Chapter 1: Introduction

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The State and Regional Water Boards

Responsibility for the protection of surface water and groundwater quality in California rests with the State Water Resources Control Board (hereinafter, State Water Board) and nine Regional Water Quality Control Boards (hereinafter, Regional Water Boards) (collectively, Water Boards). The Water Boards are part of the California Environmental Protection Agency, along with the Air Resources Board, the Department of Resources Recycling and Recovery, the Department of Pesticide Regulation, the Department of Toxic Substances Control, and the Office of Environmental Health Hazard Assessment.

The State Water Board establishes statewide water quality control policy and regulation. The State Water Board also coordinates Regional Water Board efforts and reviews Regional Water Board actions for consistency with statewide policy and regulation.

The Regional Water Boards are semi-autonomous and make critical water quality decisions for their region. All duties and responsibilities of the Regional Water Board are directed at providing reasonable protection and enhancement of the quality of both surface and ground waters in the Region. The programs by which these duties and responsibilities are carried out include:

- designating beneficial uses, establishing water quality objectives to protect those uses, and identifying programs of implementation to meet objectives;
- developing new or revised policies addressing region-wide water quality concerns;
- issuing, monitoring compliance with, and enforcing waste discharge requirements and NPDES permits and other orders;
- providing recommendations to the State Water Board on financial assistance programs, budget development, and other statewide programs and policies;
- coordinating with other public agencies that are concerned with water quality control; and
- informing and involving the public on water quality issues.

Given the highly diverse environmental and land use characteristics of regions within the State, region-specific water quality regulations are contained in Water Quality Control Plans (Basin Plans) that recognize regional beneficial uses, water quality characteristics, and water quality problems.

The California Regional Water Quality Control Board, Los Angeles Region (hereinafter referred to as the Los Angeles Water Board or Regional Water Board) has jurisdiction over the coastal drainages between Rincon Point (on the coast of western Ventura County) and the eastern Los Angeles County

line (Figure 1-1). The Regional Water Board consists of seven part-time members appointed by the Governor and confirmed by the State Senate, each of whom represents, and acts on behalf of, all of the people. Members serve staggered four-year terms and must reside in, or have a principal place of business within, the Region. Members of the Regional Water Board conduct their business at regular meetings and public hearings at different locations throughout the Region at which public participation is encouraged. The public may address the Regional Water Board regarding any matter within the Regional Water Board's jurisdiction during the public forum of any regular Regional Water Board meeting. The public may also address the Regional Water Board on specific items under consideration at any Regional Water Board meeting. Copies of the Regional Water Board meeting agendas are available on the Regional Water Board's website at www.waterboards.ca.gov/losangeles. The staff at the Regional Water Board, led by an Executive Officer appointed by the Board, implements the Region's water quality control programs and makes recommendations to the Regional Water Board members regarding matters under its jurisdiction.

Function of the Basin Plan

The Regional Water Board's Basin Plan contains the Region's water quality regulations and programs to implement the regulations. The Basin Plan is designed to preserve and enhance water quality and protect the beneficial uses of all regional waters. Specifically, the Basin Plan: (i) identifies beneficial uses for surface and ground waters, (ii) includes the narrative and numerical water quality objectives that must be attained or maintained to protect the designated beneficial uses and conform to the State's anti-degradation policy, and (iii) describes implementation programs and other actions that are necessary to achieve the water quality objectives established in the Basin Plan. In combination, beneficial uses and their corresponding water quality objectives are called Water Quality Standards.

Major State and Regional Water Board resolutions, policies, plans, and Basin Plan amendments are summarized in Chapter 5. In addition, all total maximum daily loads (TMDLs) applicable to waters within the Region are referenced in Chapter 5 and, where adopted as an amendment to this Basin Plan, are incorporated in Chapter 7. Regulations, plans, and policies of other agencies applicable to the Regional Water Board's programs are referenced in appropriate sections throughout the Basin Plan.
The Regional Water Board implements the Basin Plan by issuing and enforcing waste discharge requirements to individuals, municipalities, or businesses whose waste discharges can affect water quality. These requirements can be either State waste discharge requirements for discharges to land,

or National Pollutant Discharge Elimination System (NPDES) permits issued under federal delegation for discharges to surface water. The Regional Water Board also implements the Basin Plan by issuing orders for investigation and cleanup or abatement at sites containing discharges of waste and by prohibiting certain discharges of waste in some areas. The Basin Plan is also implemented by encouraging water users to improve the quality of their water supplies, particularly where the wastewater they discharge is likely to be reused.

The Basin Plan is reviewed and updated as necessary every three years through a process known as a Triennial Review, which is discussed later in this chapter. Following adoption by the Regional Water Board, amendments to the Basin Plan are subject to approval by the State Water Board, the State Office of Administrative Law (OAL), and in some instances, the United States Environmental Protection Agency (USEPA).

The Basin Plan is a resource for the Regional Water Board and others who use water and/or discharge waste to surface or ground water in the Los Angeles Region. Other agencies and organizations involved in environmental permitting and resource management activities also use the Basin Plan. Finally, the Basin Plan provides valuable information to the public about local water quality issues.

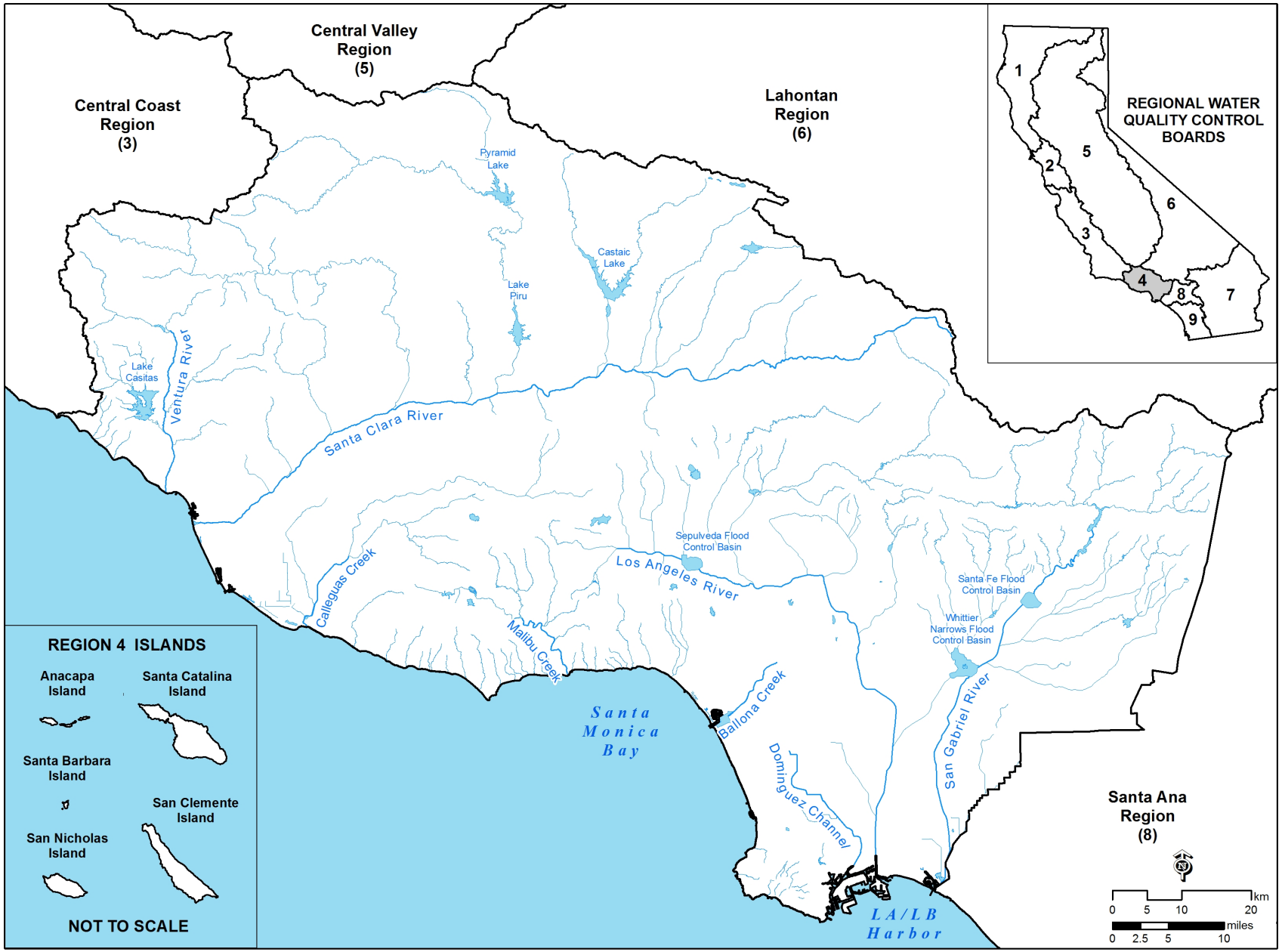


Figure 1-1. Regional Map: Regional Water Quality Control Board, Los Angeles Region.

Legal Basis and Authority

California's Porter-Cologne Water Quality Control Act (Porter-Cologne Act), enacted by the State of California in 1969 and effective January 1, 1970, is considered landmark water quality legislation and has served as a model for subsequent legislation by the federal government and other state governments. This legislation, which became Division 7 of the California Water Code (Water Code, § 13000 et seq.), establishes the responsibilities and authorities of the nine Regional Water Boards (previously called Regional Water Pollution Control Boards) and the State Water Board. The Porter-Cologne Act identifies these Boards as "... the principal State agencies with primary responsibility for the coordination and control of water quality" (§ 13001). Each Regional Water Board is directed to "...formulate and adopt water quality control plans for all areas within the region," including both surface waters and groundwater (§ 13240). A water quality control plan for the waters of an area is defined as having three components: beneficial uses to be protected, water quality objectives that protect those uses, and a program of implementation needed to achieve the water quality objectives (§ 13050). Further, "such plans shall be periodically reviewed and may be revised" (§ 13240). The State Water Board is also authorized to adopt water quality control plans on its own initiative (§ 13170).

The Clean Water Act (CWA) (33 U.S.C. § 1251 et seq.), enacted by the federal government in 1972, was designed to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. One of the national goals states that wherever attainable water quality should provide for the protection and propagation of fish, shellfish, and wildlife, and provide for recreation in and on the water. The CWA provides for the delegation of certain responsibilities in water quality control and water quality planning to the states. Section 303(c) of the CWA directs states to establish water quality standards for all "waters of the United States" and to review and update such standards on a triennial basis. Other provisions of the CWA related to basin planning include Section 208, which authorizes the preparation of waste treatment management plans, and Section 319 (added by 1987 amendments), which mandates specific actions for the control of pollution from nonpoint sources. Section 307(a) of the CWA also mandates that states adopt numerical standards for all priority pollutants.

Where USEPA and the State Water Board have agreed to such delegation, the Regional Water Boards implement portions of the Clean Water Act, such as the NPDES program. The Code of Federal Regulations (Title 40, C.F.R.) and USEPA guidance documents provide direction for implementation of the CWA.

The Porter-Cologne and Clean Water Acts also describe how enforcement of requirements pertaining to discharges of waste is to be carried out. Enforcement tools available to the Regional Water Board range from simple letters to the discharger, through formal Regional Water Board orders, and direct assessments of administrative civil liability and penalties, to judicial civil and/or criminal enforcement including civil liability, penalties, fines, and/or injunctive relief. Legally noticed public hearings are required for most actions, but some enforcement actions (e.g., Cleanup or Abatement Orders) have been delegated to the Executive Officer to allow for a quicker response than regularly scheduled Regional Water Board meetings can provide.

In addition to state and federal laws, several court decisions provide guidance for basin planning. For example, the 1983 Mono Lake Decision (*National Audubon Society v. Superior Court* (1983) 33 Cal.3d 419) reaffirmed the public trust doctrine, holding that the public trust is "an affirmation of the duty of the state to protect the people's common heritage of streams, lakes, marshlands and tidelands, surrendering that right of protection only in rare cases when the abandonment of that right is consistent with the purposes of the trust." Public trust encompasses uses of water for commerce, navigation, fisheries, and recreation. In *California Trout, Inc. v. State Water Resources Control Board* ((1989) 207 Cal.App.3d 5856), the courts found that the public trust doctrine also applies to activities that could harm the fisheries in a non-navigable water.

History of Basin Planning and the Basin Plan in the Los Angeles Region

The Dickey Act, enacted by the State of California in 1949, established nine Regional Water Pollution Control Boards in California. Regional Water Pollution Control Boards were directed to establish water quality objectives in order to protect the quality of receiving waters from adverse impacts of wastewater discharges. During the first few years, the Los Angeles Regional Water Pollution Control Board only established narrative objectives for discharges. By 1952, the Los Angeles Regional Water Pollution Control Board began including numerical limits in requirements for discharges and adopting water quality objectives for receiving waters.

With the enactment of the Porter-Cologne Act in 1969, the names of the Regional Water Pollution Control Boards were changed to Regional Water Quality Control Boards, and their authorities were broadened. At this time, the Regional Water Quality Control Boards initiated development of

comprehensive regional Basin Plans.

In 1971, the Regional Water Board adopted an *Interim Water Quality Control Plan* that compiled all of the existing objectives and policies into one document and rescinded all individually adopted objectives and policies. A more comprehensive planning effort was undertaken when the State Water Board engaged Daniel, Mann, Johnson, and Mendenhall, Inc., and Koebig and Koebig, Inc. to develop Basin Plans for the Santa Clara River Basin and the Los Angeles River Basin, respectively. This major planning effort culminated in 1975 with the *Water Quality Control Plan for the Santa Clara River Basin (4A)* and the *Water Quality Control Plan for the Los Angeles River Basin (4B)*. Those two documents, which together comprised the Basin Plans for the Los Angeles Region, were amended in 1976, 1978, 1990, and 1991. In 1994, the two 1975 Basin Plans and the aforementioned amendments to those plans were superseded by a single Basin Plan, which for planning purposes divided the Region into major surface watersheds and groundwater basins.

Since 1994, numerous Basin Plan amendments have been adopted and more current background, program, and geographical information have become available. In 2010, the Regional Water Board recognized the need for an overall update to the Basin Plan as several amendments to the Basin Plan, which had been adopted since 1994 and were in effect, had not been physically integrated into the Basin Plan. Also, the Basin Plan did not reflect current information on State and Regional Water Board programs, plans, and policies, or more recently available geographical and background information for the Los Angeles Region. As a result, an administrative update of the Basin Plan was identified as a priority project to be addressed during the 2008-2010 triennial review (Resolution No. R10-001). The administrative update was conducted in phases.

Since 1975, progress has been made toward the control of a number of water quality problems identified in the 1975 Basin Plans, including the control of point source discharges from municipal wastewater treatment plants, industrial facilities, and municipal separate storm sewer systems (MS4s) and discharges from nonpoint sources such as irrigated agriculture in the Region. At the same time, many new issues and areas of concern have arisen. Scientists continue to identify contaminants of emerging concern (CECs) that pose ecosystem and public health risks. The State and Regional Water Boards undertake a continuing planning process (described below), based on the latest scientific information, which addresses both old and new water quality issues.

Continuing Planning Process

While the Basin Plan provides sound long-term standards and program guidance for the Region, it is not a static document. The Basin Plan is a flexible tool that is reviewed and revised periodically to adapt to changing conditions. The CWA and federal regulations (CWA § 303(e); 40 C.F.R. § 130.5(b)) require that the State have a "continuing planning process" approved by the USEPA. This process has nine required elements, one of which is water quality planning consisting of adoption, review, and amendment of Basin Plans. As part of the State and Regional Water Board's continuing planning process, components of the Basin Plan are reviewed as new data and information become available or as specific needs arise. Updates of the Basin Plan occur in response to this periodic review or as a result of State or federal legislative requirements or judicial mandates such as consent decrees. State Water Board and other governmental entities' (federal, state, and local) plans that can affect water quality are considered in the planning process.

Triennial Review Process

Section 303(c)(1) of the CWA requires states to hold public hearings for the purpose of reviewing water quality standards and, as appropriate, modifying and adopting standards, at least once every three years, in a process known as a triennial review. Water quality standards consist of beneficial use designations and water quality criteria (referred to as water quality objectives in State terminology) necessary to protect those uses. This requirement is based upon recognition that the science of water quality is constantly advancing; its purpose is to ensure that standards are based on current science, methodologies, and USEPA mandates, recommendations, and guidance. The triennial review does not involve the revision of all standards every three years. Federal law only requires modifications "as appropriate." Modifications to the Basin Plan are usually made to incorporate new scientific and technical information; in response to USEPA's mandates, applicable recommendations, and guidelines, as appropriate; to address stakeholder concerns, where it is appropriate to do so; to address new legislation or case law; and to address issues identified in due course by the State or Regional Water Boards themselves or its staff during the regular course of business.

The availability of new scientific information or methodological developments may not directly translate into a change to standards during a triennial review cycle. The state of the science also has to be taken into consideration; for example, it would be premature to modify standards while scientific understanding is actively evolving and new methodologies are being developed and tested. Moreover,

notwithstanding the evolution of applicable scientific knowledge or policy considerations, federal or state law or regulations may preclude changes that might otherwise be deemed desirable by stakeholders. In addition, while a major part of the review process consists of identifying potential issues, an important part of the review is the reaffirmation of those portions of the Basin Plan where no potential issues are identified. Therefore, it is common for standards to remain unchanged as a result of a triennial review process.

Even where changes are appropriate and lawful, the State's Continuing Planning Process, and other federally approved documents, recognize that the process of modifying water quality standards is resource intensive, and typically limited by staffing and budgetary constraints. As such, the triennial review process assists in identifying the most important or compelling projects and allows the State and Regional Water Boards to prioritize those as resources allow.

This federal requirement for a triennial review of the Basin Plan is complemented by the provision in Section 13240 of the California Water Code that requires a periodic review of the Basin Plan and allows for revisions.

The triennial review occurs in three phases. During the first phase, the Board reviews water quality standards and identifies potential issues for possible Basin Plan amendments that can be completed within existing resource allocations over a three-year period. In the second phase, the Board holds a hearing and prioritizes the standards-related issues on a priority list that will be further researched and potentially addressed through subsequent Basin Plan amendments. Placing a potential issue on the priority list will only require the Regional Water Board staff to investigate the need for an amendment; it does not necessarily mean a revision of the Basin Plan will be made. Finally, during the third phase, the Board, if appropriate, develops projects addressing these issues and adopts any resulting changes to the Basin Plan as individual Basin Plan amendments over the course of the three-year review period. Public input is a key component of each phase. Stakeholder input is solicited on issues of concern, on prioritization, and during the development of each individual Basin Plan amendment. The triennial review process may ultimately result in some amendments to the Basin Plan to adopt or modify water quality standards and implementation provisions.

A triennial review is not the only occasion where Basin Plan modifications are contemplated. The Regional Water Board can amend the Basin Plan whenever needed. Such amendments need not coincide with the triennial review process.

Basin Plan Amendments

Amendments to the Basin Plan involve the preparation of an amendment, a resolution, a staff report, and substitute environmental documents required by the California Environmental Quality Act (California Public Resources Code, § 21080.5 et seq.). Public workshops are often held to inform and solicit input from the public about issues before formal action is scheduled on the amendments. Following a public review and comment period of 30 to 45 days, the Regional Water Board responds in writing to timely submitted written comments. Subsequently, the Regional Water Board takes action on the amendments at a public hearing. Basin Plan amendment hearings are advertised in the public notice section of a newspaper circulated in areas affected by the amendment, as well as on the Regional Water Board's website. Persons interested in a particular issue can also notify the Regional Water Board staff of their interest in being notified of workshops and hearings on that topic.

The California Environmental Quality Act provides that the Secretary of Resources can exempt regulatory programs of State agencies from the requirements of preparing environmental impact reports, negative declarations, and initial studies should such programs be certified as "functionally equivalent." The Water Board's Basin Planning process has been so certified. Accordingly, amendments to the Basin Plan and accompanying documentation, including the staff report, substitute environmental document, and responses to comments, are functionally equivalent to an environmental impact report or negative declaration.

Following adoption by the Regional Water Board, Basin Plan amendments and supporting documents are submitted to the State Water Board for review and approval. All Basin Plan amendments approved by the State Water Board after June 1, 1992 must also be reviewed and approved by the State Office of Administrative Law (OAL). All amendments take effect upon approval by the OAL and filing of the Department of Fish and Wildlife fee, where appropriate. In addition, the USEPA must review and approve those Basin Plan amendments that involve surface water quality standards to ensure such changes are consistent with federal regulations.

The Region

Regional Setting

The Los Angeles Region (Figure 1-1) encompasses all coastal watersheds and drainages flowing to the Pacific Ocean between Rincon Point (on the coast of western Ventura County) and the eastern Los Angeles County line, as well as the drainages of five coastal islands (Anacapa, San Nicolas, Santa Barbara, Santa Catalina, and San Clemente). In addition, the Region includes all coastal waters within three nautical miles (approximately 5½ kilometers) off the continental and island coastlines.

The Regional Water Board relies on the watershed classification system developed by the United States Geological Survey (USGS), known as the Watershed Boundary Dataset (WBD), which divides surface waters into a hierarchical system of hydrologic units, areas, and subareas (Table 1-1 and Figure 1-2). The USGS National Hydrography Dataset (NHD) is used to delineate surface waters, including rivers, streams, lakes, and ponds. Figures 1-3 and 1-4 illustrate many of the larger streams and lakes within the Region. The major watershed boundaries used for planning purposes are illustrated on Figure 1-5. The eastern regional boundary, formed by the Los Angeles County line, departs somewhat from the watershed divide; consequently, the Los Angeles and Santa Ana Regions share jurisdiction over watersheds along their common border.

In addition, the Regional Water Board uses the classification system developed by the California Department of Water Resources (as provided in the agency's Bulletin 118 "California's Groundwater"), which divides ground waters into major groundwater basins (see Ground Waters, below). This system also classifies surface waters into hydrologic units, areas, and subareas (Figure 1-2, Table 1-1). Watersheds and watershed management areas used by the Regional Water Board for planning purposes may be completely within a hydrologic unit or may cross several hydrologic units (e.g., Ventura County Coastal Watershed Management Area). In other cases, a hydrologic unit may contain more than one watershed management area. For example, the San Gabriel Hydrologic Unit contains the Los Cerritos and Dominguez Channel Watersheds in addition to the San Gabriel River Watershed. Surface waters in the region are categorized by watershed and hydrologic unit codes in the beneficial use tables contained in Chapter 2.

Geology/Topography

Most of the Los Angeles Region lies within the western portion of the Transverse Ranges Geomorphic Province. The San Andreas transform fault system, forming the boundary between the North American and Pacific tectonic plates, dissects these western Transverse Ranges. This fault system, which extends northwesterly for over 700 miles (1,127 kilometers) from the Salton Sea in southern California to Cape Mendocino in northern California, bends in an east-west direction through the Transverse Ranges. Known as the "Big Bend," this portion of the San Andreas fault system formed from complex movements of the Pacific Plate against the North American Plate. Compression generated by such forces resulted in uplift of the Transverse Ranges, which have a conspicuous east-west trend (unlike other major ranges in the continental United States, which typically have a roughly north-south trend).

Major mountain ranges within the Los Angeles Region include the San Gabriel Mountains, Santa Monica Mountains, Santa Susana Mountains, Simi Hills, and Santa Ynez Mountains (Figure 1-6). The San Gabriel Mountains are the most prominent range in this group. The rock types exposed in the San Gabriel Mountains consist predominantly

The hydrologic unit numbers below are the last 5 digits of the HUC12 as the prefix of HUC12 for the region is the same, 1807010.

10000 VENTURA HYDROLOGIC UNIT
- 10100 Ventura River HA
  - 101 Matilija Creek HSA
  - 102 North Fork Matilija Creek HSA
  - 103 San Antonio Creek HSA
  - 104 Upper Ventura River HSA
  - 105 Coyote Creek HSA
  - 106 Lower Ventura River HSA
- 10200 Rincon Creek HA
  - 202 Los Sauces Creek HSA
  - 203 Arundell Barranca HSA

20000 SANTA CLARA HYDROLOGIC UNIT
- 20100 Headwaters Santa Clara River HA
  - 101 Aliso Canyon HSA
  - 102 Kentucky Springs Canyon HSA
  - 103 Acton Canyon HSA
  - 104 Agua Dulce Canyon HSA
  - 105 Arrastre Canyon HSA
  - 106 Mint Canyon HSA
  - 107 Sand Canyon HSA
- 20200 Bouquet Canyon HA
  - 201 Upper Bouquet Canyon HSA
  - 202 Lower Bouquet Canyon HSA
- 20300 Castaic Creek HA
  - 301 Elizabeth Lake HSA
  - 302 Fish Canyon HSA
  - 303 Upper Castaic Creek HSA
  - 304 Elizabeth Lake Canyon HSA
  - 305 Middle Castaic Creek HSA
  - 306 Lower Castaic Creek HSA
- 20400 Upper Santa Clara River HA
  - 401 South Fork Santa Clara River HSA
  - 402 San Francisquito Canyon HSA
  - 403 Salt Canyon HSA
- 20500 Upper Piru Creek HA
  - 501 Mutau Creek HSA
  - 502 Cedar Creek HSA
  - 503 Seymour Creek HSA
  - 504 Lockwood Creek HSA
  - 505 Snowy Creek HSA
  - 506 Hungry Valley HSA
  - 507 Gorman Creek HSA
  - 508 Buck Creek HSA
  - 509 Liebre Gulch HSA
- 20600 Lower Piru Creek HA
  - 601 Agua Blanca Creek HSA
  - 602 Fish Creek HSA
  - 603 Lake Piru HSA
  - 604 Hosler Canyon HSA
- 20700 Sespe Creek HA
  - 701 Abadi Creek HSA
  - 702 Tule Creek HSA
  - 703 Piedra Blanca Creek HSA
  - 704 Tar Creek HSA
  - 705 West Fork Sespe Creek HSA
  - 706 Boulder Creek HSA
- 20800 Middle Santa Clara River HA
  - 801 Hopper Canyon HSA
  - 802 Pole Creek HSA
- 20900 Lower Santa Clara River HA
  - 901 Santa Paula Creek HSA
  - 902 Timber Canyon HSA
  - 903 Adams Canyon HSA
  - 904 Harmon Canyon HSA

30000 CALLEGUAS HYDROLOGIC UNIT
- 30100 Calleguas Creek HA
  - 101 Upper Simi Arroyo HSA
  - 102 Lower Simi Arroyo HSA
  - 103 Las Posas Arroyo HSA
  - 104 Upper Conejo Arroyo HSA
  - 105 Lower Conejo Arroyo HSA
  - 106 Beardsley Wash HSA
  - 107 Revolon Slough HSA
- 30200 McGrath Lake HA
  - 201 Mugu Lagoon HSA
  - 202 McGrath Lake HSA

40000 SANTA MONICA BAY HYDROLOGIC UNIT
- 40100 Malibu Creek HA
  - 101 Potrero Valley Creek HSA
  - 102 Medea Creek HSA
  - 103 Las Virgenes Arroyo HSA
- 40200 Big Sycamore Canyon HA
  - 201 Big Sycamore Canyon HSA
  - 202 Arroyo Sequit HSA
  - 203 Zuma Canyon HSA
  - 204 Solstice Canyon HSA
- 40300 Ballona Creek HA
- 40400 Garapito Creek HA
  - 401 Garapito Creek HSA
  - 402 Santa Monica Canyon HSA
  - 403 Santa Monica Beach HSA
- 40500 Frontal Santa Monica Bay-San Pedro Bay HA
  - 500 Manhattan Beach HSA

50000 LOS ANGELES HYDROLOGIC UNIT
- 50100 Big Tujunga Creek HA
  - 101 Alder Creek HSA
  - 102 Mill Creek HSA
  - 103 Upper Big Tujunga Creek HSA
  - 104 Little Tujunga Creek HSA
  - 105 Lower Big Tujunga Creek HSA
- 50200 Upper Los Angeles River HA
  - 201 Bell Creek HSA
  - 202 Browns Canyon Wash HSA
  - 203 Aliso Canyon Wash HSA
  - 204 Bull Creek HSA
  - 205 Upper Pacoima Wash HSA
  - 206 Lower Pacoima Wash HSA
  - 207 Verdugo Wash HSA
  - 208 Tujunga Wash HSA
  - 209 Arroyo Seco HSA
  - 210 Scholl Canyon HSA
- 50300 Rio Hondo HA
  - 301 Eaton Wash HSA
  - 302 Santa Anita Wash HSA
  - 303 Alhambra Wash HSA
- 50400 Lower Los Angeles River HA
  - 401 Chavez Ravine HSA
  - 402 Compton Creek HSA

60000 SAN GABRIEL HYDROLOGIC UNIT
- 60100 Dominguez Channel HA
  - 101 Upper Dominguez Channel HSA
  - 102 Lower Dominguez Channel HSA
- 60200 West Fork San Gabriel River HA
  - 201 Devils Canyon HSA
  - 202 Upper West Fork San Gabriel River HSA
  - 203 Bear Creek HSA
  - 204 North Fork San Gabriel River HSA
  - 205 Lower West Fork San Gabriel River HSA
- 60300 Upper San Gabriel River HA
  - 301 Fish Fork HSA
  - 302 Cattle Canyon HSA
  - 303 Iron Fork HSA
- 60400 Walnut Creek HA
  - 401 San Dimas Wash HSA
  - 402 Big Dalton Wash HSA
- 60500 San Jose Creek HA
  - 501 Upper San Jose Creek HSA
  - 502 Lower San Jose Creek HSA
- 60600 Lower San Gabriel River HA
  - 601 Santa Fe Flood Control Basin HSA
  - 602 La Mirada Creek HSA
  - 603 Brea Creek-Coyote Creek HSA
  - 605 Carbon Creek HSA
  - 606 Coyote Creek HSA
- 60700 Alamitos Bay-San Pedro Bay HA
  - 701 Long Beach Harbor HSA
  - 702 Alamitos Bay HSA
  - 703 San Pedro Bay HSA

70000 SAN PEDRO CHANNEL ISLANDS HYDROLOGIC UNIT
- 70000 San Nicholas Island-Santa Catalina Island HA
  - 001 San Nicolas Island HSA
  - 002 Santa Catalina Island HSA
  - 003 Santa Catalina Island HSA
  - 004 San Clemente Island HSA

The Santa Barbara Channel Islands Hydrologic Unit (see below) has a different prefix of HUC12, 1806001.

40000 SANTA BARBARA CHANNEL ISLANDS HYDROLOGIC UNIT
- 40200 Santa Cruz Island HA
  - 202 Santa Cruz Island-Frontal Pacific Ocean HSA

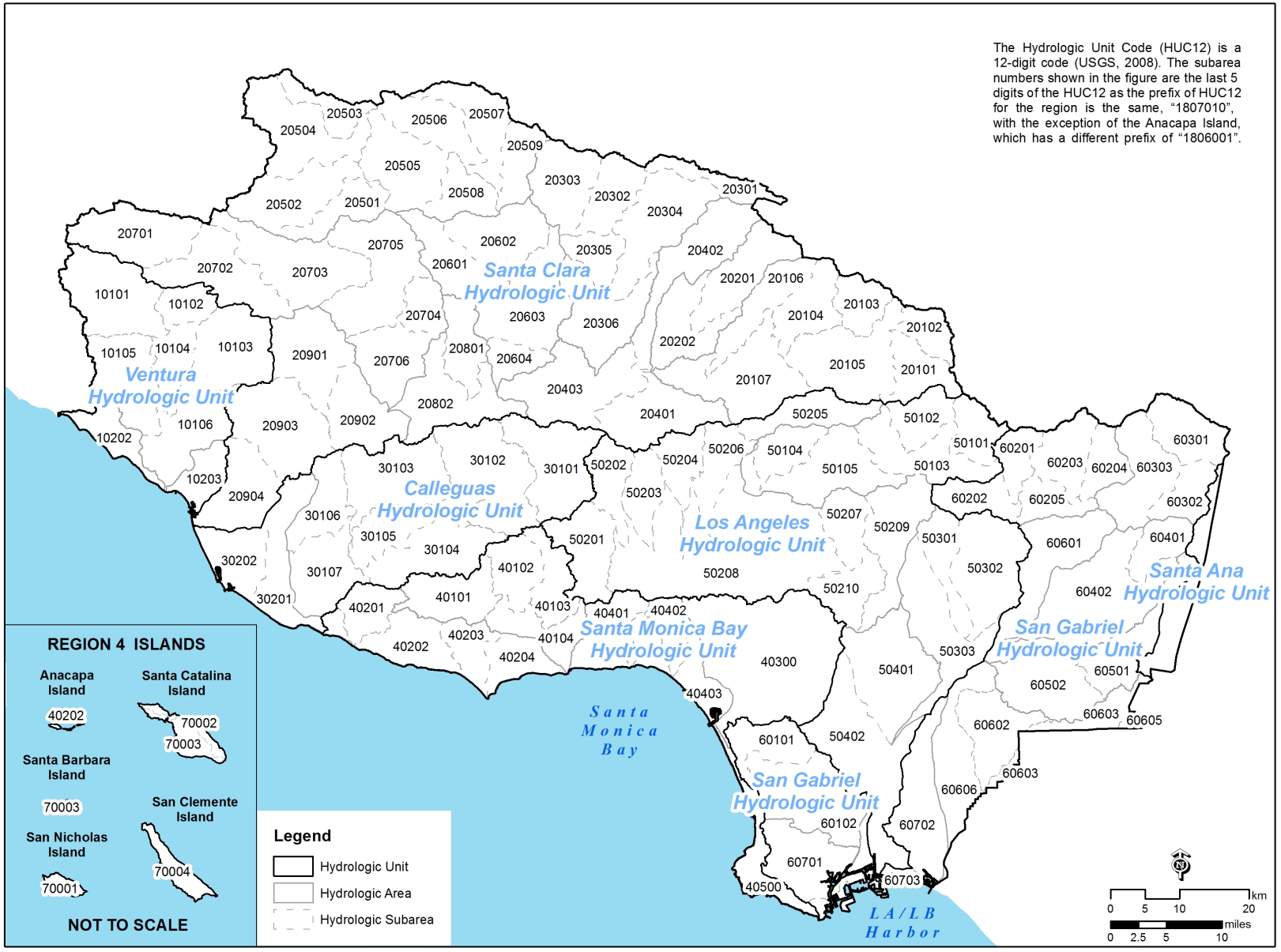


Figure 1-2. Hydrologic Units with Areas and Subareas.

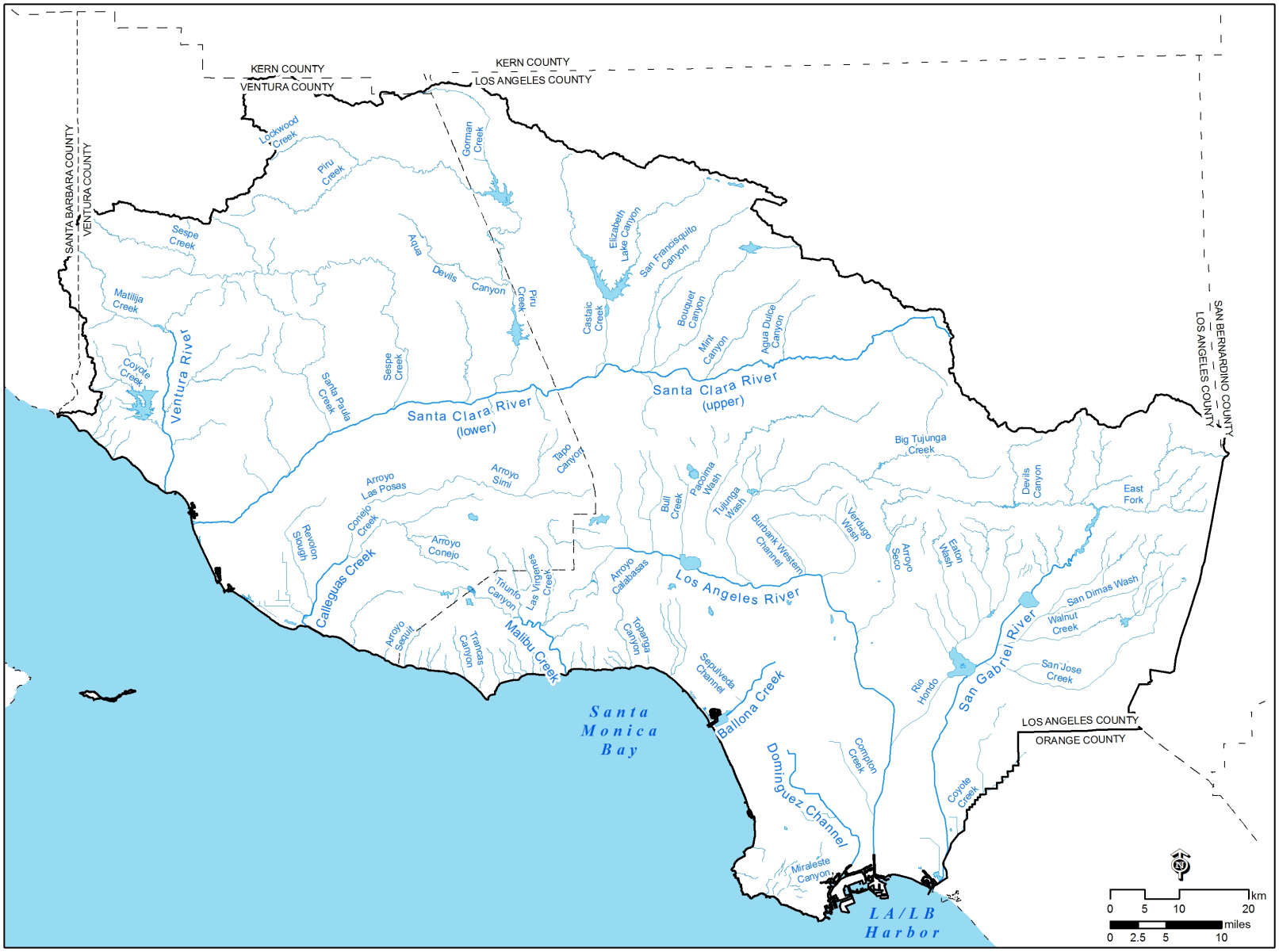


Figure 1-3. Major Rivers and Streams.

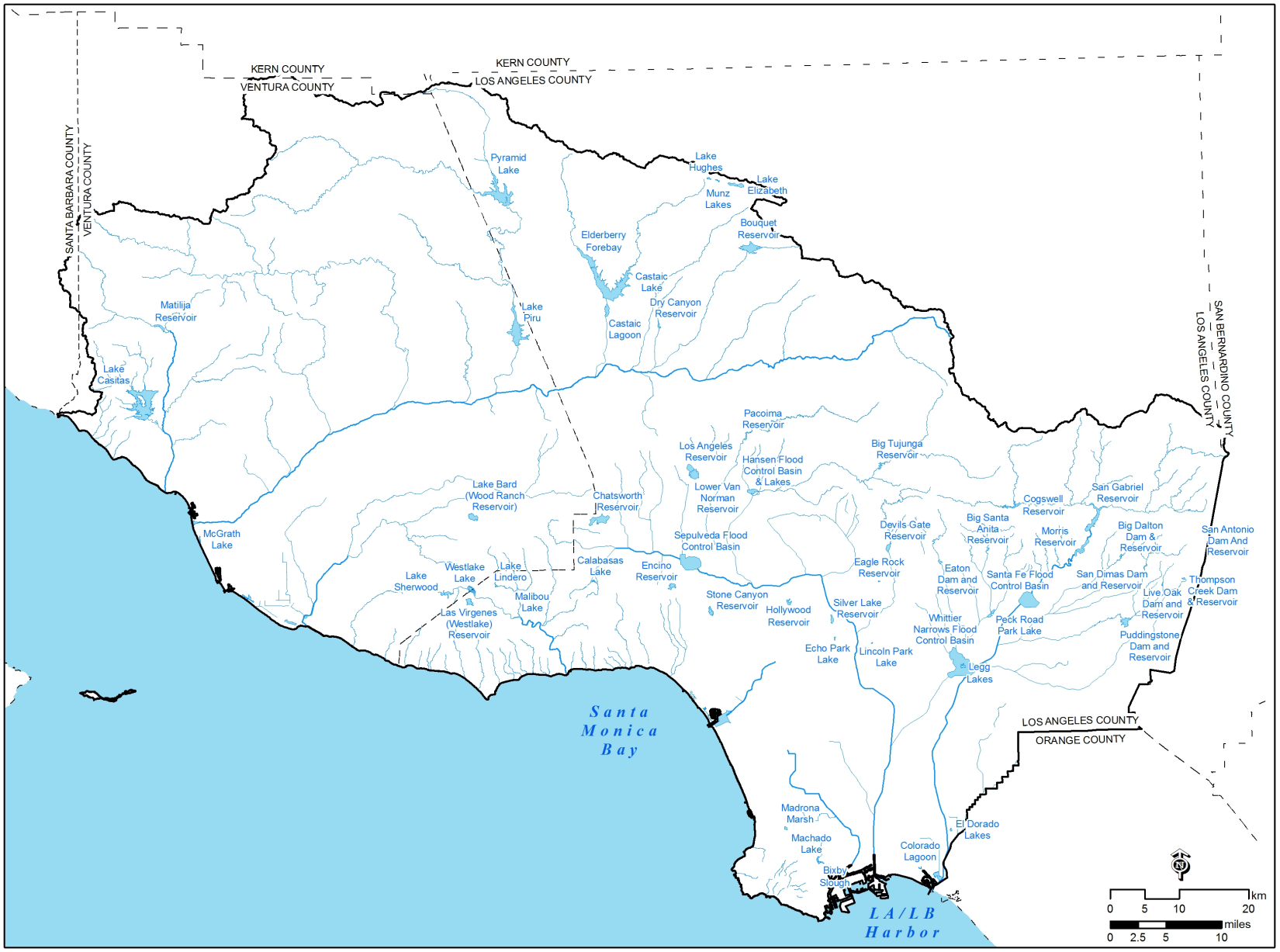


Figure 1-4. Major Lakes and Reservoirs.

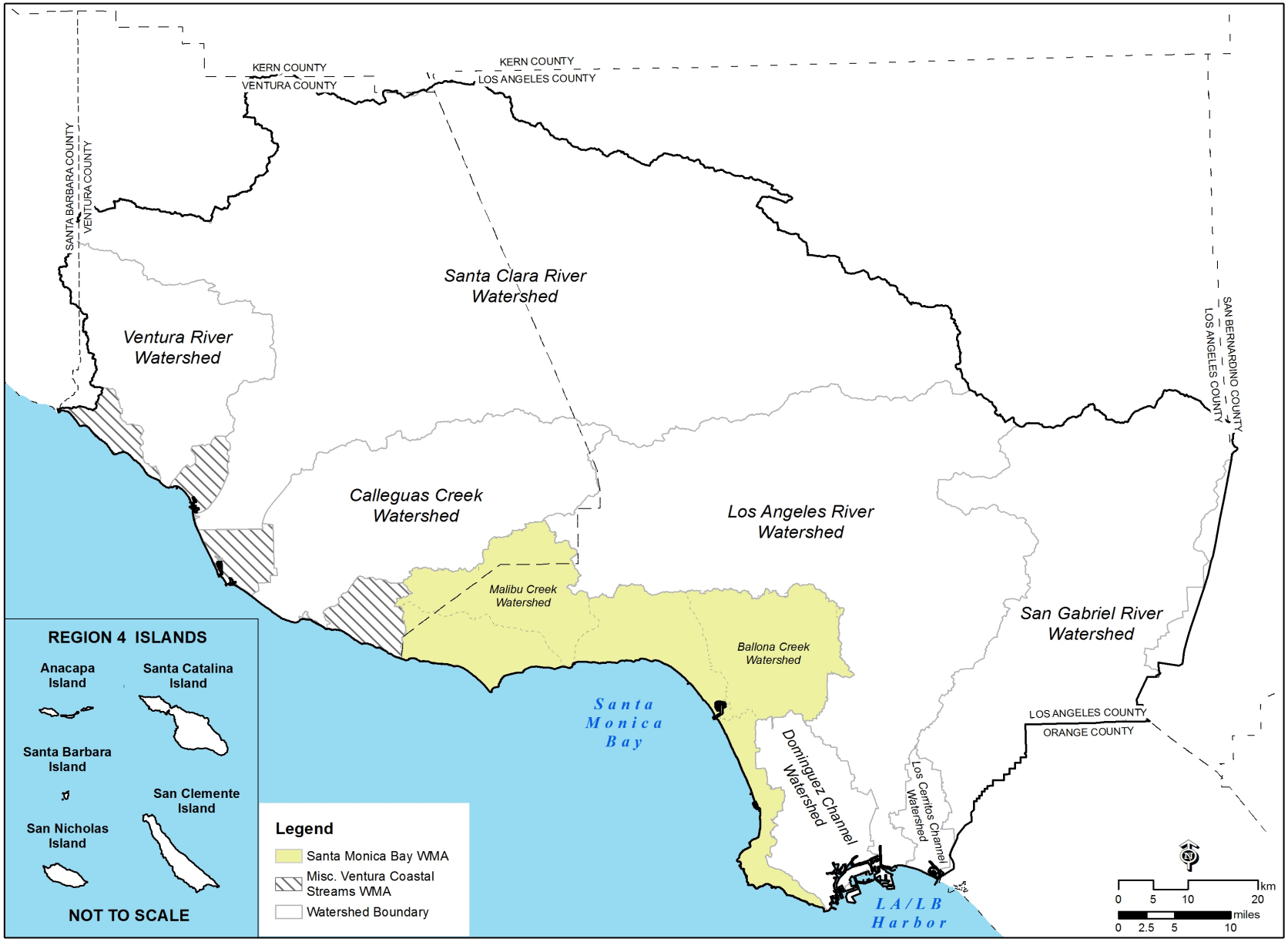


Figure 1-5. Watershed Management Areas (WMAs).

of Mesozoic granitic rocks (66 to 245 million years old), with minor exposures of Precambrian igneous and metamorphic rocks (prior to 570 million years old), and small stocks of Tertiary plutonic rocks (1.6 to 66 million years old). Cenozoic sedimentary beds (younger than 66 million years) are exposed only at the margins of the San Gabriel Mountains. Reflecting the recent and continuing uplift from plate tectonic activity, the San Gabriel Mountains are rugged mountains with deeply dissected canyons. Eroded sediments from these mountains have formed and are continuing to form prominent alluvial fans in the valleys along the flanks of the range.

During the Miocene Epoch (5 million to 23.5 million years ago), the sea advanced to the base of the San Gabriel Mountains, depositing fine-grained marine sediments. As the sea retreated, coarser grained sediments, eroded from the Transverse Ranges, were deposited as alluvial fans in low-lying areas such as the San Fernando Valley, San Gabriel Valley, Oxnard Plain, and the Los Angeles Coastal Plain (Norris and Webb, 1991). These low-lying areas or basins are filled with layers of sediment. Many of these layers of sediment form aquifers that are important sources of groundwater in the Region.

Climate

With prevailing winds from the west and northwest, moist air from the Pacific Ocean is carried inland in the Los Angeles Region until it is forced upward by the mountains. The resulting storms, common from November through March, are followed by dry periods during summer months. Differences in topography are responsible for large variations in temperature, humidity, precipitation, and cloud cover throughout the Region. The coastal plains and islands, with mild rainy winters and warm dry summers, are noted for their subtropical Mediterranean climate. The inland slopes and basins of the Transverse Ranges, on the other hand, are characterized by more extreme temperatures and little precipitation.

Precipitation in the Region generally occurs as rainfall, although snowfall can occur at high elevations. Most precipitation occurs during just a few major storms. Annual rainfall in Ventura County averages 16.1 inches (40.9 cm), although there is considerable variability in rainfall totals in dry versus wet years and at high versus low elevations. In wet years, mountain areas can exceed 40 inches (101.8 cm) of rain while in dry years, coastal lowlands can receive as little as 5 inches (12.7 cm) (VCWPD, 2007). The average annual rainfall for Los Angeles County is 15.7 inches (39.9 cm). However, large variations exist within Los Angeles County also, as indicated by average annual rainfall of 34.2 inches (86.9 cm) at Cogswell Dam in the San Gabriel Mountains and average annual rainfall of 13.71 inches (34.82 cm) for the coastal plain part of the County (LACDPW, 2011). These variations in precipitation are expected to increase as the impacts of climate change become more pronounced.

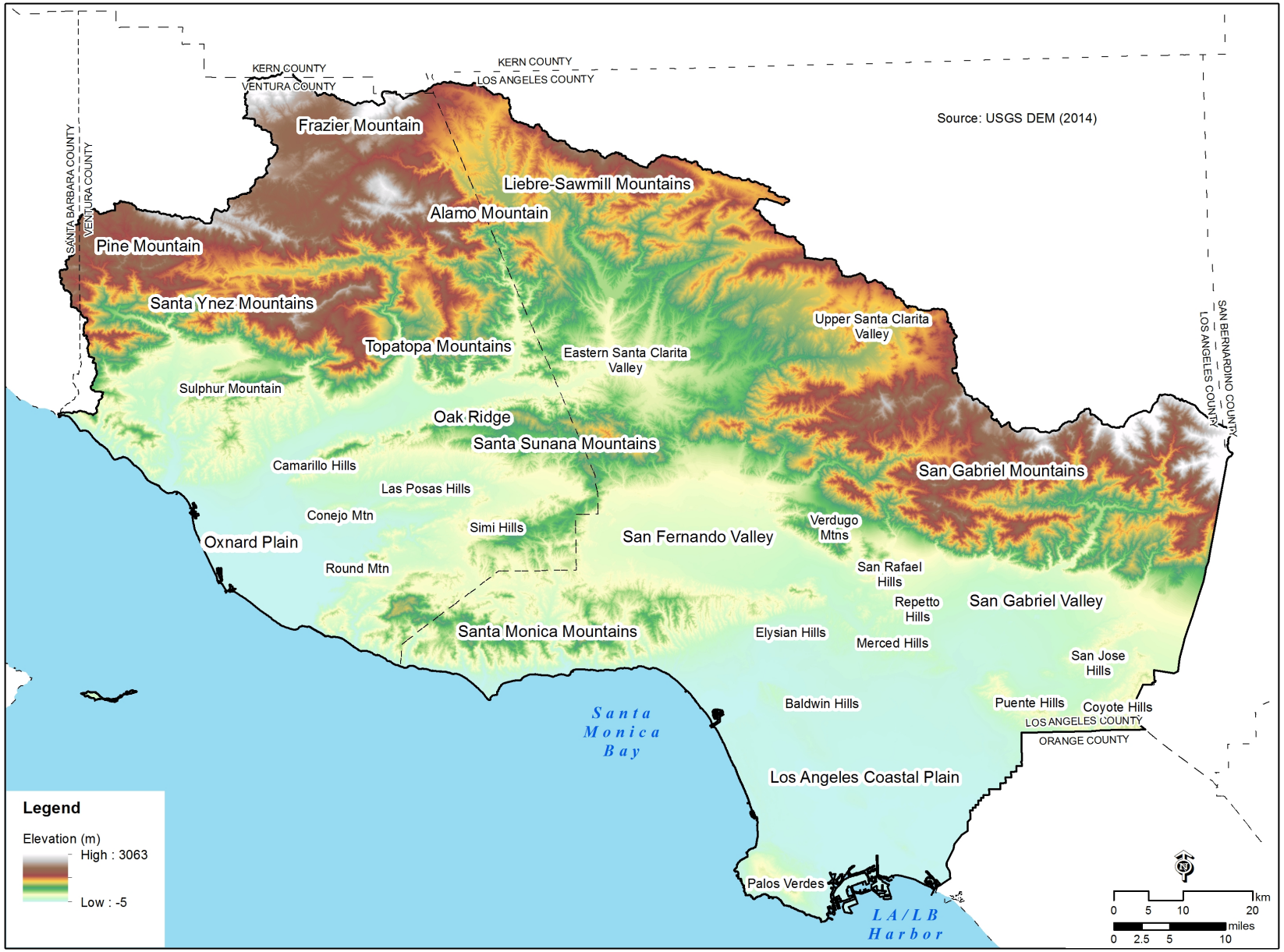


Figure 1-6. Physiographic Features of the Los Angeles Region.

Land Use/Population

Land use within the Region varies considerably (Figure 1-7). In Ventura County, land uses are changing from agriculture and open space to urban residential and commercial. In southern Los Angeles County, the predominant land uses include urban residential, commercial, and industrial. In northern Los Angeles County, open space is rapidly being transformed into residential communities.

The economy in Los Angeles County is primarily industrial, commercial, and service; while in Ventura County the economy is primarily agricultural, service, and commercial.

About 10.6 million people currently live in the Region (SCAG, 2011). From 1950 to 2000 the population in the Region more than doubled. The Region's population is projected to be 10.8 million by 2015 and 11.3 million by 2020 (State Department of Finance, 2011).

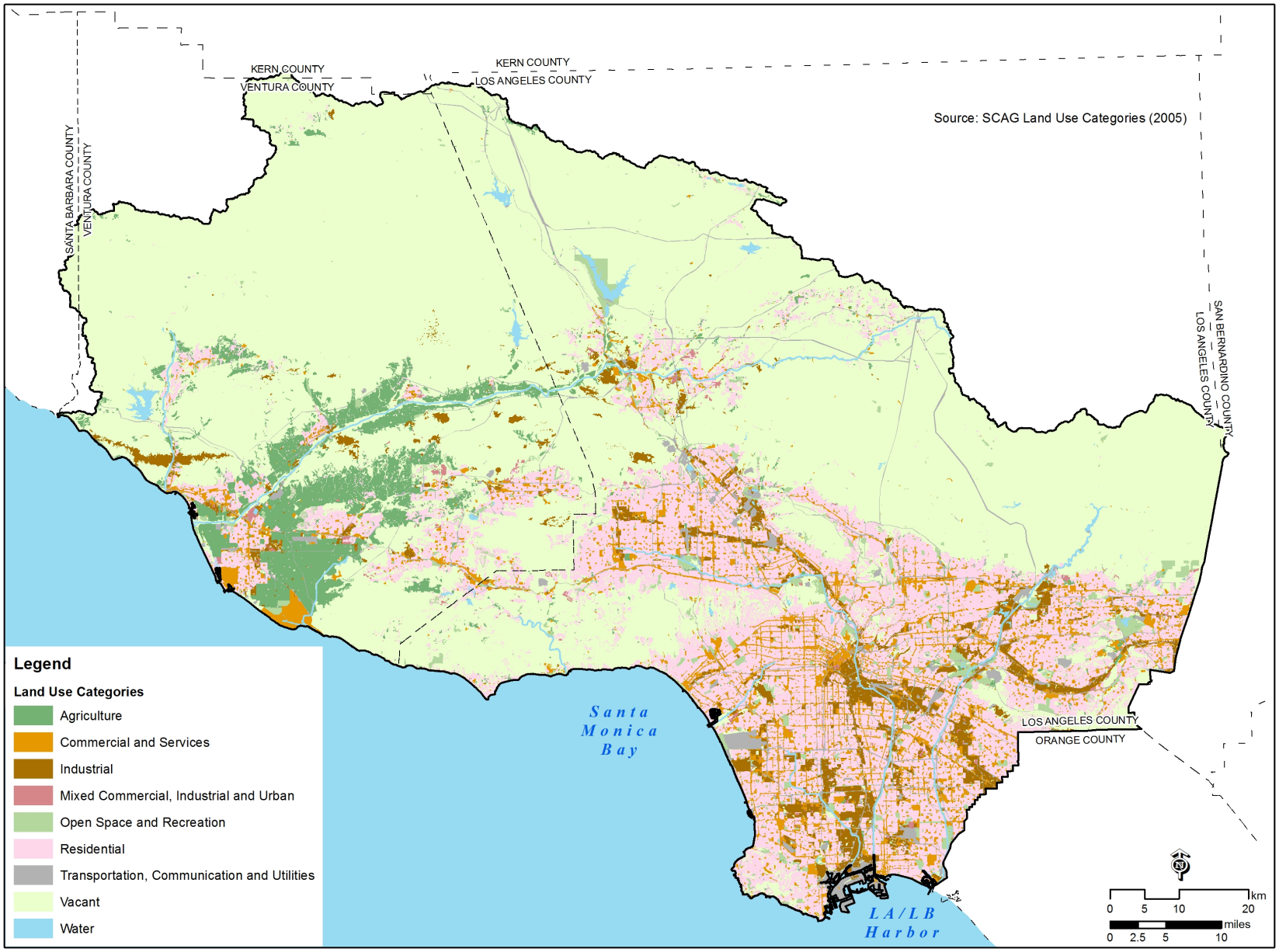
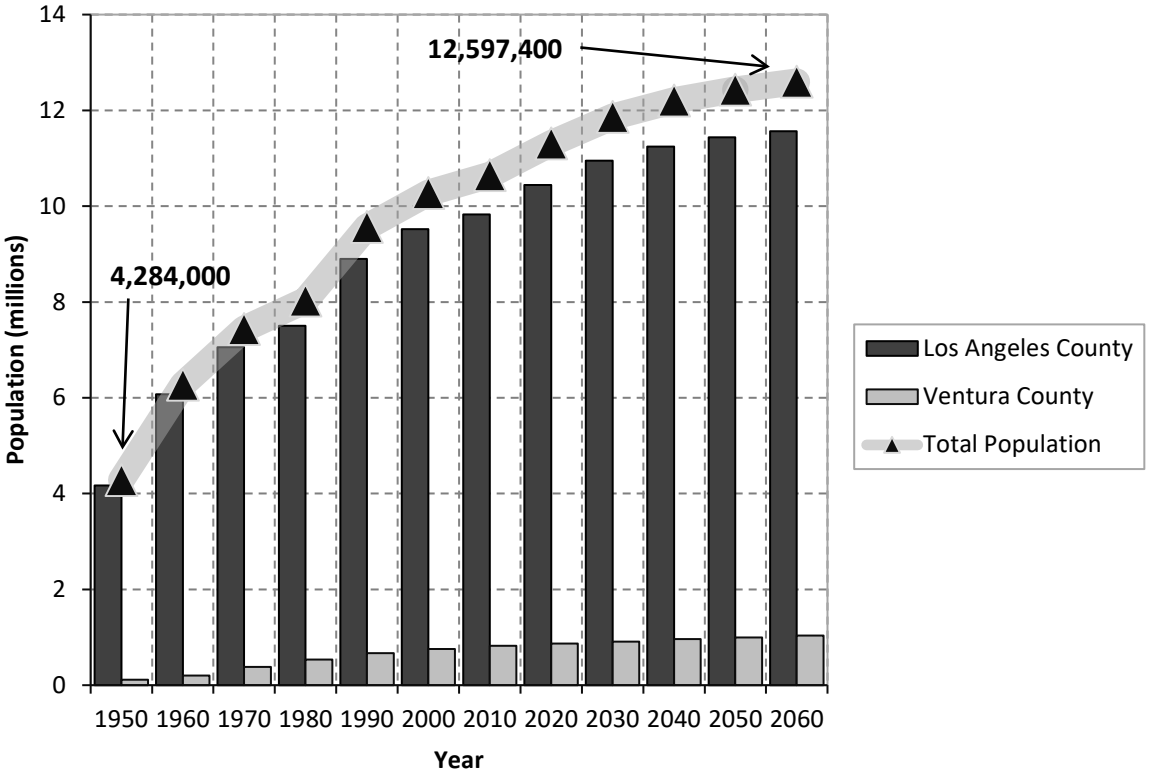


Figure 1-7. Regional Land Use.



Year	Los Angeles County	Ventura County	Total
1950	4,168,400	115,600	4,284,000
1960	6,071,900	203,100	6,275,000
1970	7,055,800	381,400	7,437,200
1980	7,500,300	532,200	8,032,500
1990	8,897,500	671,000	9,568,500
2000	9,519,300	753,200	10,272,500
2010	9,824,900	825,100	10,650,000
2020	10,441,400[p]	867,500[p]	11,308,900[p]
2030	10,950,300[p]	912,500[p]	11,862,800[p]
2040	11,243,000[p]	960,500[p]	12,203,500[p]
2050	11,434,600[p]	995,600[p]	12,430,200[p]
2060	11,562,700[p]	1,034,700[p]	12,597,400[p]

p = Projected Population

Source: California Department of Finance, September 2013

Figure 1-8. Population Trend and Projection in Los Angeles and Ventura Counties.

Natural Resources

Diversity in topography, soils, and microclimates of the Region supports a corresponding variety of plant and animal communities. Native vegetation in the Region can be categorized into a number of general plant communities including grasslands, coastal sage scrub, chaparral, oak woodland, riparian, pinyon - juniper, and timber - conifer.

Chaparral is the most common type of vegetation association in the Region. It is generally located on steeper slopes and has characteristics that make it highly flammable. Large expanses of chaparral are found in the Santa Monica Mountains. Inland, coastal sage scrub occurs in the Simi Hills, Santa Susana Knolls, Verdugo Hills, and San Gabriel Mountains. Oak woodland, with the easily identifiable Valley oaks sometimes reaching heights of 20 to 60 feet (6.1 to 19.3 m), is dominant in Thousand Oaks, Lake Casitas, Hidden Valley, Santa Clarita Valley, and elsewhere in the Transverse Mountain Ranges. A large area of foothill oak woodland is found on Sulphur Mountain. Grasslands occur in Point Mugu State Park and hillsides and valleys of northern Los Angeles (Ventura County, 2010; LA County, 1980).

Riparian vegetation, found along most of the rivers and creeks, consists of sycamores, willows, cottonwoods, and alders. Extensive riparian corridors occur along Piru, Sespe, Santa Paula, Malibu, and Las Virgenes Creeks, Santa Clara, Ventura, and San Gabriel Rivers, as well as other rivers and creeks of the Los Padres and Angeles National Forests. The riparian vegetation provides essential habitat and wildlife corridors, supporting a great abundance and diversity of species (Ventura County, 2010; LA County, 1980).

The offshore environment also contains important resources. The dominant benthic habitat is soft bottom, which consists of fine to moderately coarse sediments. Few attached plants live in this habitat but invertebrates are abundant and diverse. Resident animals include crabs, shrimp, snails, worms, and echinoderms. Hard bottom areas consist of seafloor covered with bedrock, gravel, and phosphorite. Kelp beds will often be found in these hard bottom areas at depths of 20 to 70 feet (6.1 to 21.3 m). Although far less expansive in acreage than soft bottom habitat, kelp beds provide cover and protection, and thus habitat for more than 800 species of fishes and invertebrates, some of which are uniquely adapted for life in the beds. The open ocean habitat is the primary home to fish such as Pacific sardine, northern anchovy, Pacific mackerel, and Pacific bonito as well as marine mammals

such as seals and sea lions. Many species of whales and dolphins are also observed offshore during the winter/spring migration. Phytoplankton are the dominant plant life in the pelagic environment.

Sandy beaches are the most prominent and dominant habitat along the shoreline. Beaches support species of macroinvertebrates such as sand crabs and Pismo clams; they also support surf fish, such as California corbina, barred surfperch, and shovelnose guitarfish. Many sandy beaches are important spawning grounds for California grunion. Intertidal zones include mud flats, tide pools, sandy beaches, and wave-swept rocks. They provide important habitat and breeding grounds for a variety of plants such as marine algae, fish such as grunion, and many invertebrates. Both beaches and other intertidal zones are important nesting and feeding grounds for migratory waterfowl and shore birds such as egrets, herons, gulls, terns, sanderlings, and plovers (CRWQCB-LA, 2010).

The existence of "ecological islands" as a result of topography and climatic changes has led to the evolution of species, subspecies, and genetic strains of plants and animals in the Region. However, increasing urbanization and development have resulted in the loss of habitat and a decline in biological diversity. As a result, several native flora and fauna species have been listed as rare, endangered, or threatened. Representative examples of endangered species include: California condor, American peregrine falcon, California least tern, tidewater goby, unarmored threespine stickleback, Mohave ground squirrel, conejo buckwheat, many-stemmed *Dudleya*, least Bell's vireo, and slender-horned spine flower (Ventura County, 2010; LA County, 1980).

Unique Habitats

Habitats that support rare, threatened, endangered, or other sensitive plant or animal species are unique, not simply because they support these species, but because they are unique habitats in terms of their physical, geographical, and biological characteristics.

Because of the existence of kelp beds, tide pools, and significant ecological diversity, the nearshore area between Laguna Point and Latigo Point is designated by the State Water Board as an Area of Special Biological Significance (ASBS). An ASBS, also known as a State Water Quality Protection Area, is a non-terrestrial marine or estuarine area designated to protect marine species or biological communities from an undesirable alteration in natural water quality. An ASBS is afforded special

protection for marine life through requirements that waste discharges to the ASBS are prohibited or limited by special conditions. There are eight ASBS in the Los Angeles Region (see Chapter 5).

The California Department of Fish and Wildlife designates marine protected areas (MPAs), which are marine or estuarine waters set aside to protect or conserve marine life and its associated habitat. MPAs are classified into several types based on the level of protection afforded to the area and the types of uses that are permitted in the MPA. Marine protected areas are located in the vicinity of Point Dume, the Palos Verdes Peninsula, Anacapa Island, Santa Barbara Island, San Nicolas Island, and Santa Catalina Island.

Both Ventura and Los Angeles Counties have officially designated unique habitat areas that are described in detail in the counties' respective General Plans. The Ventura County Board of Supervisors designated Significant Biological Resources in 1988 with the adoption of the General Plan (Ventura County, 2010). The Los Angeles County Board of Supervisors designated Significant Ecological Areas (SEAs) in 1980 with the adoption of the General Plan and similar areas on Santa Catalina Island with the adoption of the Santa Catalina Island Local Coastal Plan in 1983. The collection of SEAs together was intended to designate critical components of the biodiversity of Los Angeles County as it was known and understood at that time (LA County, 1980). The section on Surface Waters/Watersheds below describes some of the more significant biological resources and ecological areas recognized by the counties in each watershed.

Water Resources/Water Quality

The Los Angeles Region is the State's most densely populated and industrialized region. Despite this, many of the watersheds in the Region encompass a great deal of diversity in level of development, land use, topography, and socioeconomic characteristics. National forest land may dominate one part of a watershed, while extensive development dominates another part. Irrigated agriculture and grazing remain significant in parts of the Region. To add to this complexity, the Regional Water Board regulates over 1,000 discharges of wastewater from a wide variety of municipal and industrial sources throughout the Region and a vast network of municipal separate storm sewer systems serving two counties and 99 cities (CRWQCB-LA, 2007). The sources of water that sustain the Region are also diverse. Because surface water and groundwater supplies within the Region are insufficient to support the population,

water imported from other areas meets about 50 percent of fresh water demands in the Region (MWD, 2010). In addition, the demand for water is increasingly being fulfilled by the use of reclaimed water for indirect potable reuse (i.e. groundwater recharge) and non-potable purposes such as landscape irrigation and industrial processing and servicing. (See Other Sources of Water, below.)

Surface Waters/Watersheds

The rivers and streams of the Los Angeles Region flow from headwaters in pristine mountain areas (largely in two National Forests -- the Angeles National Forest and Los Padres National Forest, and the Santa Monica Mountains National Recreation Area), through urbanized foothill and valley areas, high density residential, industrial, or intensely farmed coastal areas, and terminate at highly utilized recreational beaches and harbors.

Coastal waters in the Region include bays, harbors, estuaries and lagoons, beaches, and the open ocean. Santa Monica Bay dominates a large portion of the Region's open coastal waters and is a nationally significant waterbody, which is part of the National Estuary Program. Deep-draft commercial harbors include the Los Angeles/Long Beach Harbor complex and Port Hueneme. Shallower, small craft harbors, such as Marina del Rey, King Harbor, and Ventura Marina, are spread along the coastline. Coastal wetlands include regionally significant resources such as Mugu Lagoon and Malibu Lagoon and numerous small coastal wetlands as well as larger ones such as the Ballona and Los Cerritos Wetlands. Recreational beaches occur nearly uninterrupted along the entire length of the Region’s coastline.

Coastal waters are impacted by a variety of activities, including:

- Municipal and industrial wastewater discharges
- Municipal separate storm sewer system discharges
- Cooling water discharges
- Failing onsite wastewater treatment systems (a.k.a. septic systems)
- Oil spills from tankers and offshore platforms
- Vessel wastes
- Dredging
- Increased development and loss of habitat
- Illegal dumping

- Natural oil seeps

Generally, largely uncontrolled discharges of pollutants from municipal separate storm sewer systems and from nonpoint sources are believed to be the greatest threats to rivers and streams within the Region. Recent advances in permitting municipal separate storm sewer system discharges, and control of certain nonpoint sources are expected to remedy many of these threats.

Major surface waters in the Region are also specifically impacted by:

- Poor mineral quality in some areas due to geology, agricultural runoff, discharge of highly mineralized groundwater, and high salinity levels in of some imported waters
- Bioaccumulation of toxic compounds in fish and other aquatic life
- Impacts from increased development and recreational uses
- In-stream toxicity from point and nonpoint sources
- Diversion of flows necessary for the propagation of fish and wildlife populations
- Channelization, dredging, and other losses of habitat
- Impacts from transient camps located along creeks and lagoons
- Illegal dumping
- Introduction of non-native plants and animals which displace native biota
- Impacts from sand and gravel mining operations
- Natural oil seeps
- Eutrophication and the accumulation of toxic pollutants in lakes

The Region encompasses ten Watershed Management Areas (WMAs), which generally consist of a single large watershed within which exist smaller subwatersheds that are tributary to the mainstem river. However, in some cases they may be a collection of drainage areas that does not meet the strict hydrologic definition of a watershed (e.g., several small Ventura coastal waterbodies in the Region are grouped together into one WMA). Watersheds in the strictest sense are geographic areas draining into a river system, ocean, or other body of water through a single outlet and include the receiving waters. They are usually bordered, and separated from, other watersheds by mountain ridges or other naturally elevated areas.

1. Ventura River Watershed: The Ventura River is the northernmost major river system in the Region; it drains an area of 235 square miles (609 square kilometers) situated within the western

Transverse Ranges. Topography in the watershed is rugged and, as a result, the surface waters that drain the watershed have very steep gradients, ranging from 40 feet per mile (7.6 m per km) at the mouth to 150 feet per mile (28.4 m per km) at the headwaters. The watershed supports a number of sensitive aquatic species, several of which are endangered or threatened. Water quality in the upper reaches is good but quality in the lower reaches is influenced by a combination of municipal wastewater discharges, agricultural activities, livestock, MS4 discharges, and oil industry discharges among other sources of pollutants. Excessive algae occurs at many locations. Wetlands are found at the Ventura River estuary, along the river itself, bordering lakes, and at isolated low-lying areas within the watershed such as Ojai Meadows (CRWQCB-LA, 2007).

Local populations of steelhead and rainbow trout have been greatly reduced in the watershed through physical barriers to migration and diverted stream flows. A limited resident population of rainbow trout occurs above Robles Diversion Dam and in San Antonio Creek and the lower Ventura River. Migratory steelhead trout ascend upstream in the Ventura River and into San Antonio Creek and may utilize areas above the Robles Diversion Dam via a fish passageway.

Multiple interested agencies, and other entities, however, have recognized the potential for the restoration and enhancement of steelhead populations in the Ventura River through the removal of Matilija Dam, which blocks access to a large area of prime spawning habitat (USACE and VCWPD, 2004). Ventura County has explored alternatives and is seeking funding to realize this removal.

The wetland at the mouth of the Ventura River is considered to be a Significant Biological Resource by Ventura County due to its ability to provide habitat for thousands of biota that include endangered, rare, or threatened species. The mainstem of the river as well as San Antonio Creek are also listed as Significant Biological Resources due to their use by steelhead trout. “Critical” condor habitat exists in three areas in Ventura County, including Matilija Creek (Ventura County, 2010).

Residents and agricultural interests in this watershed are entirely dependent on local surface water and groundwater since there is no connection to the State Water Project to deliver imported water.

2. Santa Clara River Watershed: The Santa Clara River, at approximately 100 miles (161 kilometers) in length with a 1200 square mile (3,108 square kilometer watershed), is the largest river system in southern California that remains in a relatively natural state. The river originates on the

northern slope of the San Gabriel Mountains in Los Angeles County, traverses Ventura County, and flows into the Pacific Ocean halfway between the cities of San Buenaventura and Oxnard. Land use in the watershed is predominately open space; residential, agriculture, and some industrial uses occur along the mainstem (CRWQCB-LA, 2007).

Threats to water quality include increasing development in floodplain areas (particularly in the upper watershed), necessitating flood control measures such as channelization that results in increased flows, erosion, and loss of habitat. In many of these highly disturbed areas the exotic giant reed (Arundo donax) is gaining a foothold. Increasing loads of nitrogen (from irrigation and onsite wastewater treatment discharges) and salts such as chloride (from irrigation and publicly owned treatment works (POTW) discharges) in surface and groundwaters threaten beneficial uses, including irrigation and drinking water supply. Additionally, stream flows are diverted, usually during high flow, for groundwater recharge or direct delivery; wells are then pumped for municipal and agricultural uses. Thirty-six percent of the watershed is controlled by dams such as Santa Felicia and Pyramid Dams on Piru Creek and Castaic Dam on Castaic Creek. The hydrology of the river is complex; perennial flows occur in some portions of the river before disappearing into the permeable bed material and then reappearing further downstream where groundwater surfaces. Groundwater underlying the Santa Clarita Valley in the upper watershed has been impacted by perchlorate contamination. The chemical was originally detected in four Saugus wells in 1997 near the former Whittaker-Bermite industrial facility. Since then, the wells have been out of water supply service. Remediation of the perchlorate and restoration of the impacted well capacity is underway (CRWQCB-LA, 2006 and 2007).

While there are several small publicly owned treatment works (POTWs) in the Ventura County portion of the watershed and two larger POTWs in the upper watershed, many of the smaller communities in the watershed remain unsewered. In particular, in the Agua Dulce area of the upper watershed, impacts to drinking water wells from onsite wastewater treatment systems are of concern. The community has undertaken a wellhead protection effort, with oversight by Regional Water Board staff (CRWQCB-LA, 2007).

Significant Biological Resources described in Ventura County's General Plan include the extensive patches of high quality riparian habitat that are present along the length of the river and its tributaries. Also considered significant are areas such as the wetlands found at the Santa Clara River estuary, along the river itself, bordering lakes, and at isolated low-lying areas within the watershed such as the

"Pothole" in the Devil's Potrero (on Agua Blanca Creek) that supports several species of plants unique to freshwater marshes (Ventura County, 2010). In the upper part of the watershed, within Los Angeles County, SEAs have been designated including: (1) the Santa Clara River SEA, which also includes the previously designated Kentucky Springs SEA (a distinctive stand of great basin sagebrush) and the previously designated San Francisquito Canyon SEA (which provides habitat for the endangered threespine stickleback); (2) the Santa Susana and Simi Hills SEA, which includes the previously designated Lyons Canyon SEA (a chaparral and oak woodland); and (3) the Valley Oaks Savannah near Newhall (LA County, 1980 and 2011).

One of the largest of Santa Clara River's tributaries, Sespe Creek, contains most of the Santa Clara River's remnant, but restorable, run of the steelhead trout. Sespe Creek is designated as a “Wild Trout Stream” by the State of California and supports significant steelhead spawning and rearing habitat. Additionally, the federal Los Padres Wilderness Act (1992) permanently set aside portions of Sespe Creek for steelhead trout protection and designated Sespe Creek as a “Wild and Scenic River” and Ventura County considers Sespe Creek a Significant Biological Resource. The Pacific lamprey, another anadromous fish, also uses Sespe Creek and the Santa Clara River for spawning (Ventura County, 2010).

The Sespe Condor Sanctuary was dedicated in 1947 and set aside 53,000 acres (21,448 hectares) in aide of that species’ recovery. The Sanctuary is surrounded on the west, north, and east by critical condor habitat and the Hopper Mountain National Wildlife Refuge is to the south of the Hopper Mountain area. "Critical" condor habitat exists for three areas in Ventura County including Mount Pinos and Sespe-Piru. All federal agencies must ensure that actions authorized, funded, or carried out by them do not result in the destruction or modification of these critical habitat areas. "Essential" habitat includes those areas intended to supplement the officially designated critical habitat. These areas have no legal status unlike “Critical Habitat” areas; however, the habitat management recommendations are intended to be applied with equal emphasis in these areas. The essential habitat in the watershed extends the Sespe-Piru critical habitat -- on the northeast to Liebre Mountain in Los Angeles County and on the west to Madulce Peak in Santa Barbara County (Ventura County, 2010).

Piru and Santa Paula Creeks, two other tributaries of the Santa Clara River, also support good habitat for steelhead, although both contain barriers to migration. Additionally, the Santa Clara River has populations of unarmored threespine stickleback, Santa Ana suckers, arroyo toads, and California least

Bell's vireo. San Francisquito Canyon, Placerita Canyon, Soledad Canyon, Castaic, and Elizabeth Canyon Creeks are smaller tributaries that all provide valuable habitat. The Santa Clara River also serves as an important wildlife corridor (CRWQCB-LA, 2006).

Residents and agricultural interests in this watershed are dependent on a mix of local surface water and groundwater as well as imported water. Several large reservoirs are used to store imported water, which is also used to recharge groundwater basins. Use of recycled water is practiced extensively in the dryer upper watershed.

3. Calleguas Creek Watershed: Calleguas Creek and its major tributaries, Revolon Slough, Conejo Creek, Arroyo Conejo, Arroyo Santa Rosa, and Arroyo Simi drain an area of 343 square miles (888 square kilometers) in southern Ventura County and a small portion of western Los Angeles County. The Santa Susana Mountains, South Mountain, and Oak Ridge form the northern boundary of the watershed, while the Simi Hills and Santa Monica Mountains form the southern boundary (CRWQCB-LA, 2007).

Calleguas Creek drains a predominantly agricultural area on the Oxnard Plain as well as a mix of agricultural, residential, and open space areas further inland; it empties into Mugu Lagoon, one of southern California's few remaining large wetlands, which supports a rich diversity of fish and wildlife. The lagoon borders on an ASBS and supports a great diversity of wildlife including several endangered birds and one endangered plant species (CRWQCB-LA, 2007). The wetland at Mugu Lagoon is considered to be a Significant Biological Resource by Ventura County due to its ability to provide habitat for thousands of biota include endangered, rare, or threatened species (Ventura County, 2010). Additionally, a small portion of the eastern end of the watershed falls within Los Angeles County, which has designated several SEAs including the Santa Susana Mountains, Santa Susana Pass, and the Simi Hills (Los Angeles County, 1980).

While natural creek flows in the past were intermittent in this fairly low-gradient watershed, discharges of municipal, agricultural, and urban wastewaters have increased surface flow in the watershed resulting in increased sedimentation in the lagoon. The general instability of the streambanks, continual destruction of riparian vegetation, and other land use practices have accelerated erosion in the watershed. Erosion problems are intensified in areas where residential development is occurring on steeply sloping upland areas.

Aquatic life in both Mugu Lagoon and the inland streams of this watershed has been impacted by a variety of pollutants including DDT, PCBs, other pesticides, and some metals. High concentrations of minerals and nitrates are common in surface water as well as groundwater. The elevated levels of salts are as a result of applied imported water and agriculture, and are expected to be addressed through the use of groundwater desalters and the advanced treatment of wastewater effluents via reverse osmosis. The brine solution produced from these processes will be disposed of through a Salinity Management Pipeline (brine line), currently under construction, which will discharge to the Pacific Ocean.

Sediment toxicity is also elevated in some parts of the lagoon. Reproduction is impaired in the resident endangered species, such as the light-footed clapper rail, due to elevated levels of DDT and PCBs. Overall, this is a very impaired watershed (CRWQCB, 2007).

While residents and agricultural interests in this watershed utilize some local groundwater, they are highly dependent on imported water; use of reclaimed water is increasing.

4. Miscellaneous Ventura Coastal WMA: The WMA is composed of four separate coastal drainage areas located between the Regional boundary, Ventura River, Santa Clara River, and Calleguas Creek Watersheds as well as the Santa Monica Bay WMA. The drainage areas are typified by either small coastal streams, wetlands, or marinas/urban centers (CRWQCB-LA, 2007). The WMA encompasses an area that historically consisted of extensive wetlands (Grossinger, et al. 2011). Many unique habitats, including coastal wetlands and lagoons, such as McGrath Lake and Ormond Beach Wetlands, and the nearby coastal dunes remain and are found along the southern coast of Ventura County. They are considered to be Significant Biological Resources by Ventura County. These areas provide habitats for many fish, birds, invertebrates, sea lions, and other marine and estuarine species (Ventura County, 2010).

The water quality problems found at the coastal wetlands generally involve legacy and current-day pesticides since most of the wetlands are located adjacent to or downstream of agricultural areas. Some of these wetlands receive runoff from urban areas through sizable drains and pollutants associated with MS4 discharges will additionally be found. The water quality problems found at the marinas in the WMA generally involve elevated metals and, at times, legacy pesticides. While there is

a POTW in the WMA, which discharges to the ocean, some of the smaller communities in the WMA remain unsewered. The Regional Water Board determined that wastewater is contaminating the underlying groundwater basin (Oxnard Forebay) in the El Rio area on the Oxnard Plain. Since groundwater from the basin is used as a drinking water supply for the area, this contamination, with pathogens and nitrogen compounds, is impairing the beneficial use of the groundwater. The Regional Water Board amended the Basin Plan in August 1999 to prohibit new onsite wastewater treatment systems in the Oxnard Forebay, including El Rio and Saticoy areas, and discharge of septic effluent for lots less than 5 acres by January 1, 2008. Implementation of the prohibition continues. (CRWQCB-LA, 2007).

While residents and commercial/agricultural interests in this WMA utilize some local groundwater, they are highly dependent on imported water.

5. Santa Monica Bay WMA: The Santa Monica Bay WMA encompasses an area of 414 square miles (1,072 square kilometers). Its borders reach from the crest of the Santa Monica Mountains on the north and from the Ventura-Los Angeles County line to downtown Los Angeles. From there it extends south and west across the Los Angeles plain to include the area east of Ballona Creek and north of the Baldwin Hills. A narrow strip of land between Playa del Rey and Palos Verdes drains to the Bay south of Ballona Creek. The WMA includes waters that flow into the Bay through 28 catchment basins that can be grouped into nine watershed areas based on their geographic characteristics. The two largest watersheds are Malibu Creek to the north (west) and Ballona Creek to the south. The smaller Topanga Creek Watershed is located partway between Malibu and Ballona. Many of the beaches lining the Bay are impaired for bacteria, while the nearshore and offshore zones are impaired due to DDT and PCBs (CRWQCB-LA, 2010).

The WMA contains a number of SEAs designated by Los Angeles County due to their unique, uncommon, or scientifically interesting features including: Point Dume, Upper La Sierra Canyon, Malibu Canyon and Lagoon, Hepatic Gulch, Cold Creek, and Las Virgenes. Other areas were selected to provide examples of the more common habitats and to ensure that the full range of the remaining biotic and geographic diversity in the region was represented. These areas include: Zuma Canyon, Tuna Canyon, Temescal-Rustic-Sullivan Canyons, and Palo Comado Canyon. Additionally, Agua Amarga Canyon on the Palos Verdes Peninsula is designated as a SEA, as well as the Palos Verdes Peninsula coastline, Portuguese Bend Landslide, Ballona Creek, the El Segundo Dunes, the Malibu

coastline, and the Malibu Creek State Park Buffer Area (LA County, 1980).

Residents and commercial/industrial interests in this WMA are highly dependent on imported water; use of recycled water is increasing.

Malibu Creek Watershed: The Malibu Creek Watershed, at about 109 square miles (282 square kilometers), is one of the largest draining to Santa Monica Bay. Approximately two-thirds of this watershed lies in Los Angeles County and the remaining third is in Ventura County. Much of the land is part of the Santa Monica Mountains National Recreation Area and is under the purview of the National Park Service (CRWQCB-LA, 2007). The watershed has changed rapidly in the last 30 years from a predominantly rural area to a steadily developing area that has increased in population to nearly 90,000 residents. Increased flows and channelization of several tributaries to Malibu Creek have caused an imbalance in the natural flow regime in the watershed and have led to habitat impacts in Malibu Lagoon at the mouth of the watershed. Restoration efforts, completed by the California Department of Parks and Recreation and the California Coastal Conservancy in 2013, improved the natural structure and function of the Lagoon.

Pollutants of concern, many of which are discharged from nonpoint sources, include excess nutrients, sediment, and bacteria. In response to the ongoing bacterial and nutrient pollution in this area, the Regional Water Board adopted a prohibition of discharges from onsite wastewater treatment systems (i.e., septic systems) in the Malibu Civic Center Area in 2009 (see Chapter 4).

Malibu Lagoon supports two important plant communities, the coastal salt marsh and coastal strand, and is an important refuge for migrating birds (over 200 species of birds have been observed). As Malibu Canyon dissects the Santa Monica Mountains, species normally restricted to the drier interior valleys have extended their range down the canyon. Perennial streams in Malibu Canyon support oak and riparian woodlands. Malibu Creek is also the southernmost watercourse in California where steelhead trout continue to spawn in relatively large numbers despite a major barrier to upstream migration, Rindge Dam.

Topanga Creek Watershed: The Topanga Creek Watershed is located east of Malibu and covers an area of 18 square miles (47 square kilometers) within the Santa Monica Mountains. Topanga Creek flows through a small town center and residential areas in the upper reaches and through steep, narrow

gorges in the lower reaches, ultimately emptying into the ocean just south of Pacific Coast Highway. A small lagoon exists at the mouth of the creek due to a berm created by littoral drift and wave action. Bacteria levels are of concern in the lagoon. The lower reaches of the creek flow year-round and support a small population of spawning steelhead trout aided by deep pools where temperatures remain cooler (CRWQCB-LA, 2010).

Ballona Creek Watershed: Ballona Creek, at approximately 127 square miles (329 square kilometers), is the largest drainage tributary to Santa Monica Bay and discharges to the ocean adjacent to the entrance of the Marina del Rey Harbor. The mostly channelized creek collects runoff from several partially urbanized canyons on the south slopes of the Santa Monica Mountains as well as from intensely urbanized areas of West Los Angeles, Culver City, Beverly Hills, Hollywood, Inglewood, Santa Monica, and parts of central Los Angeles (CRWQCB-LA, 2007). The watershed encompasses an area that historically consisted of extensive wetlands (Grossinger, et al. 2011). The current-day Ballona Wetlands are located near the mouth of the creek and represents one of the few remaining regionally significant coastal wetlands along Santa Monica Bay. The complex of wetlands is a mixture of habitats dominated by coastal salt marsh; a number of special status species are supported there including Belding's Savannah Sparrow (CRWQCB-LA, 2007). In 2004, the State of California acquired ownership of this remaining wetland area (600 acres (243 hectares) in total), and the California Department of Fish and Wildlife, the State Lands Commission, and the State Coastal Conservancy have been working with stakeholders, scientist, and other agencies to develop plans for its restoration (CSCC, 2008).

A large number of pollutants associated with urban development are found in the creek and, in turn, impact the nearby beaches and ocean. In addition, high concentrations of DDT in sediments at the mouth of the creek and in Marina Del Rey Harbor provide evidence of past discharges that have resulted in long-term water quality problems.

6. Dominguez Channel and Los Angeles/Long Beach Harbors WMA: The Los Angeles and Long Beach Harbors are located in the southern portion of the Los Angeles Basin and occupy an area that was once a vast wetlands complex (Grossinger, et al. 2011). Along the northern portion of San Pedro Bay is a natural embayment formed by a westerly extension of the coastline which contains both harbors, with the Palos Verdes Hills the dominant onshore feature. The channelized 15-mile (24-kilometer) long Dominguez Channel enters Los Angeles Harbor from the north. Unlike more traditional watersheds containing a river flowing toward the ocean and draining upland and mountainous areas to

the ridgeline, the WMA has a generally low gradient. Its boundaries are not visually apparent in many locations and are defined by the directions that underground storm drains flow (CRWQCB-LA, 2007 and 2008).

The harbors are considered to be one oceanographic unit; together they have an open water area of approximately 8,127 acres (3,289 hectares). Despite its industrial nature, contaminant sources, disrupted wetlands habitat, and low flushing ability, the inner harbor area supports fairly diverse fish and benthic populations and provides a protected nursery area for juvenile fish. The California least tern, an endangered species, nests in one part of the harbor complex. Some wetlands persist in the Machado Lake area (CRWQCB-LA, 2007 and 2008).

The outer part of both harbors (the greater San Pedro Bay within the breakwaters) has been less disrupted and supports a great diversity of marine life and a large population of fish. It is also open to the ocean at its eastern end and receives much greater flushing than the inner harbors (CRWQCB-LA, 2007 and 2008).

Dominguez Channel drains a highly industrialized area with numerous sources of pollution resulting from polycyclic aromatic hydrocarbons (PAHs) and also contains remnants of persistent legacy pesticides as well as PCBs, all of which contribute to poor sediment quality both within the Channel and in adjacent Inner Harbor areas. Oil pumping had a large presence in the area historically with some wells still in operation. Although highest in Dominguez Channel estuary and Consolidated Slip sediments, DDT is pervasive throughout the harbors. Metals remain elevated at some locations in the sediments of the inner harbors. Consolidated Slip, the part of Inner Harbor immediately downstream of Dominguez Channel, continues to exhibit a very impacted benthic invertebrate community (CRWQCB-LA, 2007).

Valuable habitat, however, remains in the WMA. Los Angeles County designated a number of areas as SEAs in this WMA including: Harbor Lake Regional Park, Madrona Marsh, the Rolling Hills Canyons, and Terminal Island (the latter due to the presence of least tern nesting sites).

Residents and commercial/industrial interests in this WMA are highly dependent on imported water; use of recycled water is increasing.

7. Los Angeles River Watershed: The Los Angeles River Watershed is one of the largest in the Region at 824 square miles (2,134 square kilometers) and is also one of the most diverse in terms of land use patterns. Approximately 324 square miles (839 square kilometers) of the watershed are covered by forest or open space land including the area near the headwaters which originate in the Santa Monica, Santa Susana, and San Gabriel Mountains (CRWQCB-LA, 2007). The rest of the watershed is intensely urbanized and the river itself is highly modified, having been lined with concrete along most of its length by the U.S. Army Corps of Engineers from the 1930s to the 1960s. There are approximately 205 miles of engineered channels within the Los Angeles River Watershed system.

An 6.8-mile (11-kilometer) long reach in the narrows area (in the middle portion of the river system), where ground water rises into the streambed, is mostly unlined along the stream bottom and provides natural habitat for fish and other wildlife in an otherwise concrete conveyance. The upper reaches of the river convey MS4 discharges and flood flows from the San Fernando Valley. Below the Sepulveda Basin, flows are dominated by tertiary-treated effluent from three municipal wastewater treatment plants. From the Arroyo Seco, north of downtown Los Angeles, to the confluence with the Rio Hondo, the river flows through industrial and commercial areas and is bordered by rail yards, freeways, and storage facilities. From the Rio Hondo to the Pacific Ocean, the river flows through industrial, residential, and commercial areas, including major refineries and petroleum products storage facilities, major freeways, and rail yards serving the Ports of Los Angeles and Long Beach.

Efforts to revitalize areas in and along the hydromodified stream sections of the watershed began in the 1980s and steadily built momentum, finally culminating in a Los Angeles River Revitalization Master Plan (with projects geared towards the greening and restoration of several areas in and around the Los Angeles River and its main tributaries) and the accompanying feasibility report developed by the US Army Corps of Engineers identifying grouped alternative restoration projects for possible federal funding.

Also part of the watershed are a number of lakes including Peck Road Park, Belvedere Park, Hollenbeck Park, Lincoln Park, and Echo Park Lakes, Legg Lake, and Lake Calabasas, which are heavily used for recreational purposes (CRWQCB-LA, 2007). Because the watershed is highly urbanized, MS4 discharges and illegal dumping are major contributors to impaired water quality in the Los Angeles River and tributaries. There is a complex mixture of pollutant sources due to the high number of point source permits and the intensely urbanized nature of the coastal plain portion of the

watershed. Excessive nutrients (and their effects) and coliform are widespread problems in the watershed as well as excessive metals (CRWQCB-LA, 2007).

The Tujunga Canyon/Hansen Dam area of the watershed is designated by Los Angeles County as a SEA and possesses several important features. The floodplain behind the dam supports some of the last examples of the open coastal sage scrub vegetation in the Los Angeles area. A spreading ground (basin used for groundwater recharge) southwest of the dam has created several freshwater marsh areas that are used by migratory waterfowl and shore birds. The area is also valuable as a wildlife corridor. Additional open space/habitat areas designated by Los Angeles County as SEAs include: Chatsworth Reservoir, Encino Reservoir, Griffith Park, the Simi Hills, the Whittier Narrows, and the Verdugo Mountains (LA County, 1980). Many streams flowing in the foothill ranges are perennial due to springs; waterfalls are evident in canyons tributary to the Tujunga Wash, Arroyo Seco, and Rio Hondo.

Residents and commercial/industrial interests in this watershed are dependent on a mix of local groundwater and imported water; use of recycled water is increasing.

8. Los Cerritos Channel/Alamitos Bay WMA: The WMA encompasses an area that historically consisted of extensive wetlands (Grossinger, et al. 2011). With urbanization came an increase in impervious surfaces, increased groundwater pumping, and less ability to recharge the groundwater. The current day Los Cerritos Channel is concrete-lined above the tidal prism and drains a relatively small, but densely urbanized area of east Long Beach. The channel's tidal prism starts at Anaheim Road and connects with Alamitos Bay through the Marine Stadium; an adjacent remnant wetland connects to the channel a short distance from the lower end of the channel. The wetland, and portion of the channel near the wetland, is an overwintering site for a great diversity of birds despite its small size. A small marina is located in the channel, which is also used by rowing teams and is a popular fishing area. Oil pumping was a large presence in the area historically with some wells still in operation (CRWQCB-LA, 2007).

Alamitos Bay is composed of the Marine Stadium, a recreation facility built in 1932 and used for boating, water skiing, and jet skiing; Long Beach Marina, which contains five smaller basins for recreational craft and a boatyard; a variety of public and private berths; and the Bay proper which includes several small canals, a bathing beach, and several popular clamming areas (CRWQCB-LA,

2007). Alamitos Bay is designated as a SEA by Los Angeles County due to the salt marsh habitat found in the area (LA County, 1980). A small bathing lagoon, Colorado Lagoon in Long Beach, has a tidal connection with the Bay and is used by overwintering migratory birds.

The water quality problems of this WMA are due to a mix of MS4 discharges from a densely populated area, legacy pollutants such as DDT and PCBs left in sediments, and both current and historic oil pumping activities (CRWQCB-LA, 2007).

Residents and commercial/industrial interests in this watershed are dependent on a mix of local groundwater and imported water; use of recycled water is increasing.

9. San Gabriel River Watershed: The 689-square mile (1,785-square kilometer) San Gabriel River Watershed receives drainage from a large area of eastern Los Angeles County; its headwaters originate in the San Gabriel Mountains. The watershed consists of extensive areas of undisturbed riparian and woodland habitats in its upper reaches. Much of the watershed of the West Fork and East Fork of the river is set aside as a wilderness area; other areas in the upper watershed are subject to heavy recreational use. The upper watershed also contains a series of flood control dams. While the upper San Gabriel River and its tributaries remain in a relatively pristine state, intensive recreational use of this area for picnicking, off road vehicle use, fishing, and hiking threaten water quality and aquatic and riparian habitats. Additional problems in the upper San Gabriel River occur as vast amounts of naturally eroding sediment from the rugged San Gabriel Mountains settle in reservoirs behind flood control dams. Improper sediment sluicing operations from these reservoirs can impact aquatic habitats and groundwater recharge areas. In the San Gabriel Valley, the middle reaches of the river have been extensively modified in order to control flood and debris flows and to recharge groundwater. Extensive sand and gravel operations are found along these stretches of the river. The watershed is hydraulically connected to the Los Angeles River through the Whittier Narrows Reservoir (normally only during high storm flows). The lower part of the river flows through a concrete-lined channel in a heavily urbanized portion of the Los Angeles Coastal Plain, before becoming a soft bottom channel once again near the ocean in the City of Long Beach (CRWQCB-LA, 2007). The lower watershed encompasses an area that historically consisted of extensive wetlands (Grossinger, et al. 2011). Large electrical power lines follow the river along the channelized portion; nurseries, small stable areas, and storage facilities are located in these areas (CRWQCB-LA, 2007). Flow in these lower reaches is dominated by effluent from several municipal wastewater treatment facilities and MS4

discharges. Impairments vary by reach; depending on the reach, they may include metals, PCBs, pesticides, bacteria, and trash.

Los Angeles County has designated a number of SEAs in this watershed. They include: Buzzard Peak/San Jose Hills, where a mix of native habitat continues to exist; the *Dudleya densiflora* Population in Glendora at the mouth of San Gabriel Canyon; the *Galium grande* Population in Monrovia at Sawpit Canyon; Powder Canyon/Puente Hills, where a mix of native habitat continues to exist; Rio Hondo College Wildlife Sanctuary; San Dimas Canyon; the Santa Fe Dam Floodplain; and Sycamore and Turnbull Canyons in the Puente Hills (LA County, 1980).

Residents and commercial/industrial interests in this watershed are dependent on a mix of local groundwater and imported water; use of recycled water is considerable and increasing, particularly in the lower watershed.

10. Channel Islands WMA: The Channel Islands within the Region's boundaries are Anacapa, San Nicolas, Santa Barbara, Santa Catalina, and San Clemente Islands. Anacapa and Santa Barbara Islands are part of the Channel Islands National Park. The waters within six nautical miles (approximately 11 kilometers) of Anacapa and Santa Barbara Islands are designated a national marine sanctuary. The ocean waters adjacent to the islands (not the entire circumference of Santa Catalina, however) are designated Areas of Special Biological Significance by the State of California (CRWQCB-LA, 2007).

A number of locations on Santa Catalina Island have been designated Areas of Botanical Significance by Los Angeles County (LA County, 1980). The west side of San Nicolas supports a large gull rookery and elephant seal breeding area. The U.S. Navy has facilities and a desalination plant on San Nicolas Island and facilities and a small package treatment plant on San Clemente Island. San Clemente Island is the primary maritime training area for the U.S. Department of the Navy Pacific Fleet, U.S. Navy SEALs, and the U.S. Marine Corps. The City of Avalon is located on Santa Catalina Island and also has a small wastewater treatment plant. Water quality in the vicinity of the islands is generally good. There are some potential water quality threats from naval facilities and small treatment plants; however, there is only one area (Avalon Beach) that is identified as impaired due to elevated bacteria (CRWQCB-LA, 2007). The impairment is being addressed by the City of Avalon through repairs and upgrades to its sewer system infrastructure and MS4, as required by a Cease and Desist Order issued

by the Regional Water Board (Order No. R4-2012-0077).

Ground Waters

Ground water accounts for most of the Region's local (i.e., non-imported) supply of fresh water. Major groundwater basins in the Region are shown in Figure 1-9.

The general quality of ground water in the Region has degraded substantially from background levels. Much of the degradation reflects land uses. For example, fertilizers and pesticides, typically used on agricultural lands, can degrade ground water when irrigation return waters containing such substances seep into the subsurface. In areas that are unsewered, nitrogen and pathogenic bacteria from overloaded or improperly sited onsite wastewater treatment systems can seep into ground water and result in health risks to those who rely on ground water for domestic supply. In areas with industrial or commercial activities, aboveground and underground storage tanks contain vast quantities of hazardous substances.

Thousands of these storage tanks in the Region have leaked or are leaking, discharging petroleum fuels, solvents, and other hazardous substances into the subsurface. These leaks as well as other discharges to the subsurface that result from inadequate handling, storage, and disposal practices can seep into the subsurface and pollute ground water.

Compared to surface water pollution, investigations and remediation of polluted ground waters are often difficult (e.g. in terms of identifying viable responsible parties), costly, and extremely slow.

Examples of specific groundwater quality problems include:

- San Gabriel Valley and San Fernando Valley Groundwater Basins: Volatile organic compounds (VOCs) from industry, and nitrates from subsurface sewage disposal and past agricultural activities, are the primary pollutants in much of the ground water throughout these basins. These deep alluvial basins do not have continuous effective confining layers above ground water and as a result pollutants have seeped through the upper sediments into the ground water.

- In light of the widespread pollution in both the San Gabriel Valley and San Fernando Valley Groundwater Basins, the California Department of Toxic Substances Control designated large areas of these basins as high priority Hazardous Substances Cleanup sites. These areas were also designated as Superfund sites by the USEPA. In the San Gabriel Basin, the Regional Water Board and USEPA's management of twelve plumes of VOCs and five plumes of nitrates, where ground water exceeds the Maximum Contaminant Level (MCL), has limited the impact to adjudicated drinking water resources. Basin water quality has also benefited from management practices and implementation of groundwater remediation conducted by the Watermaster in conjunction with local water purveyors. In the San Fernando Basin, impacts from a VOC plume and four nitrate plumes along with the irregular presence of confining layers have impacted the use of the basin for drinking water uses.

- Central and West Coast Groundwater Basins (Los Angeles Coastal Plain): Seawater intrusion that has occurred in these basins is now under control in most areas through an artificial recharge system consisting of spreading basins and injection wells that form fresh water barriers along the coast. Ground water in the lower aquifers of these basins is generally of good quality, but large plumes of saline water have been trapped behind the barrier of injection wells in the West Coast Basin, degrading significant volumes of ground water with high concentrations of chloride. Desalters are used in these areas to manage the spread of the saline plumes.

- The quality of ground water in parts of the upper aquifers of both basins is also impacted by both organic and inorganic pollutants from a variety of sources, such as leaking tanks, leaking sewer lines, and illegal discharges. As the aquifers and confining layers in these alluvial basins are typically inter-fingered, the quality of ground water in the deeper production aquifers is threatened by migration of pollutants from the upper aquifers.

- Ventura Central Groundwater Basins: Despite efforts to artificially recharge ground water and to control levels of pumping, ground water in several of the Ventura Central basins has been, and continues to be, overdrafted (particularly in the Oxnard Plain and Pleasant Valley areas). Some of the aquifers in these basins are in hydraulic continuity with seawater; thus seawater is intruding further inland, degrading large volumes of ground water with high concentrations of chloride. In addition, nutrients and other dissolved constituents in irrigation return flows are seeping into shallow aquifers and degrading ground water in these basins. Furthermore, degradation and cross-

contamination are occurring as degraded or contaminated ground water travels between aquifers through abandoned and improperly sealed wells and corroded active wells.

Once unsewered areas of Ventura County, such as the El Rio area (to the northwest of Oxnard), that represented a source of nutrient and bacterial pollution to ground water in the Ventura Central Basins are subject to a prohibition on discharges from onsite wastewater treatment systems adopted by the Regional Water Board in 1999, and these areas are being sewered.

- Santa Clara River Valley Basins: In the upgradient portion of Santa Clara River Valley, contamination of the groundwater and its exfiltrates by salts, nutrients, and bacteria as a result of increasing urbanization has impacted water quality. In addition, perchlorate contamination, as a result of industrial practices, has impacted the use of groundwater as a source of domestic supply.

- Malibu Valley Basin: Seawater Intrusion: Seawater intrusion occurred in 1950, and again in 1960, when seawater advanced 0.5 miles inland (DWR 1975). In December 1954 and April 1969, chloride concentrations exceeding 100 mg/L were found in groundwater in the coastal part of the basin (DWR 1975). In the future seawater intrusion is expected to be managed via injection of recycled water from the City of Malibu's proposed wastewater treatment plant in the lower Civic Center Gravels of the Malibu Valley Groundwater Basin to protect against further intrusion.

- Acton Valley Groundwater Basin: Ground water is the source of most potable water in this unsewered area. However, increasing concentrations of nitrate as a result of improperly sited or maintained onsite wastewater treatments systems have been found to be degrading the quality of this water.

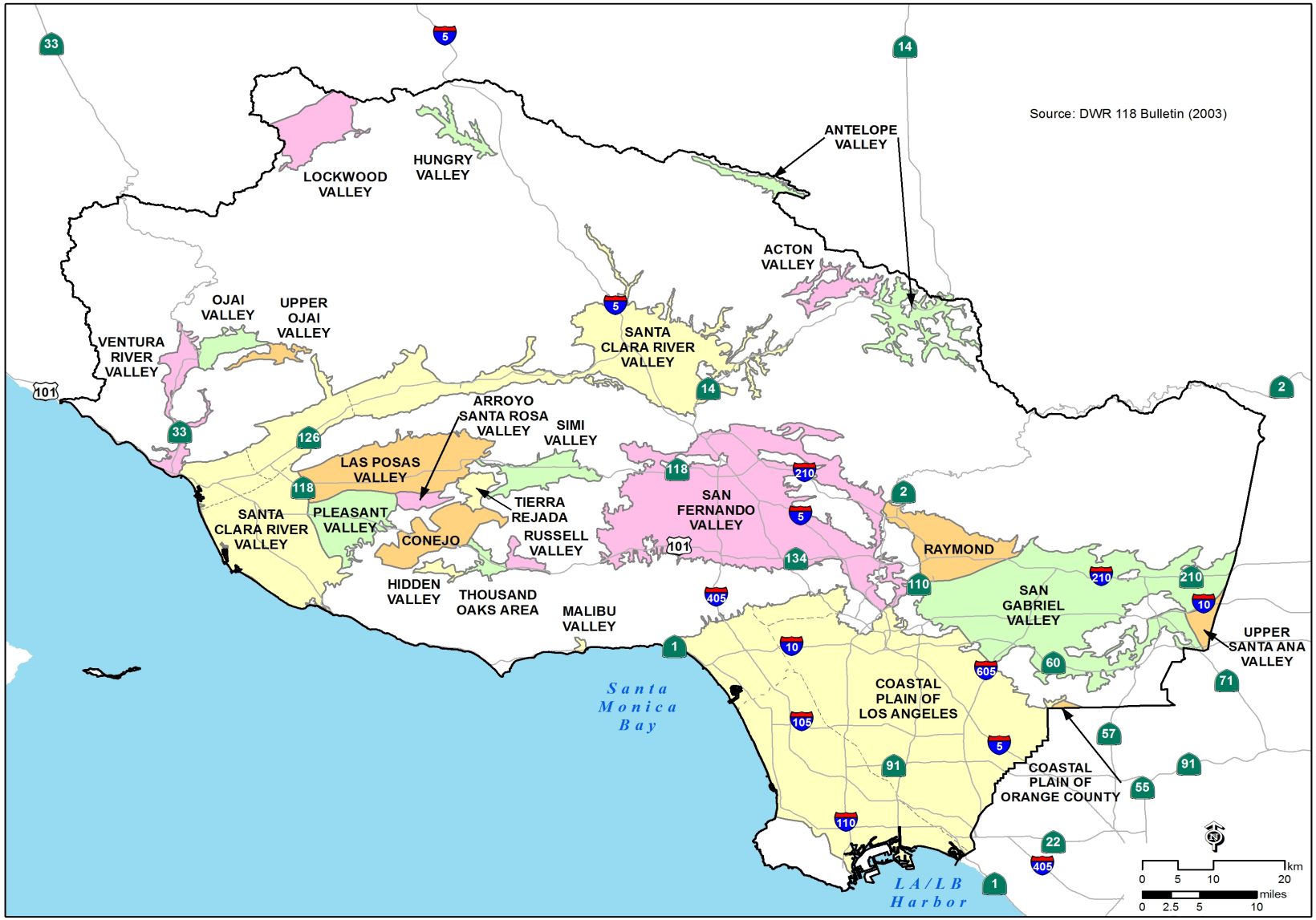


Figure 1-9. Regional Groundwater Basins.

Other Sources of Water

Imported Waters: Water from other areas has been imported into the Los Angeles Region since 1913, when the Los Angeles Aqueduct started delivering water from the Owens Valley. Since that time, southern California has developed complex systems of aqueducts to import water to support a rapidly growing population and economy. Water imported to the Region presently meets roughly half of the demand for potable water.

The principal systems (Figure 1-10) for importing water are summarized below:

The Los Angeles Aqueducts: The City of Los Angeles, Department of Water and Power, diverts water from the Mono and Owens River Basins and transports this water via the 338-mile long (544-kilometer long) Los Angeles Aqueducts to the City of Los Angeles. The original aqueduct was completed in 1913. A second aqueduct, which parallels the first, was completed in 1970.

Releases from the Haiwee Reservoir Complex, at the end of the Owens Valley Basin, supplied over 500,000 acre-feet per year to the City of Los Angeles during the first half of the 1980s. However, releases dropped to 127,012 acre-feet (15,667 hectare-meters) in 1990 as a result of a statewide drought, as well as legal restrictions on Mono Basin and Owens Valley water resources. Releases in 1992 totaled 173,945 acre-feet (21,456 hectare-meters).

The California Aqueduct (The State Water Project): The State of California, Department of Water Resources, transports about 2.4 million acre-feet (296,036 hectare-meters) per year of water, largely from the Feather and the Sacramento Rivers in northern California, to other parts of California via the California Aqueduct. In southern California, the aqueduct splits into east and west branches, terminating at Perris and Castaic Reservoirs, respectively. Approximately 1.4 million acre-feet (172,687 hectare-meters) per year of this water is delivered to four contractors for use within the Los Angeles Region: The Metropolitan Water District of Southern California (MWD), County of Ventura, Castaic Lake Water Agency, and San Gabriel Valley Municipal Water District.

The Colorado River Aqueduct: The MWD imports water from Lake Havasu on the Colorado River through the 242-mile long (389-kilometer long) Colorado River Aqueduct. This water is transported to Lake Mathews, MWD's terminal reservoir, in Riverside County. While MWD held water rights for over

1.2 million acre-feet (148,018 hectare-meters) per year in the 1930s, MWD's dependable supply of Colorado River water has now been reduced to 450,000 acre-feet (55,507 hectare-meters) per year due to the exercise of water rights by other Colorado River water users. After blending with water delivered through the State Water Project, MWD delivers a portion of this water to its member agencies in the Los Angeles Region; the remaining water is delivered to other areas in southern California.

Water imported from the Owens Valley through the Los Angeles Aqueduct is usually treated for turbidity. Water from the Colorado River typically is harder than local supplies and other imported waters. This hardness is the result of dissolved constituents from soils and rocks in the Colorado River watershed. Water from northern California, while not as hard as Colorado River water, accumulates organic materials as it flows through the fertile Sacramento-San Joaquin Delta. These organic materials when combined with chlorine during typical disinfection treatment processes can result in by-products such as trihalomethanes (THMs). As THMs are linked to cancer, a 100-parts per billion standard has been established that mitigates the occurrence of THMs in drinking water while still allowing for adequate chlorine disinfection.

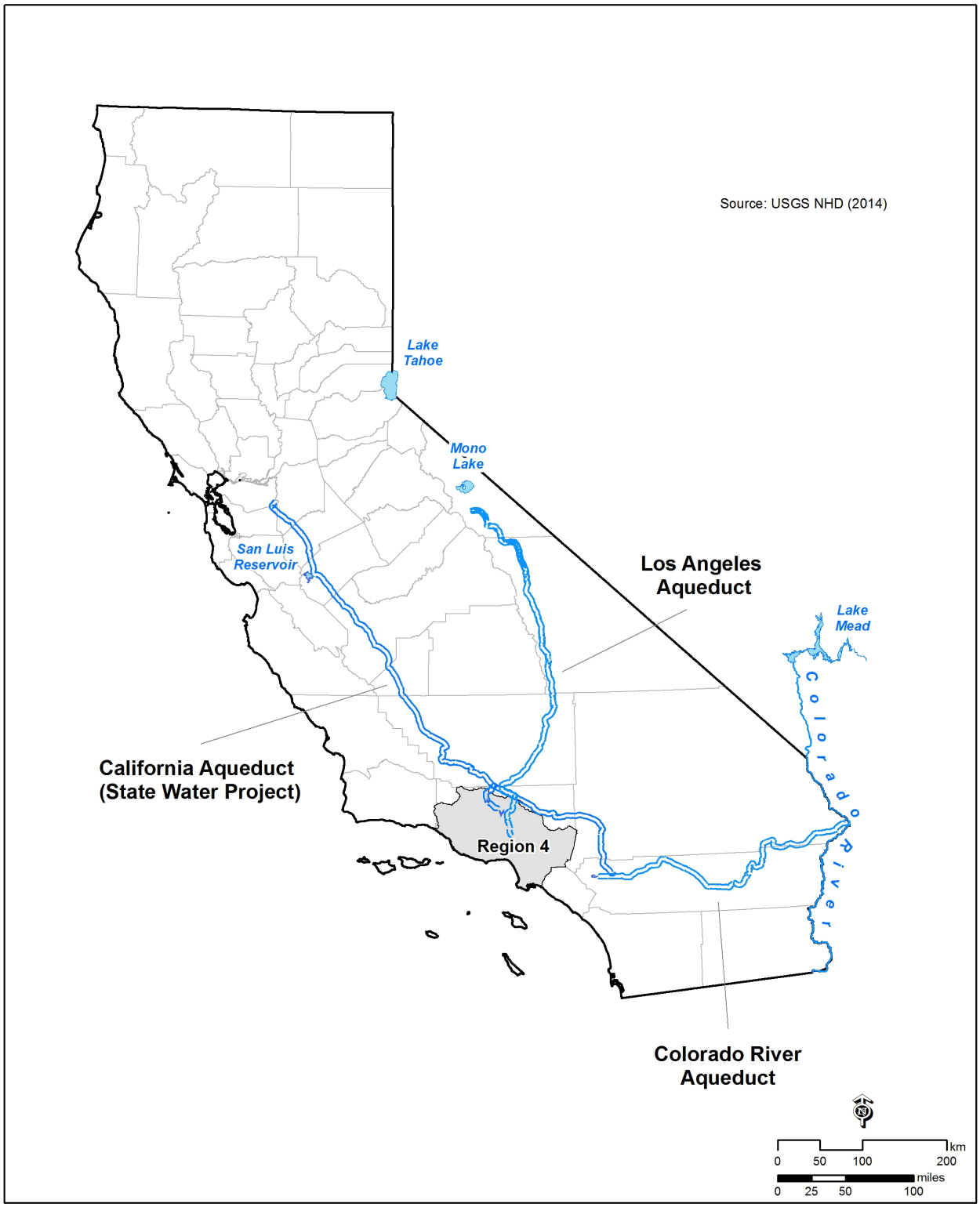


Figure 1-10. Sources of Imported Water in the Los Angeles Region.

Recycled Water: The State and Regional Water Boards recognize the shortage of fresh potable water in the Region and the need to conserve water for beneficial uses. Accordingly, reclaimed waters are an increasingly important local resource. The State Water Board's *Policy with Respect to Water Reclamation in California* (Resolution No. 77-1) and the more recently adopted *Recycled Water Policy* (Resolution No. 2009-0011, as amended by 2013-0003) are summarized in Chapter 5. The importance of water reclamation is also recognized in the California Water Code. Sections 13575 to 13577, which were added in 1991 (during the 1986-1991 drought), set reclamation goals of 700,000 acre-feet (86,344 hectare-meters) per year and 1,000,000 acre-feet (123,348 hectare-meters) per year in the years 2000 and 2010, respectively.

The Regional Water Board supports reclamation projects (i.e., those projects that reuse treated wastewaters, thereby offsetting the use of fresh waters) through the Water Reclamation Requirements program. Under this program, discussed in detail in Chapter 4, treated wastewaters are reused for groundwater recharge, recreational impoundments, industrial processing and supply, and landscape irrigation. The State and Regional Water Boards also support increased capture and infiltration of local storm water as an additional source of local water supply. The Regional Water Board provides incentives through its permits for discharges from municipal separate storm sewer systems to support increased infiltration of storm water as a means of achieving water quality standards and increasing local water supply.

In addition, the State and Regional Water Boards provide financial assistance to projects that are developing reclamation capabilities.

Drought Considerations

California experiences frequent drought conditions including the most recent instances from 1987 to 1992, 2008 to 2011, and a drought period that was declared in 2014. The Los Angeles region's dependence on imported waters leaves it vulnerable during such periods, and as such, state and local water agencies in the region have focused efforts on finding ways to integrate water quality protection programs with provisions that also have the benefit of increasing local water supplies and off-setting use of imported water, while reducing run-off from irrigation and other urban and agricultural activities. These efforts have included promoting water recycling as opposed to discharges, promoting reuse of water under de-watering permits; water conservation programs; public education; and the promotion of

stormwater capture for recharge of groundwater basins. In response to 2014 drought conditions, on July 29, 2014, the State Water Board adopted emergency regulations to increase conservation practices by all Californians (State Water Board Resolution No. 2014-0038). This regulation establishes the minimum level of conservation practices that residents, businesses and water suppliers must implement as the drought deepens and will be in effect for 270 days unless extended or repealed. The State and Regional Water Boards are also expediting permitting to safely use recycled water in order to reduce demand on potable water supplies.

In addition to the water supply concerns during drought periods, impacts to water quality such as increasing salinity need to be considered and managed. In the past, as in the drought period from 1987 through 1992, the Regional Water Board addressed these concerns though the adoption of interim permit limits for wastewater treatment plant discharges in certain watersheds - temporarily allowing for higher effluent limits for salts to accommodate drought-related increases in salt loading from imported potable water. In a similar vein, during the current drought period the State Water Board has acted on requests to provide flexibility with respect to recycled water permit requirements (State Water Board Order No. WQ 2014-0090). Such measures are taken in consideration of the need to protect existing and potential beneficial uses of receiving waters.

The Basin Plan

The following chapters identify the designated beneficial uses of the Region's waters (Chapter 2), include the narrative and numeric water quality objectives that must be attained or maintained to protect these beneficial uses and conform to the State's anti-degradation policy (Chapter 3), describes programs of implementation and other plans, policies, and actions that are necessary to achieve the water quality objectives (Chapters 4, 5 and 7); and describe monitoring and assessment programs that are used to determine attainment of water quality objectives (Chapter 6).