listed rivers and streams. The Calleguas Creek river system has 119 miles that are 303(d) listed. Calleguas Creek is located in southern Ventura County in close proximity to the cities of Thousand Oaks, Moorpark, Simi Valley and Camarillo. These urban areas have a combined population of 172,000.



Source: State Water Resources Control Board
Figure 1. Ventura County Watersheds and 303(d) Listed Rivers and Streams, 2006.

Table 1. Ventura County 303(d) Listed Rivers and Streams Lengths, Pollutant, and Sources, 2006.

Watershed: Beneficial Uses			
River/Stream	Miles	Pollutant/Stressor	Sources
Santa Clara Watershed: Recreation, Habitat, Municipal, Agriculture, Groundwater, Freshwater Replenishment			
Piru Creek	77	Chloride, pH	Nonpoint Source
Santa Clara River	54	Toxicity, Total Dissolved Solids, Coliform Bacteria, Pesticides	Nonpoint/Point Source
Sespe Creek	54	Chloride, pH	Nonpoint Source
Hopper Creek	13	Sulfates, Total Dissolved Solids	Nonpoint/Point Source
Wheeler Canyon/Todd Barranca	10	Sulfates, Total Dissolved Solids	Nonpoint Source
Pole Creek	9	Sulfates, Total Dissolved Solids	Nonpoint Source
Brown Barranca/Long	3	Nitrate and Nitrite	Nonpoint Source
Total	220		
Calleguas-Conejo Creek Watershed: Industrial, Recreation, Municipal, Agriculture, Habitat, Groundwater, Freshwater Replenishment			
Calleguas Creek	98	Bacteria, Pesticides, Lubricants, Sedimentation, Trash, Total Dissolved Solids, Fecal Coliform	Agriculture, Natural Sources, Nonpoint/Point Source
Fox Barranca	7	Boron, Sulfates, Total Dissolved Solids	Nonpoint Source
2	12	Indicator bacteria	Source Unknown
Rio De Santa Clara/Oxnard Drain No. 3	2	Pesticides, Chemicals, Nitrogen, PCBs, Sediment	Nonpoint Source
Total	119		
Ventura River Watershed: Habitat, Municipal, Recreation, Agriculture, Industrial, Groundwater, Freshwater Replenishment			
Ventura River	27	Total Coliform, Nutrients, Trash	Nonpoint/Point Source
Matilija Creek	15	Fish Barriers (Fish Passage)	Dam Construction
San Antonio Creek	10	Nitrogen	Nonpoint Source
Canada Larga	8	Fecal Coliform, Low Dissolved Oxygen	Nonpoint Source, Confined Animals
Ventura River Estuary	1	Total Coliform, Nutrients, Trash	Nonpoint/Point Source, Confined Animals
Rincon Creek	8	Boron, Toxicity	Source Unknown
Total	69		
Cuyama Watershed: Municipal, Recreation, Agriculture, Habitat, Groundwater, Freshwater Replenishment			
Cuyama River	21	Boron	Source Unknown
Santa Monica Bay Watershed: Municipal, Industrial, Recreation, Agriculture, Habitat, Groundwater			
Las Virgenes Creek	12	Nutrients (Algae), Low Dissolved Oxygen, Sedimentation, Trash	Nonpoint Source
Lindero Creek	7	Nutrients (Algae), Selenium, Trash	Nonpoint Source
Malibu Creek	12	Nutrients, Sedimentation, Selenium, Sulfates, Trash	Nonpoint/Point Source
Medea Creek	8	Nutrients, Sedimentation, Selenium, Trash	Nonpoint Source
Triunfo Canyon Creek	11	Lead, Mercury, Sedimentation	Nonpoint Source
Total	50		
Los Angeles River Watershed: Municipal, Industrial, Recreation, Agriculture, Habitat, Groundwater, Freshwater Replenishment			
Bell Creek	9	Coliform Bacteria	Nonpoint/Point Source
Grand Total	488		

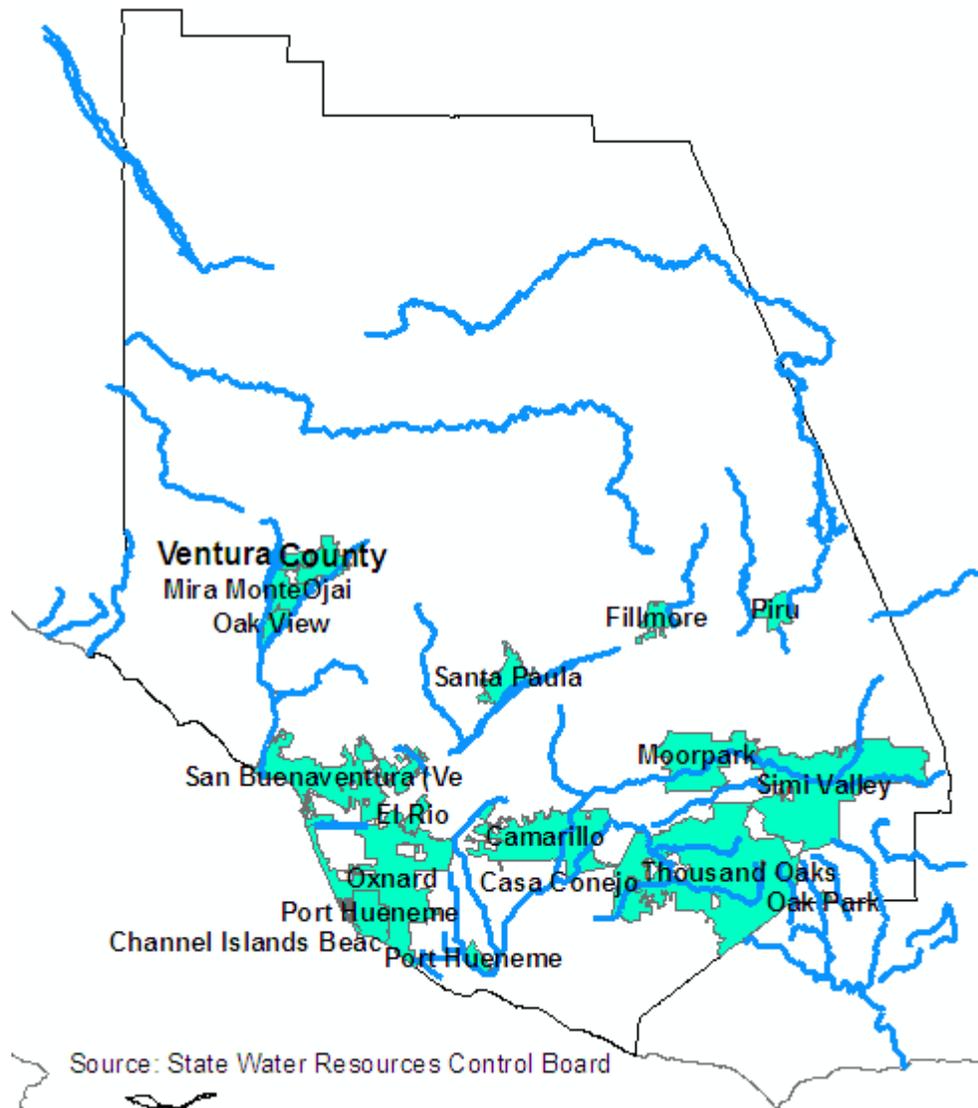
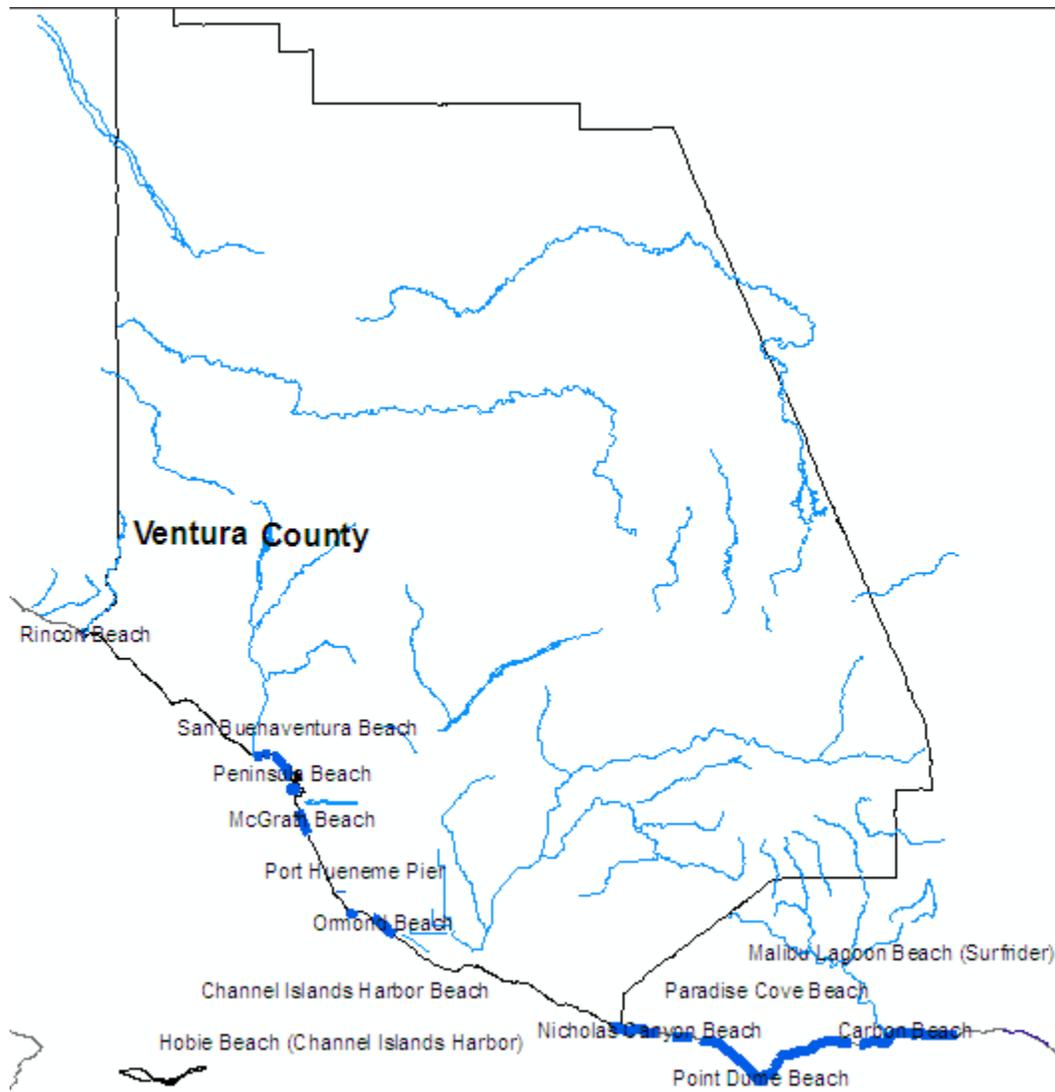


Figure 2. Ventura County Urban Areas and 303(d) Listed Rivers and Streams, 2006.

Coastal Shorelines and Beaches

Coastal waters in the Los Angeles Region include bays, estuaries, lagoons, harbors, beaches, and ocean waters. The Ventura Coast is the terminus of most of the rivers and streams listed in the previous section. Figure 3 shows those rivers and streams, and the 303(d) listed coastal shorelines and beaches. Beneficial uses for these coastal waters are habitat for marine life, recreation, boating, shellfish harvesting, and commercial and sport fishing.

A total of 29.65 miles of Ventura and Los Angeles County coastal shorelines and beaches are affected by Ventura County stormwater pollution (Table 2).



Source: State Water Resources Control Board

Figure 3. Ventura County 303(d) Listed Coastal Shorelines and Beaches, 2006.

Table 2. Length of Ventura County and a Portion of Los Angeles County 303(d) Listed Coastal Shorelines and Beaches, 2006

Feature	Miles
Point Dume Beach	2.50
Dan Blocker Memorial (Coral) Beach	2.05
Leo Carillo Beach (South of County Line)	1.77
San Buenaventura Beach	1.75
Paradise Cove Beach	1.66
Nicholas Canyon Beach	1.65
Ormond Beach	1.64
Zuma Beach (Westward Beach)	1.59
McGrath Beach	1.51
Carbon Beach	1.46
Trancas Beach (Broad Beach)	1.26
Escondido Beach	1.21
Robert H. Meyer Memorial Beach	1.17
Las Flores Beach	1.12
Malibu Lagoon Beach (Surfrider)	1.01
Big Rock Beach	1.01
Malibu Beach	0.78
La Costa Beach	0.74
Ventura Marina Jetties	0.69
Amarillo Beach	0.64
Surfers Point at Seaside	0.53
Puerco Beach	0.50
Promenade Park Beach	0.37
Port Hueneme Pier	0.33
Sea Level Beach	0.22
Peninsula Beach	0.20
Rincon Beach	0.09
Channel Islands Harbor Beach	0.08
Hobie Beach (Channel Islands Harbor)	0.06
Pacific Ocean at Point Rincon	0.06
Total	29.65

Stormwater pollution also affects beach posting and closings. The following table presents the Ventura County beach postings and closing from the year 2000 through 2007 in terms of beach-mile-days. Beach-mile-days is an index that characterizes beach posting and closures in extent (miles) and duration (days). Although beach postings and closures have diminished because of efforts to reduce beach pollution, these data indicate the potential damage that can occur. Stormwater pollution is one cause of beach postings and contributes to beach closures. The Los Angeles County beaches affected by Ventura County pollution is not included in the posting and closure totals listed in the following table because time did not permit individual beach data to be identified and totaled.

Year	Posting	Closure
2000	45.31	-
2001	98.30	37.67
2002	14.62	2.69
2003	199.43	-
2004	25.00	-
2005	21.70	-
2006	3.50	-
2007	2.10	-

Source: State Water Resources Control Board, Beach Watch.

http://beachwatch.waterboards.ca.gov/BeachWatch/cla_common/BmdComparedCriteria.jsp

Lakes, Reservoirs, Bays, Harbors and Estuaries

Beneficial uses of lakes, reservoirs, bays, harbors and estuaries affected by stormwater pollution are municipal water supply, recreation and wildlife habitat. Figure 4 shows the location of those 303(d) listed waterbodies and their proximity to the 303(d) listed rivers and streams of Ventura County.

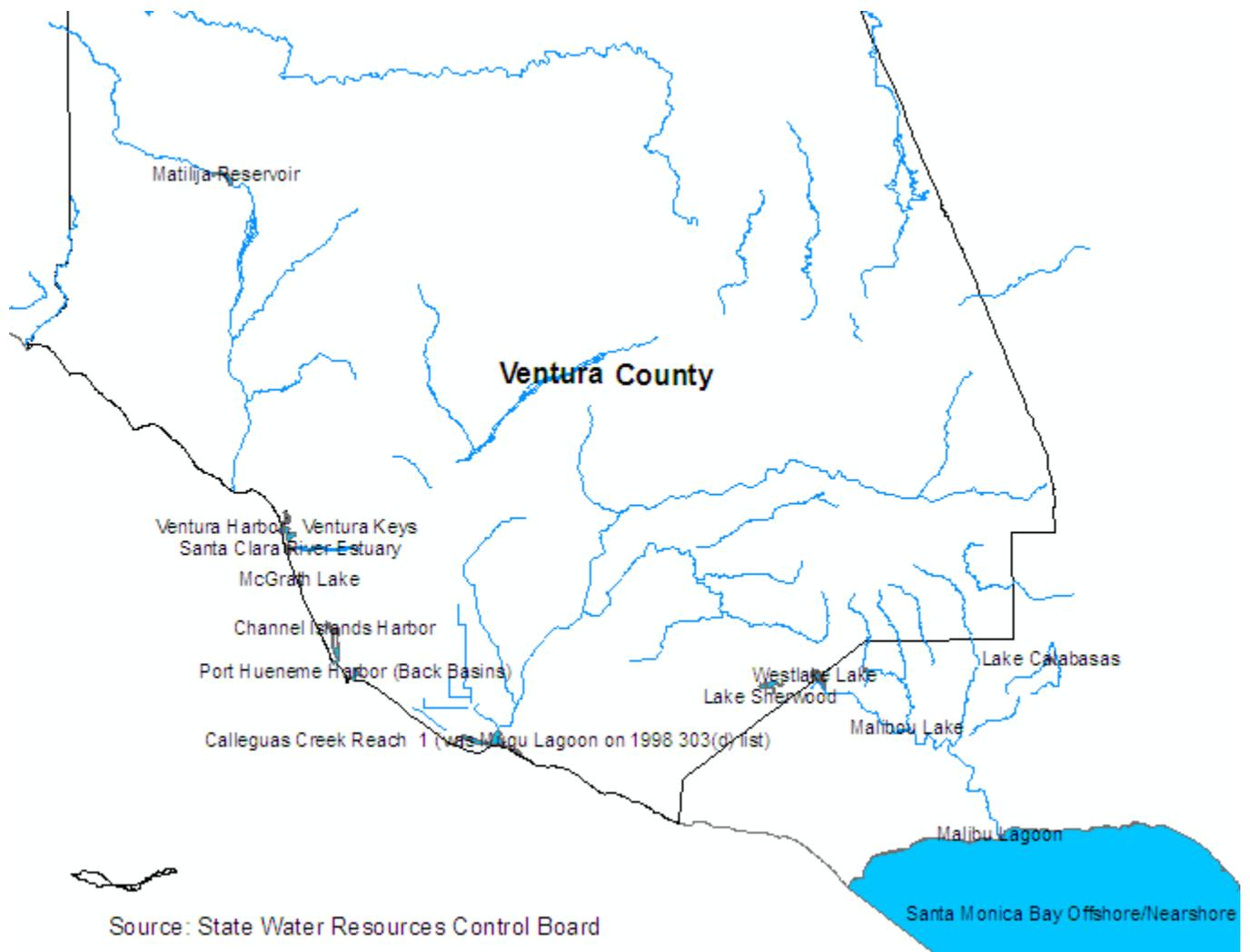


Figure 4. Ventura County 303(d) Listed Lakes, Reservoirs, Bays, Harbors and Estuaries, 2006.

A total of 148,030 acres of Ventura County bay, harbors, estuaries, lakes and reservoirs are 303(d) listed (Table 3). The largest listed waterbody is the 146,642 acre Santa Monica Bay that is the terminus of the southern Ventura County rivers and streams. The Ventura and Channel Islands harbors, the Calleguas Creek reach, and the Sherwood and Westlake lakes are vulnerable to Ventura County stormwater because of their proximity to urban areas.

Table 3. Acreage of Ventura County 303(d) Listed Lakes, Reservoirs, Bays, Harbors and Estuaries, 2006.

Bays and Harbors		Acres
Port Hueneme Harbor (Back Basins)		65
Ventura Harbor: Ventura Keys		179
Channel Islands Harbor		209
Santa Monica Bay Offshore/Nearshore		146,642
Total		147,095
Estuaries		
Santa Clara River Estuary		49
Malibu Lagoon		15
Calleguas Creek Reach		344
Total		408
Lakes/Reservoirs		
Matilija Reservoir		121
Lake Calabasitas		18
Malibu Lake		40
Westlake Lake		60
Lake Sherwood		135
McGrath Lake		20
Lake Lindero		15
Westlake Lake		119
Total		527
Grand Total		148,030

Source: State Water Resources Control Board

Groundwater

Beneficial uses for Ventura County groundwater basins include municipal, industrial and agricultural water supply. Occasionally, groundwater is used in aquaculture operations at the Fillmore Fish Hatchery. The 242,114 acre Cuyama Valley groundwater basin is the largest aquifer in the county but it is located in the rural area of the County (Table 4, Figure 5). The Santa Clara River Valley groundwater basins are located under a number of urban areas and total 125,702 acres. The designated groundwater basins underlie 526,993 acres of Ventura County.

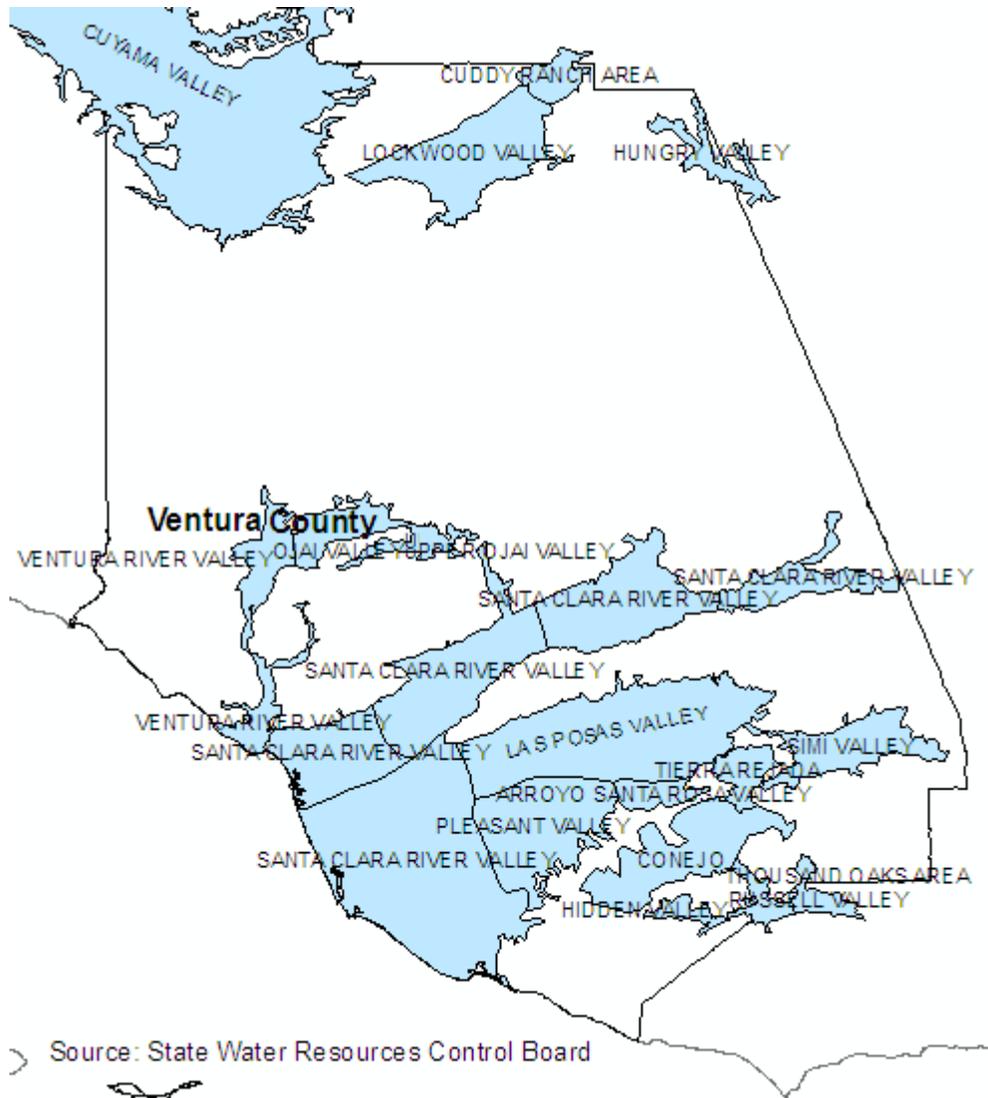


Figure 5. Ventura County Groundwater Basins

Table 4. Acreage of Ventura County Groundwater Basins

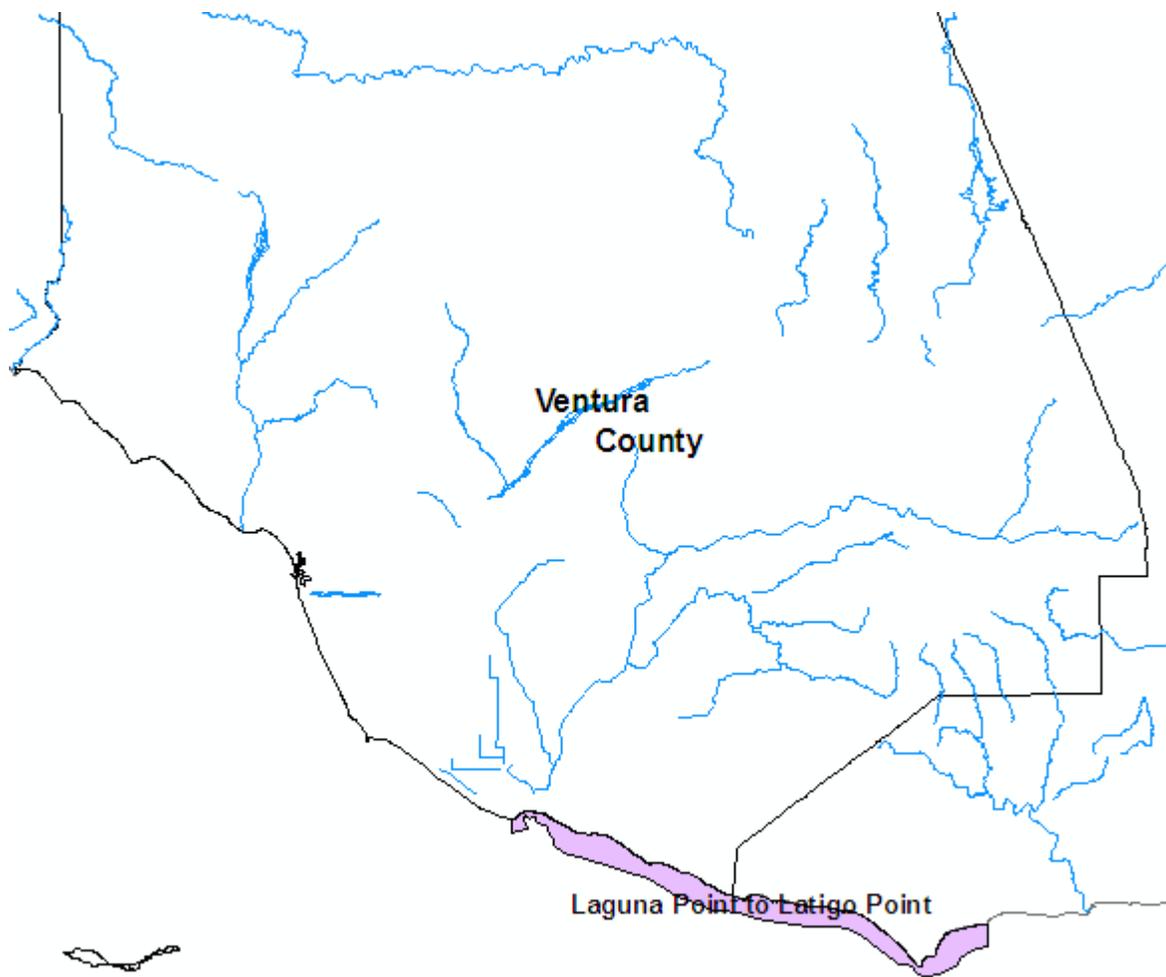
Groundwater Basin	Acreage
Arroyo Santa Rosa Valley	3,747
Conejo	18,848
Cuddy Ranch Area	4,213
Cuyama Valley	242,114
Hidden Valley	2,217
Hungry Valley	5,324
Las Posas Valley	42,353
Lockwood Valley	21,841
Ojai Valley	6,851
Pleasant Valley	21,654
Russell Valley	3,087
Santa Clara River Valley	125,702
Simi Valley	12,192
Thousand Oaks Area	3,115
Tierra Rejada	4,611
Upper Ojai Valley	3,815
Ventura River Valley	5,312
Total	526,993

Source: State Water Resources Control Board

Areas of Special Biological Significance

The Laguna Point to Latigo Point ASBS is located on the shoreline of Ventura and Los Angeles County and it is affected by Ventura County stormwater runoff (Figure 6). The ASBS is 11,842 acres.

A study completed by the Los Angeles Regional Water Quality Control Board in 1979 concluded that this ASBS is one of the least affected because of steep mountainous terrain, offshore currents and a publicly owned shoreline. However, the report mentioned the potential effect of outflows from Mugu Lagoon which contains stormwater runoff.



Source: State Water Resources Control Board

Figure 6. Ventura County Areas of Special Biological Significance

Wetlands

Wetlands include freshwater, estuarine, and saltwater marshes, swamps, mudflats, and riparian areas. As the California Water Code (§13050[e]) defines "waters of the state" to be "any water, surface or underground, including saline waters, within the boundaries of the state," natural wetlands are entitled to the same level of protection as other waters of the state.

Wetlands also are protected under the Clean Water Act (CWA), which was enacted to restore and maintain the physical, chemical, and biological integrity of the nation's waters, including wetlands. Regulations developed under the CWA specifically include wetlands "as waters of the United States" and defines them as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Although the definition of wetlands differs widely among federal agencies, the US EPA and the U.S. Army Corps of Engineers use this definition in administering the 404 permit program.

Recently, both state and federal wetlands policies have been developed to protect these valuable waters. Executive Order W-59-93 (signed by Governor Pete Wilson on August 23, 1993) established state policy guidelines for wetlands conservation. The primary goal of this policy is to ensure no overall net loss and

to achieve a long-term net gain in the quantity, quality, and permanence of wetland acreage in California. The federal wetlands policy, representing a significant advance in wetlands protection, was unveiled by nine federal agencies on August 24, 1993. This policy represents an agreement that is sensitive to the needs of landowners, more efficient, and provides flexibility in the permit process. The US EPA has requested that states adopt water quality standards (beneficial uses and objectives) for wetlands as part of their overall effort to protect the nation's water resources. The 1975 Basin Plan identified many waters which are known to include wetlands; these wetlands, however, were not identified as such. In the 1995 Basin Plan, a wetlands beneficial use category has been added to identify inland waters that support wetland habitat as well as a variety of other beneficial uses. The wetlands habitat definition recognizes the uniqueness of these areas and functions they serve in protecting water quality.

Beneficial uses of wetlands include many of the same uses designated for the rivers, lakes, and coastal waters to which they are adjacent, and include recreation, wildlife habitat and groundwater replenishment.

As some wetlands can not be easily identified in Southern California because of the hydrologic area, the Regional Board identifies wetlands using indicators such as hydrology, presence of hydrophytic plants (plants adapted for growth in water), and/or hydric soils (soils saturated during the growing season). The Regional Board contracted with Dr. Prem Saint, et al. (1993a and 1993b), to inventory and describe major regional wetlands. Information from this study will be incorporated in the next Basin Plan.

ECONOMIC CONSIDERATIONS OF REGULATING STORMWATER

Implementing and maintaining the conditions of the proposed MS4 Stormwater Permit will economically impact the principal permittee, permittees, residents, commercial entities and real estate developers. This report presents the economic impact on the principal permittee and permittees only. The economic impacts to others although important was not estimated because of the lack of data and the limited amount of time.

This section of the report describes the methodology, data sources and estimated cost of implementing the permit.

Ventura Stormwater Permit Cost Categories

The proposed Stormwater Permit designates seven special provisions. The provisions and data sources are summarized in the following sections.

Public Information and Participation Program (PIPP)

The public will be made aware of the benefits of a stormwater pollution prevention program. Target groups include residential and business. The CSUS cost survey was used to determine the cost to permittees. The CSUS study estimated that approximately five percent of the total stormwater costs should be in the Public Information and Participation Program.

Industrial and Commercial Facilities Program

Each permittee shall require pollutant reduction and control measures at industrial and commercial facilities, with the objective of reducing pollutants in stormwater. This program requires an inventory of commercial and industrial sources of stormwater pollution. Inspections will ensure that each facility has implemented the required BMPs and they will be completed twice during the five-year permit. The first inspection will be made during the first two years.

The cost to the permittees of implementing this program is assumed to be included in the CSUS cost survey. The cost of implementing the BMPs by commercial and industrial firms was not estimated. US Census indicates that there are 2,009 commercial firms located in Ventura County subject to this

program. This total includes 1,198 restaurants, 427 automotive service facilities, 180 retail gasoline outlets and 204 nurseries.

The number of industrial firms subject to this program are identified by US EPA in 40 CFR 122.2(c) but no readily accessible data source of those firms currently exists.

The CSUS study estimated that approximately three percent of the total stormwater costs were used in the Industrial and Commercial Facilities Program.

Planning and Land Development Program

The objective of this program is to minimize the effects from stormwater runoff on the biological integrity of natural drainage systems and the beneficial uses of waterbodies by minimizing the percentage of impervious surfaces on land developments to support the percolation and infiltration of stormwater into the ground.

Almost all development and redevelopment projects are subject to the provisions of this program. Those projects will reduce the percentage of Effective Impervious Area (EIA) to less than 5 percent of total project area.

All new development and redevelopment projects shall also integrate Low Impact Development (LID) principles into project design. LID is a stormwater management and land development strategy that emphasizes conservation and the use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely reflect predevelopment hydrologic functions.

All new development and redevelopment projects shall implement hydrologic control measures, to prevent accelerated downstream erosion and to protect stream habitat in natural drainage systems. The purpose of the hydrologic controls is to minimize changes in post-development hydrologic stormwater runoff discharge rates, velocities, and duration. This shall be achieved by maintaining the project's pre-development stormwater runoff flow rates and durations.

The Southern California Stormwater Monitoring Coalition (SMC) is developing a regional methodology to eliminate or mitigate the adverse effects of hydromodification from urbanization, including hydromodification assessment and management tools.

Until the completion of the SMC HCS, Permittees shall implement the Interim Hydromodification Control Criteria, to control the potential adverse impacts of changes in hydrology that may result from new development and redevelopment projects. Land development project of less than 50 acres shall implement hydromodification controls such that the two-year 24-hour storm event post development hydrograph peak flow and volume will match within one percent of the two-year 24-hour storm event pre-development peak flow and volume hydrograph. Projects of 50 acres or greater shall develop and implement a Hydromodification Analysis Study (HAS) that demonstrates that post-development conditions are not expected to alter the duration of sediment transporting flows in receiving waters. The HAS must demonstrate that the selected hydromodification control BMPs will maintain an Erosion Potential value of 1 unless an alternative value can be shown to be protective of the natural drainage systems from erosion, incision, and sedimentation that can occur as a result of flow increases from impervious surfaces and damage stream habitat in natural drainage systems.

The Permittees shall develop and implement watershed specific Hydrologic Control Plans (HCP) no later than 180 days after the completion of the SMC Hydrologic Control Study (HCS).

This Program will require permittees to start a tracking system, and an inspection and enforcement program for new development and redevelopment post-construction stormwater BMPs no later than one year after the Order adoption date.

The CSUS study estimated that approximately two percent of the total stormwater costs were used in the Planning and Land Development Program.

Development Construction Program

Each Permittee shall start a program to control stormwater discharges from construction activity at all construction sites within its jurisdiction. During the wet season, the program shall ensure that all no grading will be done on areas that have high soil erosive potential.

Each Permittee shall require the implementation of a minimum set of BMPs at all construction sites to prevent erosion and sediment loss, and the discharge of construction wastes. Roadway paving or repaving operations will be subject to a set of BMPs to reduce site erosion. An electronic site-tracking system will be used to track grading permits, encroachment permits, demolition permits, building permits, or construction permits (and any other municipal authorization to move soil and/ or construct or destruct that involves land disturbance) issued by each permittee.

The CSUS study estimated that approximately four percent of the total stormwater costs were used in the Development Construction Program.

Public Agency Activities Program

Each Permittee shall minimize stormwater pollution impacts from storm drain operations which is primarily catch-basin cleaning, and streets and roads maintenance. Other public agency activities such as public construction, vehicle maintenance, material storage and operations, landscape and recreational facilities are also included in this program.

The CSUS study estimated that approximately 62 percent of total stormwater costs were used in the Public Agency Activities program.

Illicit Connections and Illicit Discharges Elimination Program

Each Permittee shall eliminate all illicit connections and discharges to the storm drain system, and shall document, track, and report all such cases in accordance with the permit.

The CSUS study estimated that approximately two percent of total stormwater costs were used in this Program.

Reporting Program

The Principal Permittee, VCWPD, in consultation with the Permittees and Los Angeles Regional Waterboard staff shall develop an electronic reporting program to assist in managing the requirements of this Order no later than six months after the Order adoption date.

The Principal Permittee shall submit by December 15th of each year beginning the year of 2008, an annual report to the Los Angeles Regional Water Board Executive Officer documenting the status of the Municipal Stormwater Program and the results of analysis of the monitoring program.

The Permit also recommends that a spatially oriented database (GIS) be developed to manage the provisions mandated in this permit.

Part 5.B of the permit designates an activity entitled Watershed Initiative Participation. For the purposes of cost comparison with the CSUS study, this was aggregated with the Reporting Program. The Reporting Program requires participation in Southern California Stormwater Monitoring Coalition activities and other watershed planning group programs.

The CSUS study estimated that approximately 22 percent of total stormwater costs were used in overall stormwater program management (14 percent) watershed management (two percent), and water quality monitoring (six percent).

CSUS Stormwater Cost Survey

In 2004, the State Water Resources Control Board (SWRCB) funded a study to survey the costs to develop, implement, maintain and monitor municipal separate storm sewer system (MS4) management

and control programs.² The objectives of the CSUS study were to: 1) document stormwater program costs and; 2) assess alternative approaches to stormwater quality control. The six cities selected for the study were judged by SWRCB staff as having good stormwater management programs, adequate accounting systems, and represented a variety of geographic locations, hydrologic areas, populations and incomes. The cities selected were Corona, Encinitas, Fremont, Fresno-Clovis Metropolitan Area, Sacramento and Santa Clarita and the cost per household ranged from \$18 to \$46. These results were used to estimate the costs of complying with the Ventura MS4 Stormwater Permit.

Stormwater program expenditures by the six cities were compiled and normalized to be able to transfer the results to other cities. Factors considered for normalization of the data were size, location, tourism, and the degree of integration of programs. The compliance costs of construction, commercial, business and industrial firms were not considered in the study. An attempt to include private costs in this cost analysis was hindered by the limited timeframe to complete the study.

Table 5 contains demographic and economic data collected from the cities for 2002/2003 which in the case of city cost data, was the most recent. Population, household and income data are from the US Census for the year 2000.

Annual total cost per household ranged from \$18 to \$46. The average cost is \$35 and the median is \$36. The true mean which is derived by dividing the total sample costs by the total sample number of households, is \$29.

The CSUS study attempted to quantitatively associate costs with income, population, annual rainfall, years of incorporation, area and curb swept miles but due to the small sample size, correlation was statistically insignificant in almost all cases. However, a number of qualitative explanations were offered by the authors. The Fresno-Clovis cost estimate of \$18 may be low because of low land costs, climate, topography, soils and an integrated program approach. However, the latter factor was identified in the study as an important factor in permit costs.

An integrated program is one in which an overseeing agency establishes a common approach in implementing stormwater activities. Certainly in the case of Fresno-Clovis Metropolitan Area, an integrated program seems to be an important factor. No other city surveyed had a program in which a single agency implemented a comprehensive plan for post-construction stormwater control for all permittees as did Fresno Metropolitan Flood Control District for the Fresno-Clovis Metropolitan Area. This integration may contribute to relatively low cost per household; however, on the other extreme of the cost range was Fremont, who participates in the Alameda County Clean Water Program. (Source: CSUS, NPDES Stormwater Cost Survey, page 52)

The important factor is that permits that cover large numbers of households have the opportunity to achieve lower costs per household by applying a common approach to stormwater activities. Due to the large number of households, The Ventura County MS4 has the potential for applying an integrated approach.

²Currier, Brian K., Joseph M. Jones, Glenn L. Moeller. "NPDES Stormwater Cost Survey, Final Report", Prepared for California State Water Resources Control Board, California State University Sacramento, Office of Water Programs, January, 2005

Table 5. Stormwater Cost Sample Cities Demographic and Cost Data

	Corona	Encinitas	Fremont	Fresno-Clovis	Sacramento	Santa Clarita
Mean Income Per Person,	\$ 21,001	\$ 34,336	\$ 31,411	\$ 15,495	\$ 18,721	\$ 26,841
Area, (sq. miles)	35	20	97	122	99	48
Curb Miles Swept	20,877	5,832	31,405	142,411	26,450	46,800
Active Construction Sites	41	40	24		417	64
Average cost per inspection	\$ 29	\$ 423			\$ 29	
Average cost per active construction site	\$ 1,302	\$ 4,244	\$ 738		\$ 628	\$ 1,172
Industrial and Commercial Sites	3,050	417	1,028			1,071
Households	39,271	23,843	69,452	195,311	163,957	52,442
City Actual General Fund Revenue,	\$ 78,413,063	\$ 42,592,755	\$ 98,456,011	\$ 216,089,323	\$ 267,464,000	\$ 61,659,874
Annual Rainfall (cm)	29	26	37	28	46	33
Years Since Incorporation	108	20	48	119	154	17
Construction Site Stormwater Runoff Control	\$ 53,382	\$ 169,751	\$ 17,715	\$ 81,800	\$ 261,716	\$ 74,998
Illicit Discharge Detection and Elimination	\$ 20,628	\$ 49,378	\$ 5,917	\$ 13,176	\$ 37,507	\$ 114,831
Average cost per inspection	\$ 157	\$ 287				\$ 311
Industrial and Commercial Management Programs	\$ 89,916	\$ 65,596	\$ 210,027	\$ 47,780	\$ 42,318	\$ 12,600
Average cost of inspection	\$ 134	\$ 247	\$ 334			\$ 115
Overall Stormwater Program Management	\$ 317,800	\$ 128,159	\$ 453,872	\$ 570,495	\$ 281,502	\$ 515,352
Pollution Prevention and Good Housekeeping for Municipal Operations	\$ 720,222	\$ 528,252	\$ 2,128,175	\$ 2,240,605	\$ 3,510,806	\$ 859,754
Average cost per curb mile swept	\$ 20	\$ 20	\$ 61	\$ 15	\$ 50	\$ 12
Post Construction Management in New Development and Redevelopment	\$ 13,509	\$ 15,344	\$ 35,083	\$ 57,539	\$ 38,517	\$ 106,925
Public Education, Outreach, Involvement, and Participation	\$ 28,409	\$ 41,898	\$ 101,717	\$ 210,716	\$ 361,440	\$ 49,130
Water Quality Monitoring	\$ 7,000	\$ 76,262	\$ 131,326	\$ 252,918	\$ 494,577	\$ 3,300
Watershed Management	\$ -	\$ 12,400	\$ 17,610	\$ -	\$ 31,591	\$ 332,949
Total Permit Cost	\$ 1,251,285	\$ 1,087,614	\$ 3,101,885	\$ 3,475,163	\$ 5,060,178	\$ 2,070,294
Cost per Household	\$ 31.86	\$ 45.62	\$ 44.66	\$ 17.79	\$ 30.86	\$ 39.48

Source: CSUS NPDES Stormwater Cost Survey

Ventura Stormwater Permit Costs

The cost categories used in the CSUS study are different than the categories specified in the Ventura County permit. To be able to translate costs from the CSUS study to the Ventura County permit, the categories needed to be compatible. The CSUS study had nine categories based on the US EPA six minimum measures for Phase II stormwater programs plus additional categories that were based on the permits held by the six selected cities. The activities mandated by the permit, the comparable CSUS cost category, and the percent of total surveyed stormwater costs attributed to each category are presented in the Table 6.

Table 6. Stormwater Permit and CSUS Cost Categories, and Percent of Total Cost

Permit		CSUS Cost Study	
Sections	Title	Cost Category	Percent of Total Cost
Part 5.C	Public Information and Participation Program (PIPP)	Public Education, Outreach, Involvement, and Participation	5.00%
Part 5.D	Industrial/ Commercial Facilities Program	Industrial and Commercial Management Programs	3.00%
Part 5.E	Planning and Land Development Program	Post Construction Stormwater Management in New Development and Redevelopment	2.00%
Part 5.F	Development Construction Program	Construction Site Stormwater Runoff Control	4.00%
Part 5.G	Public Agency Activities Program	Pollution Prevention and Good Housekeeping for Municipal Operations	61.00%
Part 5.H	Illicit Connections and Illicit Discharges Elimination Program	Illicit Discharge Detection and Elimination	2.00%
Part 5.I	Reporting Program	Watershed Management	2.00%
Part 5.B	Watershed Initiative Participation	Water Quality Monitoring	6.00%
		Overall Stormwater Program Management	14.00%

Ventura County Watershed Protection District

The VCWPD is responsible for coordinating and facilitating activities to comply with the requirements of the proposed Permit. The VCWPD conducts the Ventura Countywide Stormwater Quality Management Program. Their mission statement is:

Enhance, protect and preserve water quality in Ventura County water bodies using proactive and innovative ideas for preservation of biodiversity, ecological viability and human health. Work as a countywide team with public agencies, private enterprise, the environmental community and the general public to locally implement Clean Water Act requirements, balancing the actions taken with social and economic constraints. (source: <http://www.vcstormwater.org/>)

They have initiated the basic programs required by NPDES regulations and probably meet some, if not most, of the requirements of the MS4 permit. A review of their Web site indicates that VCWPD has prepared a number of educational programs and materials to urge compliance with reducing stormwater pollution.

Businesses are encouraged to carry out Best Management Practices (BMPs) to reduce pollutants to stormwater runoff. BMPs are defined as general good housekeeping practices, schedules of activities, pollution prevention techniques, educational practices, maintenance procedures, prohibitions of practices and other management practices. BMPs also include treatment practices, operating procedures, and practices to control site runoff, spillage or leaks, sludge or water disposal, or drainage from raw materials storage.

Fact sheets have been made available to provide clear guidance. The BMPs described on these fact sheets are generally inexpensive to implement and may save money and resources. The fact sheets cover various topics and are available on their Web site.

Publications are also available on the Stormwater Pollution Control Plan and on various aspects of the complying with the State General Construction Activities Stormwater Permit.

Ventura Stormwater Permittees

The individual permittees are responsible for implementing activities specified in the permit. Ten cities and Ventura County have been designated as Permittees. Area, population and the number of households

for those Permittees are presented in Table 7. Population and the number of households are 2006 US Census estimates.

Table 7. Ventura County Municipal Separate Stormwater System Permittees

PLACE_NAME	Permittee	Sq Mile*	Population**	Households**
Oxnard	City	24.8	169,649	46,443
Thousand Oaks	City	49.2	125,875	43,939
Simi Valley	City	33.4	124,653	39,899
San Buenaventura (Ventura)	City	20.4	99,969	39,723
Camarillo	City	18.4	57,077	21,438
Moorpark	City	12.5	31,415	8,994
Santa Paula	City	4.5	28,598	8,136
Port Hueneme	City	5.9	21,845	7,268
Fillmore	City	2.7	13,643	3,762
Ojai	City	4.4	7,862	3,088
Mira Monte	Ventura Co.	4.3	7,177	2,619
El Rio	Ventura Co.	1.6	6,193	1,467
Oak View	Ventura Co.	1.7	4,199	1,430
Meiners Oaks	Ventura Co.	1.4	3,750	1,288
Casa Conejo	Ventura Co.	0.5	3,180	985
Channel Islands Beach	Ventura Co.	0.5	3,142	1,362
Oak Park	Ventura Co.	0.3	2,320	747
Piru	Ventura Co.	2.8	1,196	308
Rest of County	Ventura Co.	1,668.0	87,977	26,197
Principal Permittee	VCWPD	1,857.3	799,720	259,093

*US Census, 2000

**US Census, 2006

As stated above, the CSUS study cost estimates for the six surveyed permittees range from \$18 to \$46 (2002\$) per household per year. The number of households ranged from 23,843 to 195,311. A linear relationship was estimated between the annual cost per household and the number of households. The resulting equation was:

$$\text{Cost/Household} = 44.29 - .000109(\text{Number of Households})$$

This relationship is depicted in Figure 7. Extending this relationship to a permit with 200,000 households would result in a per household cost of \$22.46 per year (2002\$). Ventura County exceeds the number of Fresno-Clovis Metropolitan Area households by 33 percent and should be able to capture the economies of size when implementing the permit. Therefore a total annual cost of \$23 (2002\$) per household was judged to be applicable to the cost of implementing the Ventura County permit.

Two additional cost scenarios were considered to illustrate the range of the CSUS data (Table 8). The first is based on the true sample mean of the aggregate stormwater cost for all cities surveyed divided by the aggregate number of households which was \$29 per household (2002\$). The second is based on the mean of the six values for each city which is \$35 per household (2002\$). When adjusted for inflation, the annual cost estimates range from \$27.60 to \$42.00 (2008\$) per household (Table 9).

The estimated total annual cost to public agencies of implementing the Ventura County Stormwater MS4 permit range from \$7,148,400 to \$10,878,000 (2008\$).

Figure 7. Annual Stormwater Permit Costs by Number of Households

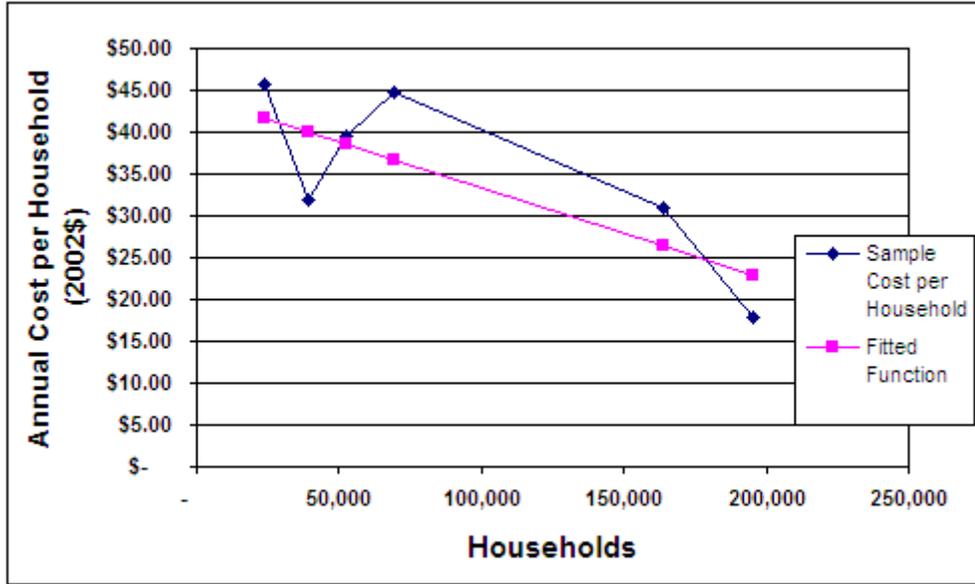


Table 8. Summary of CSUS Normalized Stormwater Costs for Sample Municipalities, 2002\$.

Municipalities	Municipality Description	Cost/Household (\$)
City of Encinitas	Coastal tourism, small city	46
City of Fremont	Bay Area, moderately integrated countywide program	45
City of Santa Clarita	Tourism and industrial	39
City of Corona	Industrial	32
City of Sacramento	Pumped stormwater, large city	29
Fresno-Clovis Metropolitan Area	65-90% infiltration, fully integrated multi-city program	18
Summary Statistics		
Mean of the six values for each city		35
Median of the six values for each city		36
Standard Deviation of the six values for each city		11
True Mean ¹		29

1. The "true" mean is the aggregate stormwater cost for all cities surveyed divided by the aggregate number of households

Source: CSUS NPDES Stormwater Cost Survey, page 50.

Table 9. Annual Cost per Household and Total Annual Cost of Implementing the Ventura County MS4 Stormwater Permit by Program for Three Cost Scenarios.

Cost Category	Based on Relationship of Number of Households to Cost		Based on True Sample Mean		Based on the Mean of the Six Values for Each City	
	Cost per Household	Total Cost*	Cost per Household	Total Cost*	Cost per Household	Total Cost*
Public Information and Participation Program (PIPP)	\$ 1.38	\$ 357,420	\$ 1.74	\$ 450,660	\$ 2.10	\$ 543,900
Industrial/ Commercial Facilities Program	\$ 0.83	\$ 214,452	\$ 1.04	\$ 270,396	\$ 1.26	\$ 326,340
Planning and Land Development Program	\$ 0.55	\$ 142,968	\$ 0.70	\$ 180,264	\$ 0.84	\$ 217,560
Development Construction Program	\$ 1.10	\$ 285,936	\$ 1.39	\$ 360,528	\$ 1.68	\$ 435,120
Public Agency Activities Program	\$ 17.11	\$ 4,432,008	\$ 21.58	\$ 5,588,184	\$ 26.04	\$ 6,744,360
Illicit Connections and Illicit Discharges Elimination Program	\$ 0.55	\$ 142,968	\$ 0.70	\$ 180,264	\$ 0.84	\$ 217,560
Reporting Program & Watershed Initiative Participation	\$ 6.07	\$ 1,572,648	\$ 7.66	\$ 1,982,904	\$ 9.24	\$ 2,393,160
Totals	\$ 27.60	\$ 7,148,400	\$ 34.80	\$ 9,013,200	\$ 42.00	\$ 10,878,000

*2008\$. Based 259,000 households.

The Public Agency Activities Program comprises 62 percent of the estimated total annual costs. Street cleaning and storm drain cleaning operations are the main activities of the Program (Figure 8). These activities are being conducted at the municipal or county level, however the proposed Permit specifies the frequency of the operations. The cost of this program is not expected to benefit from economies of size and per household costs will be similar for small and large permittees.

The Reporting and Watershed Initiative Participation Program comprises 22 percent of annual costs. This program includes overall management, planning, monitoring and reporting activities mandated by the Permit. Because of the potential for sharing resources among permittees such as analyst's time, and computer hardware and software, the per household cost of this Program can benefit substantially from economies of size. Since the allocation of costs among categories is based on the CSUS cost survey which did not have cities with these attributes, the cost of this program could be less than reported here.

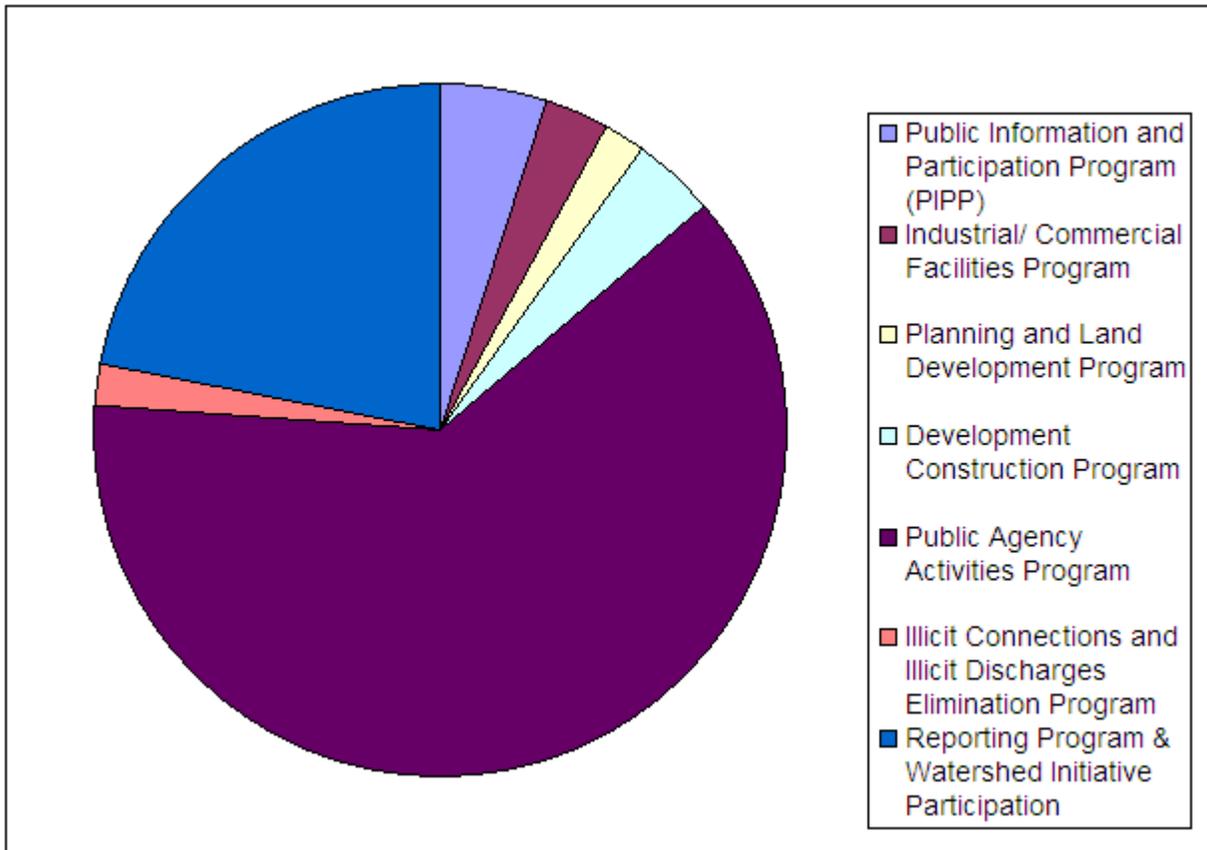


Figure 8. Distribution of Total Permit Implementation Cost among Cost Categories