



Section 3 Regional Description

3.1 History of IRWM Planning in the North Orange County (NOC) Watershed Management Area (WMA)

The Westminster Reconnaissance Study conducted by the Army Corps of Engineers (ACOE) in 2001 covered the majority of the North Orange County (NOC) region. This study recognized the challenges facing this highly urbanized region. As a result of this study the ACOE, Los Angeles County, and Orange County entered into an agreement to develop a watershed management plan for the Lower San Gabriel River/Coyote Creek Watershed, which is a watershed within the North Orange County region.

In 2005, the County of Orange as the lead agency began development of the Coyote Creek Watershed Management Plan (CCWMP). The CCWMP has become a foundational element of the NOC WMA Plan and helped to provide a framework for improving watershed management practices in the region. Through the development of the CCWMP it encouraged interjurisdictional projects and planning to promote open lines of communication, cooperation and collaboration between agencies for improved management of shared resources. The CCWMP helped establish and begin the exchange among the various stakeholders in the region. The transition to NOC WMA plan development went smoothly since the groundwork had been established by the CCWMP.

3.2 North Orange County (NOC) Watershed Management Area (WMA)

The primary purpose of the NOC WMA Plan is to bridge existing and developing watershed planning efforts, allowing for more effective collaboration and greater opportunity to leverage agency resources across jurisdictions. The NOC WMA plan will clearly articulate:

- (1) the issues and priorities of the WMA;
- (2) the goals and objectives of the WMA;
- (3) current watershed efforts;
- (4) strategies for meeting the identified goals and objectives; and
- (5) ways to evaluate the plan and update it as necessary.

The NOC WMA region encompasses the Santa Ana River Watershed, the Lower San Gabriel River/Coyote Creek Watershed, and the Anaheim Bay-Huntington Harbour Watershed. These watersheds house 1.5 million residents and provide employment for almost 1.0 million employees. including providing the water and wastewater needs for the area. These watersheds carry the runoff for approximately 1/3 of Orange County's area. These watersheds also provide the riparian habitat for many flora and fauna and include 35 miles of ocean coastline and many of the remaining significant estuary areas along the southern California coastline. Beach closures, clean oceans and meeting TMDL/NPDES requirements are critical components as are using our water resources in an efficient manner.



3.3 Hydrologic Units and Watersheds

Hydrologic Units

The North Orange County planning area is located within two hydrologic units (California Coastal Conservancy, 2001) the Santa Ana River Hydrologic Unit and the San Gabriel River Hydrologic Unit.

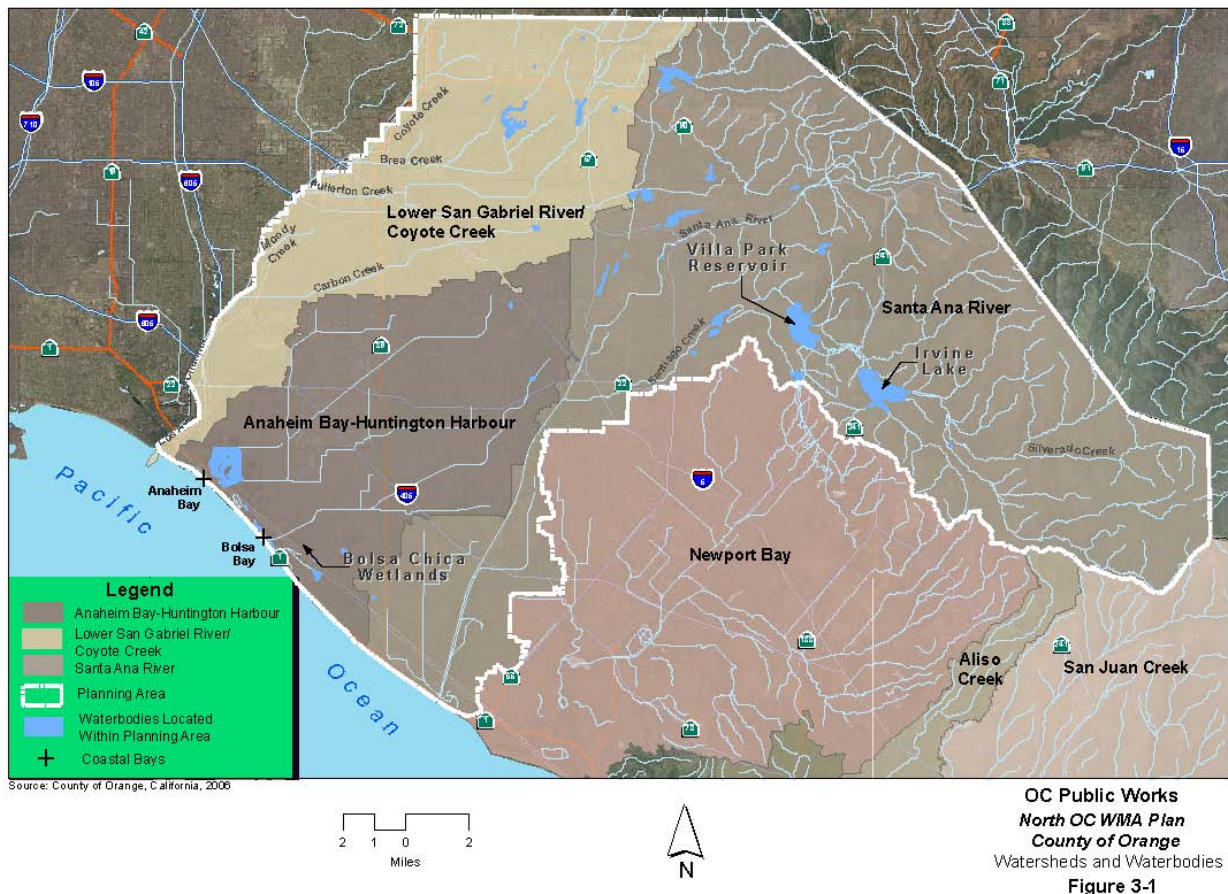
The Santa Ana River Hydrologic Unit covers an area of approximately 2,700 square miles, the majority of the Santa Ana RWQCB jurisdictional area, which includes portions of Orange, Los Angeles, Riverside, and San Bernardino Counties. This hydrologic unit includes the Santa Ana River Watershed and other sub watershed such as Santiago Creek. Approximately 210.47 square miles of the hydrologic unit lie within the North Orange County IRWMP planning area.

The San Gabriel River Hydrologic Unit contains the San Gabriel River Watershed. The watershed covers an area of approximately 70.93 square miles with 828 miles of waterways. Within the North Orange County IRWMP planning area, approximately 165.84 square miles drain to the San Gabriel River from the Coyote Creek watershed.

North Orange County Integrated Regional Watershed Management Plan



The three watersheds, as well as the water bodies and dams within each watershed, are shown in Figure 3-1.



3.3.1 Anaheim-Bay Huntington Harbour Watershed

Area: 80.35 square miles south of the Carbon Creek Watershed

Cities: includes portions of the cities of Anaheim, Cypress, Fountain Valley, Garden Grove, Huntington Beach, Los Alamitos, Santa Ana, Seal Beach, Stanton and Westminster within the planning area.

Waterways: surface water systems provide drainage within this watershed, which includes the Bolsa Chica Channel that provides drainage to the Anaheim Bay-Huntington Harbour, and the East Garden Grove-Wintersburg Channel that carries flow to Bolsa Bay and ultimately to Huntington Harbour. Westminster Channel connects to the Bolsa Chica Channel, and Sunset Channel.



Lakes: Lake Huntington and Talbert Lake are also located in this watershed within Huntington Central Park. Lake Huntington is a man-made 12-acre lake with water year around. Talbert Lake is 16 acres and dries up when groundwater levels drop during summer months.

3.3.2 Lower San Gabriel River / Coyote Creek Watershed

Area: 85.49 square miles located within the northwest corner of Orange County which now includes the Carbon Creek Watershed.

Cities: includes parts of the cities of Anaheim, Brea, Buena Park, Cypress, Fullerton, La Habra, La Palma, Los Alamitos, Placentia and Seal Beach.

Waterways: primary surface water body within the watershed is the Coyote Creek, which flows from Los Angeles County to the San Gabriel River. Carbon Creek flows from the foothills to the San Gabriel River and has six retarding basins. Other creeks/channels include Brea Creek, Moody Creek, Fullerton Creek, and Los Alamitos Channel.

Dams: Brea Dam is located in the City of Fullerton and was constructed in 1942 primarily for flood control purposes. It is owned by the US Army Corps of Engineers. Recreation facilities, managed by City of Fullerton Community Services, have been built in the vicinity of the 87-foot high dam location. Normal dry weather storage is only 1 acre-foot, while the flood control capacity of the reservoir is 7420 acre-feet with a maximum discharge of 27,000 cubic feet per second. The drainage area is 22 square miles. Fullerton Dam, also located in the City of Fullerton, was constructed in 1941 for flood control purposes and is owned by the US Army Corps of Engineers and managed by Orange County. Recreation facilities have been built in the vicinity of the 46-foot high dam location. Normal dry weather storage behind the dam is 1 acre-foot, while the flood control capacity of the Fullerton Reservoir is 1,342 acre-feet with a maximum discharge of 3,640 cubic feet per second. The drainage area is 5 square miles. Carbon Canyon Dam, located in the City of Brea within the Carbon Creek Watershed, was constructed in 1961 for flood control purposes and is owned by the US Army Corps of Engineers and managed by Orange County. Recreation facilities have been built in the vicinity of the 99-foot high dam location. Normal dry weather storage behind the dam is 1 acre-foot, while the capacity of the Fullerton Reservoir is 12,063 acre-feet with a maximum discharge of 36,800 cubic feet per second. The drainage area is 19 square miles.



3.3.3 Santa Ana River Watershed

Area: 210.47 square miles within Orange County, this is the largest watershed in Orange County. The watershed is located primarily in the northeast part of the county with a small portion, which follows the Santa Ana River to the ocean, passing through the Talbert Watershed. The watershed extends beyond Orange County.

Cities: The watershed includes portions of the cities of Anaheim, Brea, Costa Mesa, Fountain Valley, Garden Grove, Huntington Beach, Orange, Placentia, Santa Ana, Villa Park, and Yorba Linda within the planning area.

Waterways: The Santa Ana River and Santiago Creek, which is the Santa Ana River's main tributary within Orange County. The Talbert and Huntington Beach Channels drain the western side of the watershed, carrying flow to the Talbert Marsh along the coast. The Greenville-Banning Channel drains the eastern side of the watershed and carries flow to the Santa Ana River.

Dams: Santiago Dam, located at Irvine Lake. Villa Park Dam is also located in the Santa Ana River Watershed.

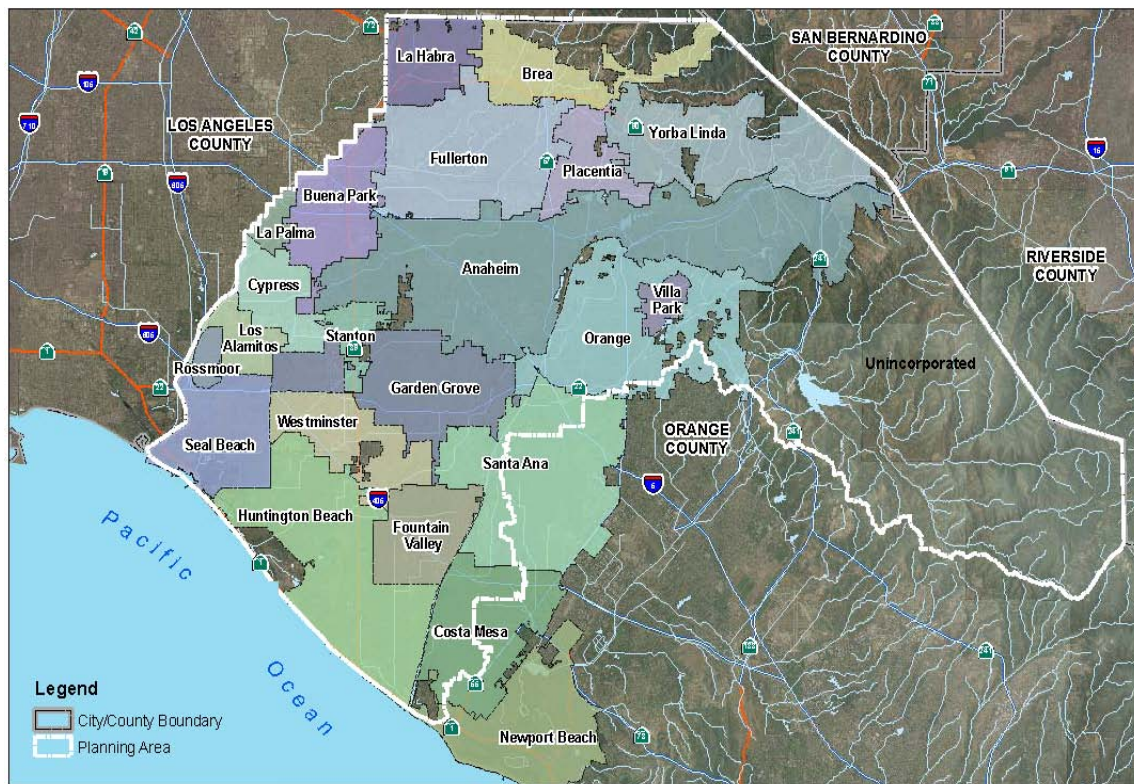
Lakes: Irvine Lake (also known as the Santiago Reservoir) captures flows from Santiago Creek and provides water supplies to the Serrano Water District and the IRWD. IRWD is a partial owner of the lake, but Serrano Water District runs its operations. The lake stores a maximum of approximately 25,000 acre feet of water, which is contained by the 810 foot high Santiago Dam, and drains an area of 63.1 square miles. In normal weather years, less water is stored than the maximum level. Maximum levels are only reached during wet years. After construction in 1933, the lake served the agricultural and farming communities surrounding Irvine Lake. Today it is well known for fishing and recreation.

3.4 Political / Jurisdictional Boundaries

There are multiple jurisdictional agencies within the planning boundaries, which include cities, the County and special use districts.

Cities and County

The NOC WMA region covers the northern part of Orange County and includes the cities of Anaheim, Brea, Buena Park, Cypress, Fountain Valley, Fullerton, Garden Grove, Huntington Beach, La Habra, La Palma, Los Alamitos, Placentia, Seal Beach, Stanton, Villa Park, Westminster, and Yorba Linda, and portions of the cities of Costa Mesa, Orange, Newport Beach, and Santa Ana, as well as unincorporated areas of Orange County. Figure 3-2 shows the jurisdictional boundaries of the cities and unincorporated portions of Orange County within the planning area.



Source: County of Orange, California, 2006

OC Public Works
North OC WMA Plan
County of Orange
City and Unincorporated County Boundaries
Figure 3-2

Table 3-1 shows the Stakeholders involved in the development of the NOC WMA plan.

Table 3-1 Stakeholders and Authority	
Stakeholders	Authority/Responsibilities/Role
State or Federal Agencies	
California Coastal Conservancy	Work in partnerships with local governments, other public agencies, nonprofit organization and private landowners to purchase, protect, restore, and enhance coastal resources.
CA Department of Fish and Game	Manage California's diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public.
U.S Fish and Wildlife Service	Habitat and wildlife management, including protection of endangered species
National Park Service	Helps communities across America preserve and enhance important local heritage and close-to-home recreational

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	opportunities. Funding is offered to register record and save historic places; create community parks and local recreation facilities; conserve rivers and streams, and develop trails and greenways.
SWRCB - Santa Ana Region	Regulatory agency
Southern California Coastal Water Research Project	Research institute focusing on coastal ecosystems of Southern California from watersheds to the ocean
County Agencies	
County of Orange	Land use, recreational facilities, storm water protection, and water quality.
Orange County Council of Governments	Voluntary advisory organization that represents 34 cities, County of Orange, and representation from transportation agencies, sanitation and water districts as well as the local air district.
Orange County Flood Control District	Flood management.
Orange County Transportation Authority	Funding for water quality projects with a link to transportation projects through Measure M.
Orange County Department of Education	Provides education for the funding region
Cities	
City of Anaheim	Land use, water service, water conservation, recreational facilities, stormwater protection, water quality, economic and community development, electric services and sanitary sewer services.
City of Brea	Land use, water service, water conservation, sanitary sewer services, recreational facilities, stormwater protection, water quality and economic and community development
City of Buena Park	Land use, water service, recreational facilities, stormwater protection, water quality and economic and community development.
City of Costa Mesa	Land use, recreational programs/facilities, economic and community development, stormwater protection, water quality.
City of Cypress	Land use, water service, water conservation, sanitary sewer services, recreational facilities, stormwater protection, water quality and economic and community development
City of Fountain Valley	Land use, water service, water conservation, sanitary sewer services, recreational facilities, stormwater protection, water quality and economic and community development
City of Fullerton	Land use, water service, water conservation, sanitary sewer services, recreational facilities, stormwater protection, water quality and economic and community development
City of Garden Grove	Land use, water service, water conservation, sanitary sewer services, recreational facilities, stormwater protection, water quality and economic and community development
City of Huntington Beach	Land use, water service, water conservation, sanitary sewer services, recreational facilities, stormwater protection, water quality and economic and community development
City of La Habra	Land use, water service, water conservation, sanitary sewer

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	services, recreational facilities, stormwater protection, water quality and economic and community development
City of La Palma	Land use, water service, water conservation, sanitary sewer services, recreational facilities, stormwater protection, water quality and economic and community development
City of Los Alamitos	Land use, sanitary sewer services, recreational facilities, stormwater protection, water quality and economic and community development
City of Orange	Land use, water service, water conservation, sanitary sewer service, recreational programs/facilities, economic and community development, stormwater protection, water quality.
City of Placentia	Land use, sanitary sewer services, recreational facilities, stormwater protection, water quality and economic and community development
City of Santa Ana	Land use, water service, water conservation, sanitary sewer service, groundwater management, recreational programs/facilities, economic and community development, stormwater protection, water quality.
City of Seal Beach	Land use, water service, water conservation, sanitary sewer services, recreational facilities, stormwater protection, water quality and economic and community development
City of Stanton	Land use, sanitary sewer services, recreational facilities, stormwater protection, water quality and economic and community development
City of Villa Park	Land use, recreational programs/facilities, economic and community development, stormwater protection, water quality.
City of Westminster	Land use, recreational programs/facilities, economic and community development, stormwater protection, water quality.
City of Yorba Linda	Land use, recreational programs/facilities, economic and community development, stormwater protection, water quality.
Special Districts	
East Orange County Water District	Retail and wholesale water services eastern areas, member of Municipal Water District of Orange County.
Mesa Consolidated Water District	Water services to Costa Mesa, John Wayne Airport and unincorporated areas.
Municipal Water District of Orange County	Imported water wholesaler for 28 Client agencies and Cities. Administers various water use efficiency programs, including device rebates, community education and school programs that reduce urban runoff and increase water quality. Lead agency implementing a variety of BMP based water use programs on behalf of the Client agencies and cities.
Orange County Sanitation District	Wastewater services in north and central Orange County. Intake of urban runoff from several runoff diversion structures. Services 23 member cities and 3 sanitary districts.

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Orange County Water District	Water recycling, Groundwater management and recharge in north and central Orange County.
Serrano Water District	
Yorba Linda Water District	Water and sewer services in most of Yorba Linda, parts of Placentia, Brea, Anaheim, and unincorporated areas.
Golden State Water Company	Water service, groundwater management, water conservation
Non Profit	
Earth Resource Foundation	Provides public education through programs that empower the general public with the resources to make environmentally sustainable decisions
Equestrian Coalition of Orange County	Protect, serve and enhance the equestrian lifestyle in Orange County
Friends of Coyote Hills	Works to protect and preserve the remaining natural open space and undeveloped areas in the West Coyote Hills
Friends of Harbor, Beaches and Parks	Provides education and inspiration by ensuring the protection and restoration of our natural lands.
Hills for Everyone	Protect, preserve and restore the environmental resources of the Puente-Chino Hills and the surrounding areas.
La Habra Vital Community Task Force	
Latino Health Access	Programs and facilities related to health for disadvantaged communities (water quality, recreation)
Los Angeles San Gabriel River Watershed Council	Preserve, restore and enhance the economic, social, and ecological wealth of the Los Angeles and San Gabriel River watershed through education, research and planning.
Orange County Coastkeeper	Funding, volunteers, and organizational support for programs for water quality and habitat protection in Orange County coastal waters and watersheds, public education.
Orange County Conservation Corps	Provides jobs by assisting low income communities with projects benefiting the environment
Sierra Club	Works to protect the environment through conservation and restoration
Save Our Beach, Seal Beach	Conducts monthly cleanup events in Seal Beach to improve water quality and remove trash and debris.
Sea and Sage Audubon Society	Promotes conservation, research and environmental education of nature
Southern California Wetlands Recovery Project	Partnership that involves public agencies, non-profits and the local community to acquire and restore rivers, streams and wetlands in Southern California.
Surfrider Foundation, SB-HB Chapter	Funding, volunteers, and organizational support for programs
Trails4All	Coordinates volunteers to help preserve trails, canyons and watersheds including the Annual Beach and Watershed

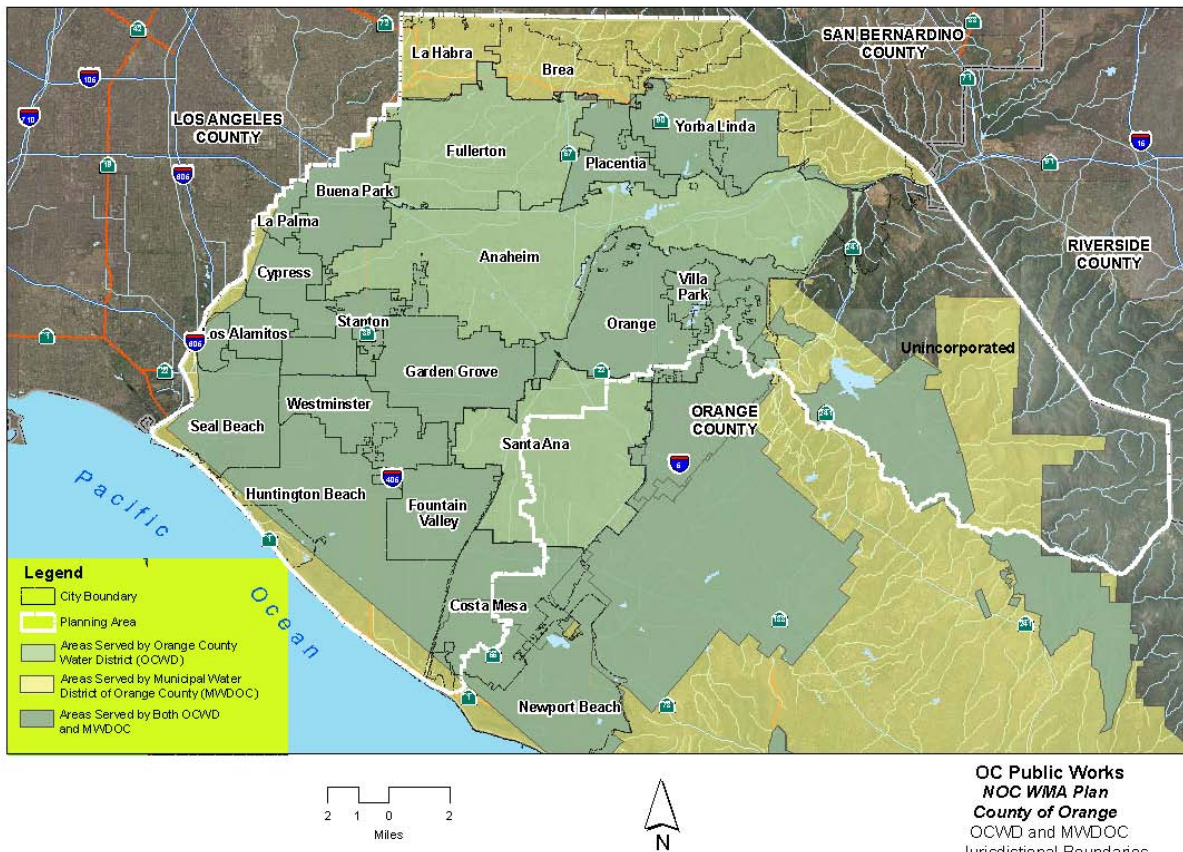
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	Cleanup event
Trust for Public Land	Land conservation organization that conserves land for people to enjoy.
Other Organizations	
National Concrete Washout	Support and involvement in watershed planning
SDG&E and The Gas Co.	Landowner
Laer Pearce & Associates	Support and involvement in watershed planning
Aera Energy-Fee Lands	Landowner, support and involvement in watershed planning
RBF Consulting	Support and involvement in watershed planning
Recupero & Associates	Support and involvement in watershed planning

Special Districts

Several special districts that provide water and wastewater management services exist within the region. Special Districts are local agencies created by legislation or by voters to provide a specialized service with specific responsibilities. They are governed by their own publicly elected board of directors. Figure 3-3 shows the service areas of Orange County Water District and Municipal Water District of Orange County.





Other Land Managers

Multiple agencies manage land within the NOC IRWMP boundaries. These include, but are not limited to: Bolsa Chica Wetlands managed by the Bolsa Chica Conservancy and Bolsa Chica Land Trust, Seal Beach National Wildlife Refuge, managed by the US Fish and Wildlife Service; Talbert Marsh managed by the Huntington Beach Wetlands Conservancy; and Huntington State Beach managed by the California State Parks.

3.5 Regional Demographics

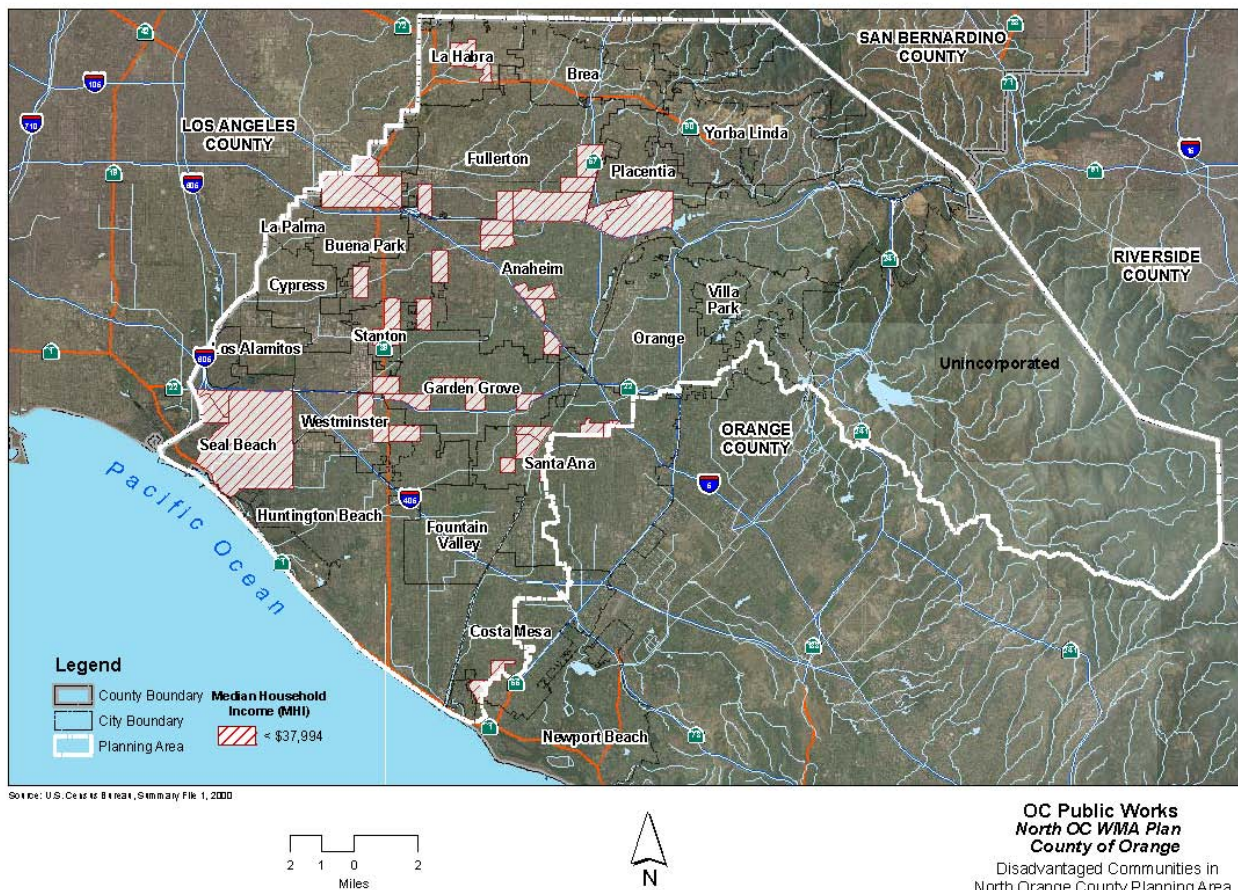
Table 3-2 shows the Population information for Cities within the NOC WMA region. Some Cities are only partially within the NOC WMA region, the population information is given for the entire City. It also includes population projections taken from SCAG.

Table 3-2						
Population Projections						
	2010	2015	2020	2025	2030	2035
Anaheim	365,985	387,414	401,750	414,763	425,781	438,645
Brea	42,973	45,417	46,031	46,295	46,751	46,997
Buena Park	86,396	87,875	89,044	89,577	90,103	90,295
Costa Mesa	120,501	122,828	124,692	125,675	126,492	126,958
Cypress	51,101	52,412	53,827	54,397	54,934	55,159
Fountain Valley	59,392	61,009	62,278	63,086	63,969	64,525
Fullerton	142,940	146,194	148,862	150,411	152,494	153,398
Garden Grove	181,032	185,265	188,623	190,409	192,315	192,532
Huntington Beach	212,957	217,822	220,892	222,569	224,788	225,815
La Habra	65,304	66,958	67,812	68,186	68,616	68,711
La Palma	16,837	17,154	17,357	17,438	17,527	17,622
Los Alamitos	12,564	12,831	13,020	13,124	13,237	13,312
Orange	150,313	154,480	157,245	158,622	159,607	160,313
Placentia	54,847	55,984	58,366	59,891	61,456	62,111
Santa Ana	364,683	371,043	376,353	378,397	380,356	380,613
Seal Beach	26,626	27,115	27,444	27,570	27,776	27,871
Stanton	39,749	41,548	43,453	44,796	45,716	46,137
Westminster	96,485	98,384	99,794	100,496	101,486	102,017
Yorba Linda	70,513	73,713	74,987	75,613	76,399	76,789
TOTALS	2,161,198	2,225,446	2,271,830	2,301,315	2,329,803	2,349,820



3.5.1 Disadvantaged Communities

The California Water Code defines a “disadvantaged community” as a community with an annual median household income less than 80 percent of the statewide annual median household income (CWC §79505.5 (a)). Based on Census 2000 data, 80% of the statewide annual median household income is \$37,994. Census tract data was used to help identify areas within the NOC WMA region that meet this definition of a disadvantaged community. Areas meeting this criterion were found within the cities of Anaheim, Buena Park, Costa Mesa, Garden Grove, Fullerton, La Habra, Placentia Santa Ana, Seal Beach, Stanton and Westminster. (See Figure 3-4 Disadvantaged Communities within the NOC WMA)



3.6 Water Quality Regulations

Water quality regulations, adopted based on underlying Federal and State Laws, exist for potable water supply (drinking water), surface and ground water receiving waters, and reclaimed water used for a variety of purposes. Ensuring that all of these waters meet the adopted regulatory standards allows for a healthy environment and protects public health. Regulations are created in order to protect and improve these water bodies and



understanding these regulations and meeting them is critical for creating an IRWMP that implements projects that improve water quality for the region.

3.6.1 Drinking Water Regulations

The Federal Safe Drinking Water Act (SDWA) provides the basis for national and state regulations governing the supply of safe drinking water. The SDWA formed the basis for the California Safe Drinking Water Act. This act gives authority to the California Department of Public Health (DPH) Division of Drinking Water and Environmental Management to protect the public from any contaminant that could adversely affect public health in the public water system. DPH then creates a list of these contaminants and establishes maximum contaminant levels (MCL). This list includes all federal MCLs and each MCL must be equal to or more stringent than the USEPA MCLs. Title 22 of the California Code of Regulations defines drinking water MCLs and treatment requirements for potable water, groundwater recharge, and recycled water.

3.6.2 Surface Water Quality Regulations

The regulatory basis for protection of all inland surface waters, estuaries, and coastal waters in the United States is governed by the Clean Water Act (CWA), which is comprised of the Federal Water Pollution Control Act and its amendment of 1972, 1977, 1981, and 1987. In California the primary statute governing water quality is the Porter-Cologne Water Quality Control Act of 1970 (Porter-Cologne Act) (Water Quality, Division 7 of the California Water Code), which grants broad powers to protect water quality to the California State Water Resources Control Board ("State Board") and nine California Regional Water Quality Control Boards ("Regional Boards"). Through this, the State Board and Regional Boards have the authority to adopt plans and policies to regulate discharges to surface and groundwater (which is not covered under the CWA), to regulate waste disposal sites, and to require cleanup of discharges of hazardous materials and other pollutants. The governing Regional Board for the North Orange County WMA is the Santa Ana Regional Water Quality Control Board (SARWQCB).

The Porter-Cologne Act requires that

- 1) the State Board adopt and implement an Ocean Plan and an Enclosed Bays and Estuaries Policy to protect human health and marine species in ocean and coastal waters, such as Huntington Harbour, and
- 2) Regional Boards adopt and regularly update a Water Quality Control Plan ("Basin Plan") to protect inland freshwaters and estuaries, such as Coyote Creek and the Santa Ana River.

The primary methods of enforcing these regulations are through the issuance of NPDES Permits and Waste Discharge Requirements.

NPDES Permits and Waste Discharge Requirements

In California, the Regional Boards have the responsibility of controlling discharges from point sources through the issuance of NPDES permits.



These permits regulate discharges of both wastewater and urban runoff to surface water bodies for municipal and industrial wastewater and stormwater runoff from municipal (MS4) systems, industrial and construction sites. Permit requirements are based on technology based limits for wastewater and maximum extent practicable standard for stormwater intended to meet water quality standards. The fourth term permit was issued by the Santa Ana Regional Water Quality Control Board on May 22, 2009 for the County of Orange, Orange County Flood Control District and 25 incorporated cities, which includes all of the Cities (referred to as the permittees) in the NOC WMA region.

TMDLs: A “beneficial use” is an established use under the relevant Basin Plan or Water Quality Control Plan applicable for the specific water body for human and habitat use. Water quality objectives are adopted to protect these established beneficial uses. When receiving waters are not meeting water quality objectives established in the Basin Plan, Regional Boards are required to prepare Total Maximum Daily Load (TMDLs). Allocations which define implementation requirements intended to restore the water quality standards. For any waterbody that is considered “impaired,” which means that there is sufficient monitoring data to indicate that it does not meet the established water quality objectives for a particular pollutant, the water body is listed on the State Board CWA 303(d) list. A listing requires that a TMDL be prepared and adopted for the pollutant and water body. The list also includes a proposed schedule for the development of the TMDL. A TMDL establishes the maximum amount of a pollutant that a waterbody can receive from both point and nonpoint sources and still meet water quality standards. Once a TMDL has been adopted and is being implemented, the listing comes off the 303(d) and the TMDL and adopted permit requirement then govern the schedule. Within the North Orange County planning area, no TMDLs have been adopted to date. Table 3-3 shows, for the North Orange County region, the 2006 Clean Water Act Section 303(d) List of Water Quality Limited Segments currently requiring TMDLs.



Table 3-3		
2006 Clean Water Act Section 303(d) List of Water Quality Limited Segments Requiring TMDLs within the NOC WMA Region		
Bolsa Chica Beach	Copper	2019
	Nickel	2019
Huntington Beach State Park	Enterococcus	2019
	Indicator Bacteria	2019
	PCBs	2019
Huntington Harbour	Chlordane	2019
	Copper	2019
	Lead	2019
	Nickel	2019
	Pathogens	2019
	PCB	2019
	Sediment Toxicology	2019
Santiago Creek, Reach 4	Salinity/TDS/Chlorides	2019
Seal Beach	Enterococcus	2019
	PCBs	2019
Source: California State Water Resources Control Board, List 2006 Clean Water Act Section 303(d) List of Water Quality Limited Segments Requiring TMDLs		

3.6.3 Recycled Water Regulations

The supply and use of reclaimed water (treated water of wastewater origin) is regulated by the Regional Water Quality Control Board and DPH. Title 22 defines requirements for the treatment, delivery and use of recycled water for non-potable uses as well as groundwater recharge.

3.6.4 Ocean Water Quality Monitoring Regulations

As discussed above, ocean water quality is regulated by the CWA and Porter-Cologne Act. In response to the Porter-Cologne Act, the SWRCB adopted the California Ocean Plan adopting ocean water quality standards. Assembly Bill 411 (AB411), passed in 1997 and implemented in 1999, mandates monitoring requirements for ocean water quality. AB411 requires testing for indicator bacteria to determine if standards are met for total coliform, fecal coliform/E. coli, and enterococcus. Indicator bacteria were selected to indicate the presence of harder to detect and more harmful



micro-organisms that may cause diseases. Testing is required at all beaches from April through October that receive 50,000 or more visitors per year and beaches adjacent to storm drain outfalls with drainage during summer months. Another requirement of AB411 stipulates closure of beaches to water-contact recreation when measured bacteria is thought to be caused by human sewage.

3.7 Water Quality

Delivered Potable Water Quality

Water retailers are required to meet SDWA requirements. This applies to both direct supplies from imported water as well as water requiring additional treatment, such as groundwater. As such, each retailer ensures that all potable water meets these water quality standards, resulting in water quality that is equal to or better than these standards.

Groundwater Quality

OCWD extensively monitors the quality of the Orange County Basin, testing for over 190 constituents, such as nitrate, salts, selenium, trichloroethylene, volatile organic compounds, and radon. This testing ensures potable water quality, (OCWD 2009).

A primary OCWD function is to monitor groundwater quality on a continual basis, and the collection of samples follows federal and state procedures. To ensure that results are representative of the ambient groundwater conditions, OCWD follows industry recognized quality assurance and quality control protocols. There are approximately 700 monitoring wells, with 1,400 sampling points, which include active drinking, private domestic, irrigation, and industrial wells, single and multi-point wells, and inactive wells. Annually, approximately 13,500 samples are collected from monitoring wells providing data to depths of 2,000 feet in many areas of the Basin (OCWD 2009). OCWD publishes an annual Engineer's Report that summarizes the groundwater quality.

Table 3-4 is taken from the OCWD Engineers Report, for 2008-2009 (OCWD 2009). The data shows: 1) untreated groundwater in OCWD service area; and 2) untreated groundwater blended with treated supplemental water supplied by various agencies within OCWD service area. Note the Irvine Ranch Water District and the City of Tustin operate groundwater quality improvements projects that treat for one or more of the constituents listed in the Table prior to distribution to customers.



Table 3-4						
Untreated Groundwater Quality in OCWD Service Area in 2008-2009						
City/Agency	Groundwater ^{1,7}			Delivered Blend ^{1,2,7}		
	TDS ³	NO ₃ -N ⁴	Hardness ⁵	TDS ³	NO ₃ -N ⁴	Hardness ⁵
Anaheim	555	3.1	327	572	2.2	313
Buena Park	363	1.0	198	440	0.8	224
East Orange County Water District	574	3.7	346	589	2.3	320
Fountain Valley	397	1.1	247	464	0.9	258
Fullerton	586	3.3	305	594	2.4	297
Garden Grove	495	3.4	301	531	2.5	295
Golden State Water Company	441	2.2	244	504	1.5	258
Huntington Beach	316	0.3	167	408	0.3	202
Irvine Ranch Water District ⁶	314*	0.4*	114*	316*	0.4*	115*
La Palma	266	ND ⁸	142	370	0.1	184
Mesa Consolidated Water District	364	0.2	134	404	0.2	158
Newport Beach	416	1.2	234	482	0.9	250
Orange	482	2.4	292	518	1.8	289
Santa Ana	389	2.2	232	458	1.6	247
Seal Beach	214	ND ⁸	81	340	0.1	144
Serrano Water District	642	1.6	356	660	1.1	351
Tustin ⁶	569*	6.5*	286*	584*	4.3*	284*
Westminster	357	1.3	226	436	1.0	243
Yorba Linda WD	617	2.9	326	616	2.1	312
Weighted Average⁷	443	2.0	240	490	1.5	252
Source: Orange County Water District, Engineer's Report, 2008-2009.						

¹ All groundwater results (alone or blend) are for untreated groundwater (see note 6 below). Units are reported in mg/L.

² Delivered blend includes untreated groundwater and treated imported MWD water (i.e., blend of Colorado River water and State Project water as measured at the MWD Diemer Plant), except Serrano Water District, which blends with treated Santiago Reservoir water.



Units are reported in mg/L. Annual average water qualities for MWD and Santiago Reservoir (Irvine Lake) for 2007-08 are as follows:

MWD Water Quality

TDS = 612 mg/L

NO₃-N = 1.4 mg/L

Hardness (as CaCO₃) = 281 mg/L

Santiago Reservoir Water Quality

TDS = 702 mg/L

NO₃-N = 0.05 mg/L

Hardness (as CaCO₃) = 340 mg/L

³ Secondary Drinking Water Standards for TDS are as follows:

500 mg/L = recommended limit

1,000 mg/L = upper limit

⁴ Primary Drinking Water Standard for nitrate NO₃-N (i.e., nitrate expressed as nitrogen) is 10 mg/L.

⁵ Hardness is reported as mg/L of CaCO₃. General classifications of hard and soft water are within the following concentration ranges:

0-75 mg/L = soft

150-300 mg/L = hard

75-150 mg/L = moderately hard

300-up mg/L = very hard

⁶ Agencies with active groundwater quality improvement projects that treat for one or more of the constituents listed in the table. The results shown herein for "groundwater" and "delivered blend" reflect results from untreated groundwater. Water quality constituents that are marked with an asterisk (*) are reduced prior to delivery to customers.

⁷ All water quality results are flow-weighted averages based on groundwater and imported water delivered to each entity.

⁸ ND = non-detect. Nitrate (as NO₃-N) analytical detection limit for OCWD Laboratory = 0.1 mg/L.

3.7.1 Local Surface Water Quality

With the goal of protecting and improving surface water in Orange County, the Orange County Stormwater Program was created to be a cooperative municipal regulatory compliance initiative, and primarily serves to meet the requirements of the NPDES municipal stormwater permits for the area. The NOC WMA region falls within the Santa Ana Regional Water Quality Control Board's jurisdiction and municipal stormwater has been required under an area wide permit since 1990.

Table 3-5 summarizes the patterns of exceedances of California Toxics Rule (CTR) criteria of relevant acute toxicity and relevant chronic toxicity, within the NOC WMA region.



Table 3-5										
Summary of Exceedances of CTR (Dry and Wet weather)										
Location	Watershed	CTR Acute Criteria	Dry				Storms			
			Samples	Cu	Ni	Zn	Samples	Cu	Ni	Zn
Bolsa Chica Channel at Westminster	AB-HH	FW	8	0	0	0	29	3	0	0
E. Garden Grove Wintersburg Channel at Gothard	AB-HH	FW	8	0	0	0	31	7	0	0
Huntington Harbour near Bolsa Chica Channel Mouth	AB-HH	SW	7	0	0	0	13	3	0	0
Huntington Harbour near Sunset Channel Outlet	AB-HH	SW	7	2	0	0	13	5	0	0
Huntington Harbour at Warner	AB-HH	SW	8	0	0	0	12	2	0	0
Bolsa Bay at Observation Pier	AB-HH	SW	11	3	0	0	10	2	0	0
Bolsa Bay near Wintersburg Tidegates	AB-HH	SW	11	1	0	0	10	2	0	0
Carbon Creek at Bloomfield	SGR/CC	FW	9	1	0	0	26	6	0	0
Coyote Creek at Valley View	SGR/CC	FW	9	0	0	0	25	2	0	1
Fullerton Creek at Valley View	SGR/CC	FW	3	0	0	0	9	5	0	0
Fullerton Creek at Richman	SGR/CC	FW	6	0	0	0	14	2	0	2
SMC Bioassessment Site	SGR/CC	FW	1	0	0	0				
SMC Bioassessment Site	SGR/CC	FW	1	0	0	0				
SMC Bioassessment Site	SGR/CC	FW	1	0	0	0				



Note: FW Criteria are based on water hardness

Mass Emissions The ROWD monitoring associated with mass emissions is intended to provide long-term data on changes in pollutant loading over time. This monitoring is of wet weather flows in flood control channels, testing for nutrients, trace elements (total recoverable and dissolved), and organophosphate pesticides. The results of the ROWD monitoring show a declining trend in Event Mean Concentrations (EMCs) and loads over time. Statistical analysis of these trends, shows that 1) there were no long-term trends and EMCs that were not accounted for by changes in Total Suspended Solids (TSS) concentrations; and 2) mean levels of TSS differed among stations, as did baseline levels of pollutants. As such, stormwater trends in metals, phosphate and nitrate concentrations were a function of TSS concentration, suggesting that reduction of TSS results in reduction of these constituents. Note that this is logical for metals and phosphate, but not for nitrate, since nitrate is a dissolved component and metals and phosphate are found in particulate form in stormwater (Orange County Stormwater Program, 2006).

3.8 Water Resources

3.8.1 Groundwater Basin

The NOC WMA region is composed primarily of deep layers of marine sediments and eroded sediments washed down from the surrounding mountains. This geology has allowed for aquifer storage of surface water that percolates through the soil. This occurs naturally where infiltration is possible through the substrate of the Santa Ana River and in spreading basins that have been constructed in the northern part of the region. Floodwaters are channeled into these spreading basins to retain the water and allow it to percolate into the groundwater tables below.

The NOC WMA region overlays two groundwater basins: the Coastal Plain of Orange County Groundwater Basin (Orange County Basin) and the La Habra Basin (Metropolitan Water District of Southern California, 2007). Some sources include the La Habra Basin as a part of the Orange County Basin, including the Southern California Association of Governments; however OCWD does not include this as part of Orange County Basin, and for water planning purposes MET has separated this basin. See Figure 3-5 for the Groundwater Basins.



OC Public Works
North OC WMA Plan
County of Orange
Groundwater Basins
Figure 3-5

Coastal Plain of Orange County Groundwater Basin

The Orange County Basin has been further split into three subbasins: Yorba Linda, Main, and Irvine. The NOC WMA region overlays the Yorba Linda and Main subbasins.

The Main subbasin, which can be divided vertically into upper, middle, and lower aquifer systems, is managed by OCWD. The Irvine subbasin, which is separated from the main subbasin by the Costa Mesa Freeway and Newport Boulevard, does not underlie the planning area (Metropolitan Water District of Southern California, 2007). The Main subbasin, which underlies the planning area, provides the majority of the groundwater produced from the Orange County Basin.

The Yorba Linda subbasin, which also underlies the area, is located within the cities of Yorba Linda and Placentia (Metropolitan Water District of Southern California, 2007). Limited groundwater production, less than natural groundwater recharge, occurs in the Yorba Linda subbasin due to high total dissolved solids (TDS) concentrations and low transmissivity. Recharge comes from the Chino Hills and flow travels southward into the Main subbasin.



Orange County Basin

The Orange County Basin underlies the coastal alluvial plain covering an area of 350 square miles. The basin is bordered by consolidated rocks which are exposed at the Puente and Chino Hills to the north, the Santa Ana Mountains in the east, and the San Joaquin Hills in the south. The Orange County Basin and the Central Basin in Los Angeles County are separated by the county border and Coyote Creek; however no physical barrier exists between the two basins.

The basins aquifers extend over 2,000 feet in depth. OCWD estimates (OCWD 2009) that the aquifer systems have total storage volumes of approximately:

Shallow aquifer system: 5 million AF

Aquitard: 1.1 million AF

Principal aquifer system: 32.9 million AF

Aquitard: 1.9 million AF

Deep Aquifer System: 25.1 million AF.

The total storage of the basin is therefore estimated to be 66 million acre-feet (AF). However, there is a limit to the amount of this volume that can safely be removed without causing physical damage to the basin, including seawater intrusion, upwelling of colored water, and increased potential of subsidence. OCWD manages the groundwater basin within an operating range with a maximum overdraft of 500,000 AF. (OCWD 2009).

The majority of groundwater production occurs in the principal aquifer. The shallow aquifer produces about 5 percent of the basin's total production, with the majority of this water produced for industrial and agricultural uses. The deep aquifer has generally been found to contain colored water which requires treatment before it can be served for domestic use. As such, few wells have been drilled in the deep aquifer, other than the four colored water production wells constructed by MCWD and IRWD.

Pumping and Recharge

The amount of water that groundwater producers can extract is managed by OCWD. There are no limits to the number of wells within the basin or to the volumes pumped. The total amount of pumping is managed through financial incentives, and pumped water is replaced in the basin through managed and natural recharge. In water year 2008-09 (July 1st –June 30th) groundwater production from the basin totaled 324,147 AF (OCWD 2009). The total amount of pumping that can be sustained each year is determined through a process that evaluates a sustainable level of pumping considering the basin's safe operating range and the amount of water available to recharge the basin.

Groundwater producers also participate in in-lieu groundwater storage programs in which they receive imported water from MET in-lieu of pumping groundwater.



There are approximately 450 production wells in the basin. Of these, approximately 250 of the wells produce less than 25 AFY (OCWD 2009). The other approximately 200 large-capacity wells are operated for municipal water supplies by 21 of the largest retail water agencies to produce 97 percent of the total water production in the basin in 2006-2007 (OCWD, 2009). Well yields generally range from 500 to 4,500 gallons per minute (GPM), with common yields of 2,000 to 3,000 GPM (DWR 2004).

OCWD owns and operates over 1000 acres of recharge ponds in and adjacent to the Santa Ana River and Santiago Creek, in the northeast portion of the Orange County Basin. These spreading basins provide for the infiltration of up to 250,000 acre feet per year (AFY). Recharge water is provided by Santa Ana River baseflow and stormflow, Santiago Creek flows, imported water from MET and the upper Santa Ana River Watershed, and highly treated recycled water from the Groundwater Replenishment (GWR) System, a joint project of OCWD and OCSd.

The GWR System provides the recycled water for groundwater recharge in Anaheim and seawater intrusion protection at the Talbert Gap barrier injection wells. The seawater barrier was recently expanded, but for many years the original barrier received highly treated recycled water from the former Water Factory 21. The GWR System began operation in January 2008. Approximately half of the water is injected into the Talbert seawater barrier and the other half is recharged at surface spreading facilities in Anaheim.

The recycled water is purified using micro-filtration, reverse osmosis, and ultraviolet light and hydrogen peroxide before percolating into the basin. The GWR System is designed to provide up to 70,000 AFY of water for recharge. Planned expansions will provide a maximum of 120,000 AFY, though the availability of sufficient secondary treated wastewater from OCSd is the determining factor in future expansion (OCWD, 2009).

Recharge at Talbert and Alamitos Barriers

Recharge is also accomplished at the Talbert and Alamitos barriers, where injection wells are in operation to manage saltwater intrusion. Orange County Water District operates the Talbert Barrier in the city of Fountain Valley using reclaimed water produced by the GWR System and imported water. The Alamitos Barrier is a series of injection wells located at the mouth of the San Gabriel River at the Orange County/Los Angeles County border that is operated by the Los Angeles County Flood Control District in cooperation with the Orange County Water District and the Water Replenishment District of Southern California (WRD). Source water injected at this barrier includes water purchased from the City of Long Beach, as well as recycled water from the WDR Leo J. Vander Lans Advanced Water Treatment Facility."



**Figure3-6
Major California Water Distribution Systems**

La Habra Basin

The La Habra Basin is composed of a shallow alluvial depression between the Coyote Hills and the Puente Hills in northern Orange County (Metropolitan Water District of Southern California, 2007). The Basin is located within the cities of La Habra and Brea to the north of the Orange County Basin. Little groundwater is produced from the basin due to low transmissivity and poor water quality, including high TDS, nitrates, sulfates, and color. Groundwater flows from this basin to both the Orange County Basin to the south and the Central Basin (Los Angeles County) to the west



at an estimated rate of between 2,200 to 5,500 AFY. The La Habra Basin is currently unmanaged

3.8.2 Water Supplies by Source

The main sources of potable water in the planning area are imported water and groundwater. Imported water from the State Project Water and Colorado River Water (as mapped in figure 3-6) are brought into Southern California by MET and distributed to local Member Agencies. Within the Study area, four Member Agencies obtain treated water from MET: the Municipal Water District of Orange County (MWDOC) and the Cities of Fullerton, Anaheim and Santa Ana. Municipal Water District of Orange County in turn provides the imported water on a wholesale basis to the remaining retail water agencies. As described previously, OCWD manages the groundwater basin used by the retail agencies to supply the remainder of their potable supply. There is also a limited amount of directly delivered recycled water to meet non-potable uses, although the larger majority of recycled water is used for groundwater recharge.

Water Supply and Reliability Metropolitan Water District of Southern California (MET) owns and operates Colorado River Aqueduct (CRA), along with major reservoirs, five regional water treatment plants, and large transmission pipelines to move imported water to its 26 public member agencies. MET is also the largest State Water Contractor, with a contract of 2.0 million acre-feet for SWP supply. Over the last few years CRA supply, historically providing over 1.2 million AFY to the region, has been severely cut. This was due to the development of the California Plan for the Colorado River, which forces California to live within its 4.4 million AF entitlement of Colorado River water. MET does have programs in place and is working on others in order to maximize supplies from the Colorado River Aqueduct. In severe droughts, State Water Project supplies to MET have been less than 0.5 million AFY.

MET augments its imported water from the CRA and SWP with stored water in water banks such as Semitropic and Arvin-Edison, conjunctive use storage in local basins, and voluntary water transfers during certain dry years. MET's IRP and IRP Update in 2003, as well as MET's 2005 Urban Water Management Plan Update indicate that MET will have the supplemental water supplies to meet all of its member agencies' water needs through 2025, even during a repeat of the 1987-1992 drought.

Municipal Water District of Orange County

The Municipal Water District of Orange County (MWDOC) manages the imported water that is distributed in the study area. MWDOC coordinates the distribution of this imported water to 29 water retailers in Orange County. Local member agencies within the planning area include the following fourteen water districts, fourteen cities and one private water utility:



Water Districts: East Orange County WD, El Toro WD, Emerald Bay Service District, Irvine Ranch WD, Laguna Beach County WD, Mesa Consolidated WD, Moulton Niguel WD, Orange County WD, Santa margarita WD, Serrano WD, South Coast WD, Trabuco Canyon WD, and Yorba Linda WD.

Cities: Brea, Buena Park, Fountain Valley, Garden Grove, Huntington Beach, La Habra, La Palma, Orange, Newport Beach, San Clemente, San Juan Capistrano, Seal Beach, Tustin and Westminster.

Golden State Water company – an investor owned utility.

Currently there is no desalination being done by MWDOC, though MWDOC is investigating this as a possible future source.

Additionally, the Municipal Water District of Orange County administers indoor and outdoor programs including device rebates, community education and school programs that promote water use efficiency to reduce urban runoff and increase water quality in all of Orange County.

Orange County Water District

Groundwater

In the planning area, groundwater pumped from the Orange County Basin is managed by the Orange County Water District (OCWD). OCWD manages the groundwater basin by balancing the demand for water with the need to protect the long-term health of the water supply.

OCWD actively recharges the groundwater basin and works to expand the basin's yield. Pumping rates are managed to maximize water withdrawals within the basin's safe operating range. The basin's water supply is managed such that supplies are adequate to meet typical demands during drought years and that there are supplies available to help lessen the impacts of drought conditions.

OCWD recharges the basin by capturing flows from the Santa Ana River, purifying waste water through the Groundwater Replenishment System, and purchasing water from MET, the San Bernardino Valley Municipal Water District (SBVMWD), the Arlington Desalter in the Arlington Basin, and Western Municipal Water District (WMWD), when supplies are available.

Recycled Water

Recycled water in the region is produced by OCWD from treated wastewater acquired from Orange County Sanitation District (OCSD). Major recycled water projects include the GWR System and the Green Acres Project.



OCWD operates the GWR System, to provide purified reclaimed water that is used to recharge the groundwater basin and is injected into the Talbert seawater intrusion barrier. The GWR System currently produces 70,000 AFY of water: expansion of the system is in the planning phase. (OCWD, 2009).

The Green Acres Project currently provides 7,700 AFY of reclaimed water for landscape irrigation (parks, schools, golf courses), and industrial uses. With the implementation of planned projects, OCWD will be able to increase this supply to approximately 8,800 AFY. Water is provided to the cities of Costa Mesa, Fountain Valley, Huntington Beach, Newport Beach, and Santa Ana (OCWD, 2009).

Local Surface Water

In the NOC WMA area, local surface water is primarily runoff from Santiago Creek that is captured in the Santiago Reservoir and is currently utilized by the Serrano Irrigation District and the Irvine Ranch Water District for non-potable irrigation. This source represents a small percentage of water supplied to the region.

3.8.3 Water Demand and Supply Projections

For every water agency, ensuring water supply reliability is critical in order to meet the growing needs of their service area. As such, water agencies must project what their service areas future water demands will be. These values are then compared with the projected available water supply for the service area in order to determine if sufficient water exists to meet the areas needs.

Each water provider is required to prepare an Urban Water Management Plan (UWMP) that states that its service area has a plan in place for ensuring that sufficient water is available to its customers. As such, sufficient water supply has been determined to be available throughout the region. However, a reduction in the dependence on imported water is a goal for the region and therefore the agencies seek alternative sources and methods of meeting demands and conserving water.

3.9 Land Use

Understanding the land uses in the planning area will help with understanding the needs of the community (i.e. where there is a need for open space) as well as where opportunities exist for implementing projects.



Land use data from the U.S. Census Bureau was used to generate Figure 3-7.

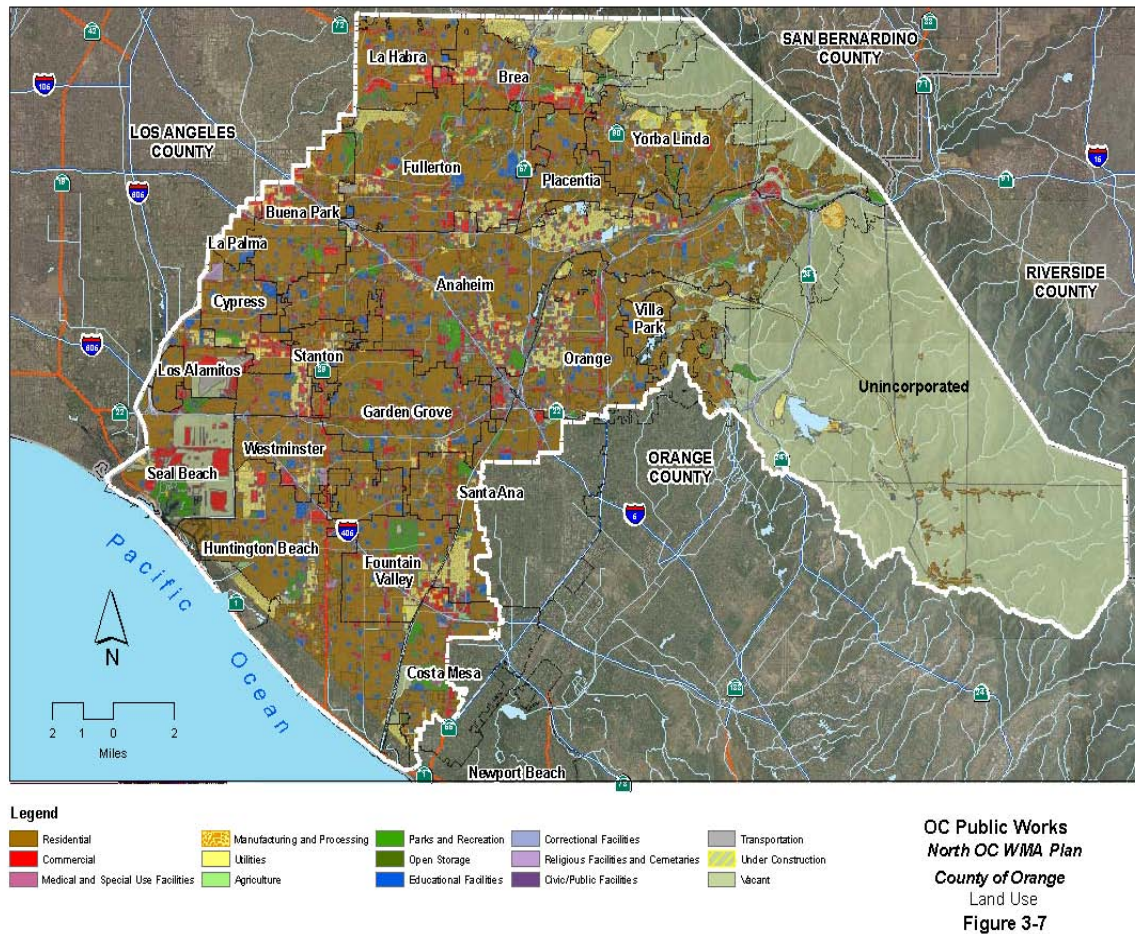




Table 3-6 also shows land use data for the NOC WMA area.

Table 3-6	
Land Use within the NOC WMA Region	
Land Use Type	Area (acres)
Agriculture	120
Civic/Public Facilities	102
Commercial	1797
Correctional Facilities	4
Education Facilities	648
Manufacturing and Processing	1192
Medical and Special Use Facilities	62
Open Storage	40
Parks and Recreation	836
Religious Facilities and Cemeteries	169
Residential	9114
Transportation	560
Under Construction	93
Utilities	268
Vacant	9729
Water Features	438
Total	25172

Land use in the planning area is primarily urbanized residential areas, large commercial areas, and industrial areas. There is minimal agricultural land use as there are very few rural areas (only 0.2 percent of the population lives in areas designated as rural (SCAG 2005)). A large portion of unincorporated Orange County, on the east side of the planning area, is vacant. However, this area is mountainous.

Open Space, Recreation, and Parks

Currently, the region has approximately 836 acres of open space, recreation, and park areas. This includes the Santa Ana River Trail system which provides a greenbelt of open space and recreation along the river, such that one could bike from Huntington Beach to Yorba Linda, and beyond into Riverside County.

Orange Coast River Park, which is approximately 1,000 acres at the mouth of the Santa Ana River, provides passive recreational opportunities, such as birding and interpretive walks adjacent to the Huntington Beach wetlands and preserve areas. Huntington Beach Central Park, which includes the Shipley Nature Center, also provides opportunities for bird watching, along with equestrian uses and walking paths.



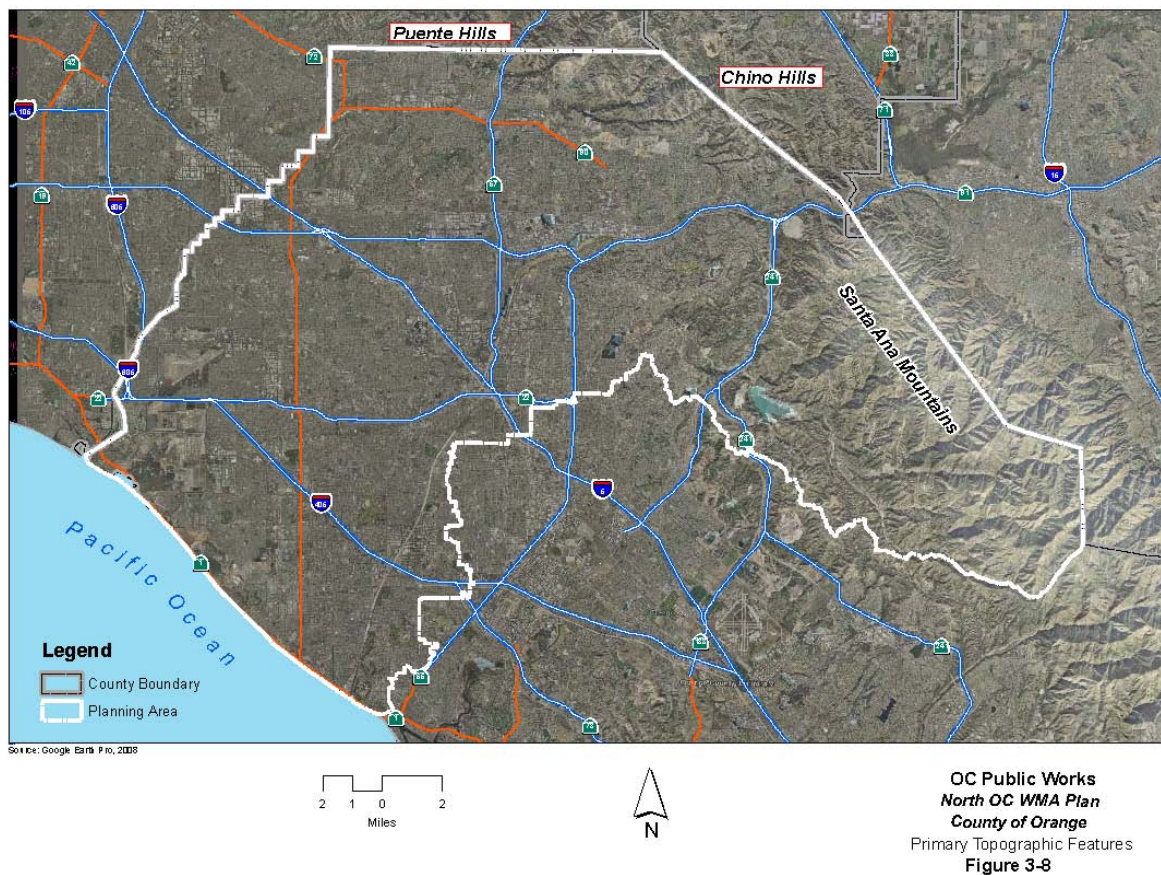
Multiple preserves are present in the region providing open space, recreation, and habitat including the Talbert Nature Preserve and the Seal Beach National Wildlife Refuge. The Coyote Creek watershed connects coastal dune open space at the mouth of the watershed to upland riparian woodlands in the canyons approaching the upper watershed, where vast open space is bisected by newer development in the communities of North Orange County.

In many areas, however, urbanization across the region has left many communities “park poor”. The lack of distributed park areas causes immense strain on the region’s existing beaches, parks, and natural areas. In response to this issue, cities and non-governmental organizations are seeking creative ways to fund park improvements and develop much needed conservation programs to acquire lands adjacent to environmental and habitat sensitive areas.

3.10 Environmental Resources

3.10.1 Geology

The topography in the planning area is comprised of uplift areas in the north and east with a low-lying and relatively flat coastal plain that gently slopes to the south and west from the base of the hills. The topography of the planning area ranges from roughly sea level to approximately 1,700 feet above mean sea level. The primary topographic features of the planning area include the Puente, Chino, and Coyote Hills, as well as the coastal plain, as shown in Figure 3-8.



The Puente and Chino Hills make up the northern part of the California Peninsular Range geomorphic province. The Peninsular Range is characterized by a series of northwest- to southeast-oriented valleys, hills, and mountains separated by faults associated with and parallel to the San Andreas Fault system. The Puente and Chino Hills are inland topographical features separating the San Gabriel Valley to the north and the coastal plain to the south. The Puente and Chino Hills are crossed by Brea, Tonner, Carbon, and Telegraph Canyons. These major canyons and smaller intervening ones dissect the upland area and provide drainage to the southwest (Department of Conservation, 2001). The Puente Hills have several peaks above 1,000 feet in elevation. The maximum elevation of the Chino Hills peaks is approximately 1,700 feet.

The Coyote Hills are located primarily in the City of Fullerton and are part of a chain of low hills that extend from the City of Yorba Linda on the east to Santa Fe Springs on the west. The natural topography has been altered significantly by oil field activities. These alterations generally consist of graded roads, well pads, canyon fills, and steep cuts into natural slopes. The elevation of the Coyote Hills peaks at approximately 600 feet. The Los Angeles/Orange County coastal plain is bounded on the north and east by the Santa Monica Mountains and the Puente Hills, on the south by



the San Joaquin Hills, and on the west by the Pacific Ocean. The surface of the coastal plain is relatively flat and gently slopes from the base of the hills to the south and west. However, several low-lying hills are formed along the Newport Inglewood Uplift.

3.10.2 Ecological Resources

The Watershed is home to a dazzling array of habitat types, including salt marsh, mudflat, coastal plain, coastal streams, riparian woodland, and coastal sage scrub.

Bolsa Bay

Bolsa Bay, located in the Anaheim Bay-Huntington Harbour Watershed, includes the Bolsa Chica Lowlands and Ecological Reserve, and is a major environmental resource in southern California. Bolsa Bay has been designated as an area of national significance, and provides habitat for a large variety of resident and migratory waterfowl and marine species including over 30 state and/or federally listed sensitive species.

Seal Beach National Wildlife Refuge

The Seal Beach National Wildlife Refuge, also located in the Anaheim Bay – Huntington Harbour Watershed, protects over 950 acres of coastal wetlands. These wetlands support a diverse array of fish and wildlife, including several endangered species and more than 200 species of migratory and wintering birds that travel along the Pacific Flyway.

Talbert Marsh

The Talbert Marsh, owned by the Huntington Beach Wetlands Conservancy (HBWC), includes a public multipurpose trail within the Talbert Watershed. The trail is situated on approximately 25 acres from Brookhurst Street to the Santa Ana River Trail. More than 75 species of birds have been observed at Talbert Marsh and the other adjoining Huntington Beach wetlands. Thousands of birds use the Huntington Beach Wetlands as a rest stop during long migrations from their nesting grounds in the Arctic to their wintering grounds in the south. Throughout most of the year, seawater flows in and out through an ocean inlet to the marsh, which can rise and fall with the tides by as much as 8 feet. Fresh water is also contributed to the marsh through storm water channels, particularly during winter rains. In 1989, tidal flushing was restored when a man-made dike that separated the wetlands from the flood control channel was breached.

Talbert Nature Preserve

Talbert Nature Preserve is managed by Orange County Parks. The preserve is divided into areas, the north area of approximately 91.5 acres and the south area of approximately 88.5 acres. Prior to the 1920's the area was part of a much larger wetland system isolated by manmade structures, including the Santa Ana River outfall and Pacific Coast Highway. Multiple habitats within the preserve include wetlands, dunes, native grasslands,



and alluvial woodlands. A botanical preserve is located within the park. A small area is present for active recreation.

Huntington State Beach

Huntington State Beach extends two miles from Beach Boulevard in Huntington Beach south to the Santa Ana River. Huntington State Beach provides habitat for the threatened snowy plover and the California least tern, an endangered species. Recreational activities include surfing, skating, surf fishing, and bicycling along the bicycle trail.

Huntington Beach Central Park

Huntington Beach Central Park, including the Shipley Nature Center, is located in the City of Huntington Beach. The park includes 190 acres and is one of the largest passive park settings in west Orange County. Included within the park is Talbert Lake, Huntington Lake, Shipley Nature Center, an equestrian center, and over four miles of walking paths. Monarch butterflies reside within the park. Habitat is provided for over 300 bird species. The park is known as a bird watchers haven. Bird species observed include: wrens, loons, tanagers, flycatchers, pelicans, egrets, ducks, coots, falcons, owls, kingfishers, woodpeckers, larks, vireos, sparrows, finches, and more. Over 12,000 trees are present in the park.

Fairview Park

Fairview Park, located in the City of Costa Mesa, protects ten vernal pools and a vernal marsh. The pool and marsh areas are areas of special concern as vernal pools and related habitat areas, once common in Southern California on mesa and coastal bluff areas, are now a rare resource. In 2006 a biological survey was conducted by LSA Associates, Inc., indicating the pool areas are in poor to moderate condition as a result of fill dirt placement in the 1980's and invasive plant species. Actual pool conditions vary by pool. Restoration of the three largest pools, previously split by fill dirt, began in October 1996. The pools are now recombined for a total area of approximately 3.3 acres.

Santa Ana River

The Santa Ana River is the major river within the North Orange County IRWMP boundaries. Included within the boundaries is the mouth of the river. Portions of the river provide habitat for native species and habitat linkages although large portions of the river have been channelized. The Santa Ana River extends from the San Bernardino and San Gabriel Mountains to the Orange County Coastal Plain where it reaches the ocean between Newport Beach and Huntington Beach. The watershed includes the Santiago, Modjeska Canyon, and Silverado Creeks. A greenbelt is provided along the river from Huntington Beach to Yorba Linda providing habitat and active and passive recreational opportunities. Passive activities include bird watching and walking. Recreational activities include bicycling and jogging.



Exotic Species

The introduction of exotic species into wetlands and riparian corridors has also impacted the environments within wetlands areas. Non-native species may thrive in wetland habitats while providing little or no benefit to native species. These species are especially invasive after fire or scour events.

Many exotic species such as Tamarisk and *Arundo donax* have no natural bio-control agents or competitors and thus thrive while monopolizing prime habitat areas for native species along the Santa Ana River and its tributaries. These species are especially invasive after fire or scour events. Habitat enhancement and restoration will make these areas less hospitable for non-native riparian and wetland wildlife.

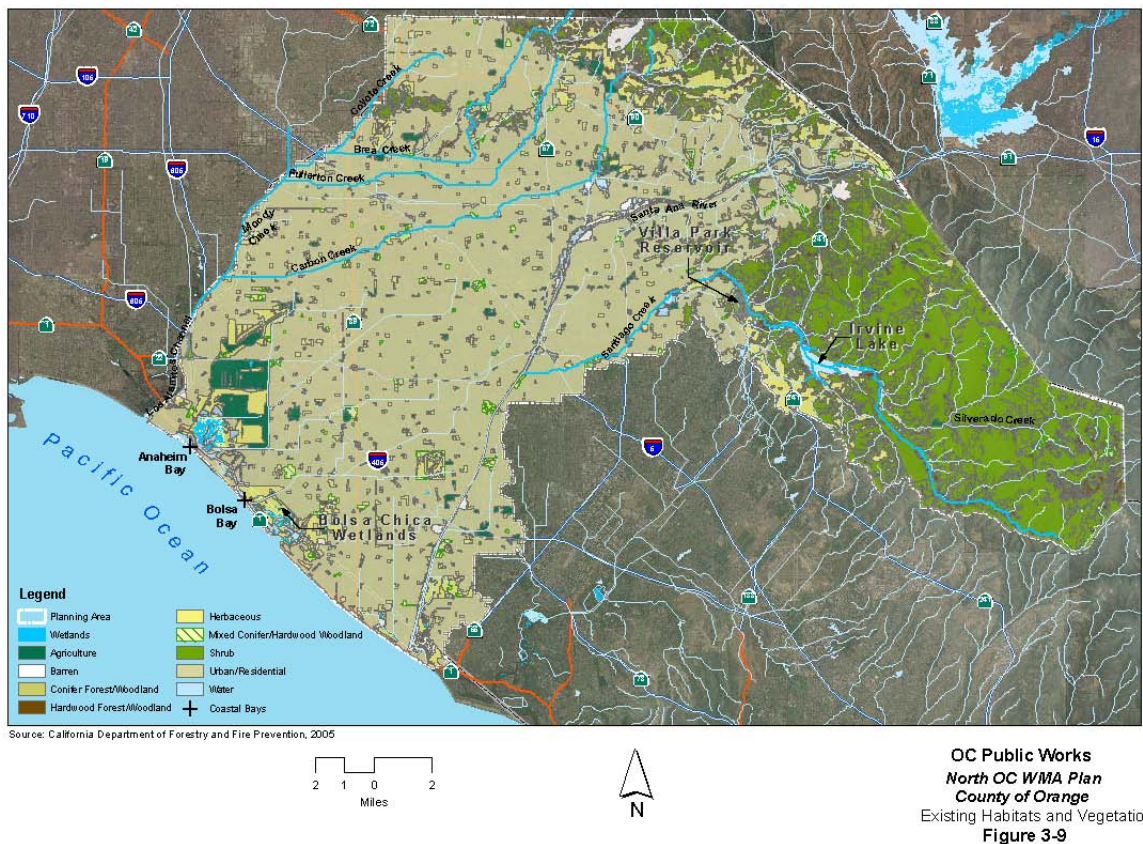
3.10.3 Biological Resources

The approximately 241,000 acre planning area is composed predominantly of densely urbanized residential, commercial, and industrial development. Drainage channels generally consist of concrete-lined or otherwise armored conveyance facilities with limited aquatic or riparian (streamside) habitat. Wildlife habitat within urbanized, developed areas is limited to landscaped parks and golf courses, residential neighborhoods, transportation corridors, and flood control channels. However, some areas of open space and natural lands exist within the watershed. These areas include some relatively natural stream channels with intact riparian vegetation and diverse aquatic habitat, as well as open hillsides with remnant historic native plant communities, including areas of coastal sage scrub, coast live oak woodland, native grasslands, coastal dunes and salt marsh, wetlands, California walnut woodlands, and riparian woodlands.

North Orange County Integrated Regional Watershed Management Plan



Existing habitats and vegetation within the NOC WMA region are shown in Figure 3-9.



These habitats support a variety of native wildlife, including native birds, fish, mammals, reptiles, and amphibians. The most extensive remnant habitats occur in the northern portion of the planning area, including natural open space in Tonner Canyon, Brea Canyon, Carbon Canyon, and open areas extending west to the Whittier Hills. Other habitat areas include those discussed above in Ecological Resources.

Federal and/or State listed endangered species include: two plants: the Santa Ana River woolly star (*Eriastrum densifolium*) and the slender-horned spine flower (*Dodecahema leptoceras*); one fish, the Santa Ana River sucker (*Catostomus santaanae*); one amphibian, the arroyo toad (*Bufo californicus*); eight birds, the least Bell's vireo (*Vireo bellii pusillus*), southwestern willow flycatcher (*Empidonax traillii*), bald eagle (*Haliaeetus leucocephalus*), California least tern (*Sternula antillarum browni*), light-footed clapper rail (*Rallus longirostris levipes*), western snowy plover (*Charadrius alexandrinus nivosus*), Belding's savannah sparrow (*Passerculus sandwichensis beldingi*) and California brown pelican



(*Pelecanus occidentalis californicus*); two mammals, the San Bernardino kangaroo rat (*Dipodomys merriami parvus*) and Stephen's kangaroo rat (*Dipodomys panamintinus*); and one insect, the Delhi Sands flower-loving fly (*Rhaphiomidas terminatus abdominalis*). California Department of Fish and Game (DFG) species of special concern include the burrowing owl (*Athene cunicularia*), fairy shrimp (*Streptocephalus wootoni*) and southwestern pond turtle (*Actinemys marmorata pallida*).

Fish: Currently only four native nongame freshwater fishes are found in nonestuarine waters of the Santa Ana River, including the arroyo chub, Santa Ana speckled dace, Santa Ana sucker, and threespine stickleback. Four other species that were historically in the Santa Ana River are no longer found.

Amphibians: Many amphibians have been displaced from Southern California's urban development. They are especially sensitive to environmental changes that alter hydrology, ecology and geology of a region. Several species are thought to be extinct, while many others have fragmented populations.

Reptiles: The Southwestern Pond Turtle is on the California Department of Fish and Game list of species of "special concern." Only a few viable populations exist in the Southern California region.

Birds: Loss and degradation of riparian and coastal wetland habitat have negatively impacted bird populations throughout the region. Other factors affecting bird populations are brood parasitism by the brown-headed cowbird and disruption of natural hydrological regimes from dams and levees.

Invasive species are found throughout the watershed. An "invasive species" is a plant or animal species not native to the watershed that may be deleterious to native species by out competing them for resources or predating on or parasitizing native species. Invasive species are generally introduced by human activity, and are more likely to colonize areas that have been disrupted by grading or soil excavations, non-native landscaping, grazing, hydrologic interruption, or other types of disturbance. Common invasive plant species within the watershed include giant reed (*Arundo donax*), tamarisk, castor bean, annual grasses such as rip-gut brome (*Bromus rigidus*), wild oat (*Avena fatua*), and others, that dominate grasslands even in relatively natural landscapes; and "ruderal" (weedy plants growing on disturbed ground) plants including wild radish (*Raphanus sativa*), Russian thistle (*Salsola tragus*), and mustard (*Brassica campestris*).