Lower San Gabriel and Los Angeles River Subregional Plan

Final

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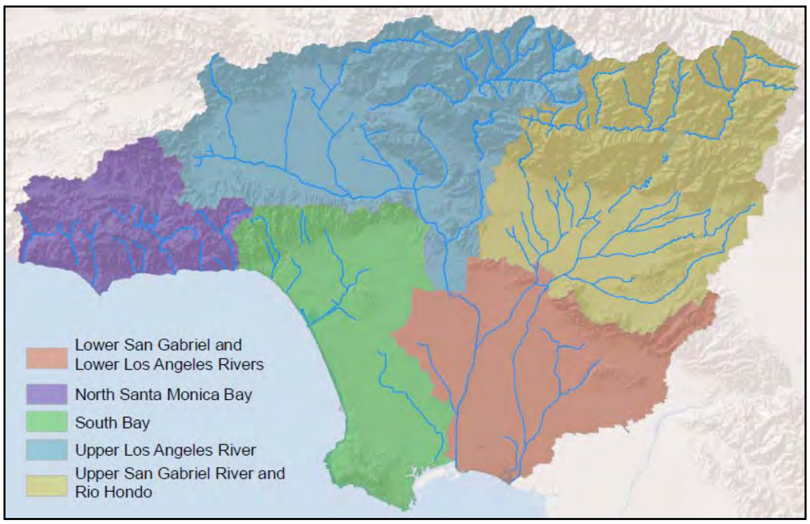
1 Background and Purpose of Subregional Plan

The Lower San Gabriel and Los Angeles River Subregional plan is one of five Subregional plans that make up the Greater Los Angeles County Integrated Regional Water Management Plan (GLAC IRWM Plan). This Subregional plan describes the Lower Los Angeles and San Gabriel's physical setting, sources of water supply, water quality, environmental resources, planning objectives and targets, and partnership and multi-benefit opportunities. The purpose of the Lower San Gabriel and Los Angeles River Subregional plan is to outline its expected contribution to meeting the GLAC regional planning goals, objective, and targets.

2 Lower San Gabriel and Los Angeles River Description

2.1 Physical Setting

Figure 1: GLAC Subregional and Watershed Boundaries



The Lower San Gabriel and Los Angeles River Subregion of the GLAC IRWM Region is located in the Southwest portion of the Los Angeles County urbanized area (Figure 1). The Subregion is also comprised of several dozen water agencies/companies and other entities which have an interest in a variety of water management issues. In addition, the Subregion overlaps with the Santa Ana Watershed Project Authority IRWM Region where Orange County overlaps with the San Gabriel River watershed. The Gateway IRWM Region, which is comprised of a number of cities, also overlaps with the southern portion of the Subregion.

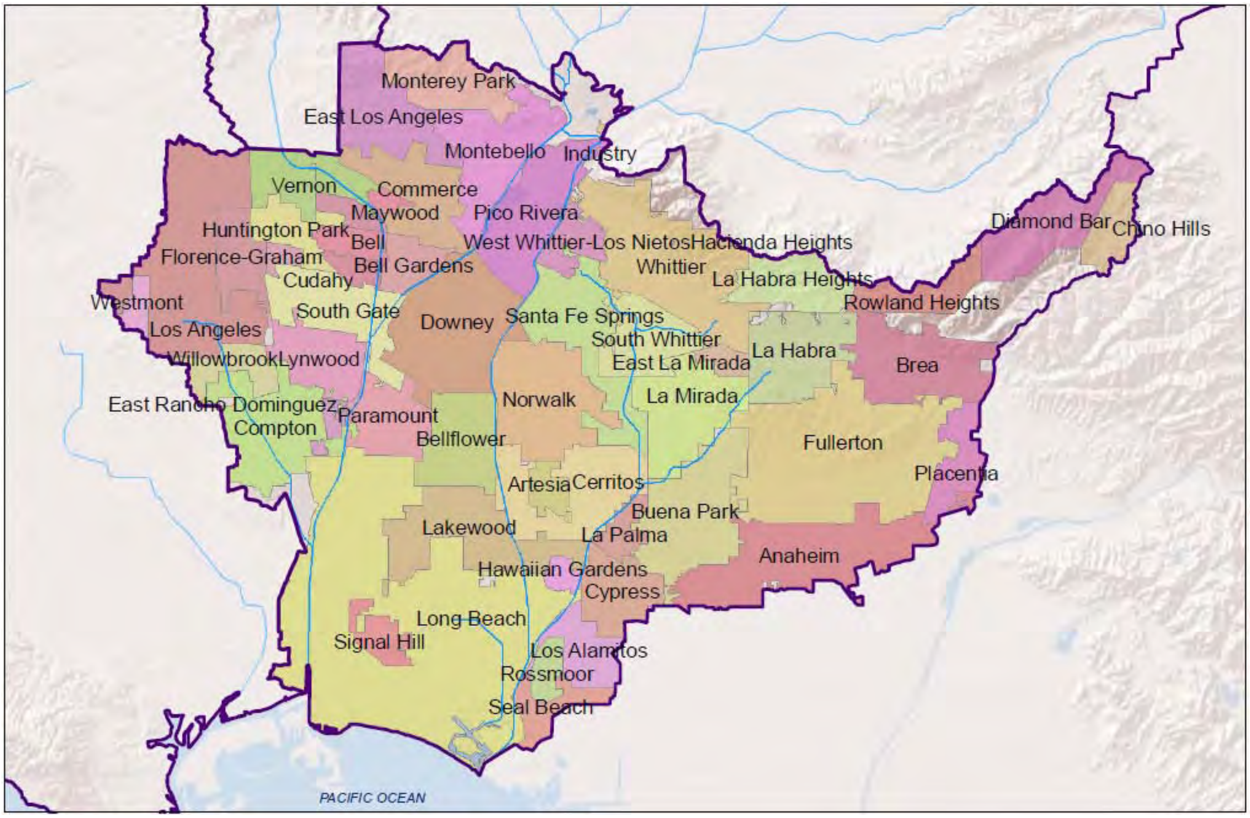
The large expanses of urban and suburban development are home to approximately 3 million residents. Further, it has the most densely developed commercial and industrial land uses coupled with the least amount of open space on a per acre basis in the GLAC. Population projections from the Southern California Area Governments (SCAG) estimate that the population within the Subregion could increase to over 3.4 million residents by 2035. (SCAG, 2012; U.S. Census Bureau, 2012)

The Subregion has one of the greatest water recharge capacities in the GLAC due to the Montebello Forebay recharge basins located just downstream of the Whittier Narrows Gap. This Subregion is in the lower reaches of a vast metropolitan area and therefore has significant water quality issues along with tremendous opportunities for conjunctive use and recycled water use, desalination and wetlands restoration in the estuaries of the San Gabriel and Los Angeles Rivers.

Political Boundaries

The Subregion consists of 39 cities and several unincorporated areas of Los Angeles County. Figure 2 depicts the city and community boundaries of the Lower San Gabriel and Los Angeles River Subregion.

Figure 2: Cities and Communities in the Lower San Gabriel and Los Angeles River Subregion



Climate, Temperature, and Rainfall

The Subregion is within the Mediterranean climate zone, which extends from Central California to San Diego. Summers are typically dry and hot while winters are wet and cool. Precipitation typically falls in a few major storm events between November and March.

Geography and Geomorphology

The geography of the Lower San Gabriel and Los Angeles River Subregion is made up of the coastal plain. The area is generally of low elevation, stretching from the Pacific Ocean in the south to the Puente Hills in the north.

2.1.1 Watersheds and Water Systems

Watersheds

The Subregion primarily consists of the lower San Gabriel River watershed and the Los Angeles River watershed (Figure 3). The San Gabriel River watershed begins in the San Gabriel River Mountains, and stretches across the San Gabriel Valley, then down to the Pacific Ocean. The Los Angeles River watershed begins from the Santa Monica Mountains on the east to the San Gabriel Mountains to the west and encompasses the entire path of the Los Angeles River which flows across the coastal plain into the San Pedro Bay. The Lower San Gabriel River watershed is made up of a number of tributaries, including: the Upper San Gabriel River watershed, Coyote Creek, La Mirada Creek, Fullerton Creek, Brea Creek, and Carbon Creek. Tributaries to the lower Los Angeles River watershed include: the Upper Los Angeles River watershed, Rio Hondo, and Compton Creek.

Flood Management and Infrastructure

Flood management is important to protect human lives and property, particularly in the Lower San Gabriel and Los Angeles River where flooding has been an issue in the past due to the growth of population and pressure for development in the lower watersheds. The Los Angeles County Flood Control District manages and maintains most of the Subregion's flood infrastructure, such as storm drains, culverts, stormwater management ponds, and flood control channels.

Within the Subregion, the primary flood control management measure has been to line channels. Upstream of the Subregion, a system of dams, debris basins, reservoirs and flood control channels has been constructed through the years by the Los Angeles County Flood Control District and the U.S. Army Corps of Engineers as development encroached upon more flood prone areas and increased impervious area caused more runoff. Dams and reservoirs upstream of the Subregion often operate secondarily as water conservation facilities. The only major flood control reservoir within the Subregion is located at the Whittier Narrows Dam which stretches across both the San Gabriel River and Rio Hondo near to where they enter the Subregion. The main San Gabriel and Los Angeles Rivers, and their many tributary stream channels often have concrete banks and bottoms constructed to reduce the risk of flooding. Portions of the Los Angeles River and San Gabriel River have not been lined to allow for percolation and recharge of groundwater basins. (RWQCB, 2000)

Water Suppliers and Infrastructure

A number of water suppliers exist in the Subregion, consisting over thirty retailers and wholesalers. Those that have the largest service areas include Central Basin MWD, Compton, Long Beach, and Fullerton, in addition to portions of Anaheim and the Municipal Water District of Orange County. These suppliers use a combination of imported water, recycled water, and groundwater to serve potable and non-potable demand in their service areas. A map of wholesale water suppliers is shown in Figure 4, and a map of retail water suppliers is shown in Figure 5. Each of these major suppliers has written a comprehensive 2010 Urban Water Management Plan (UWMP) to estimate future water supply demand and availability. These data were utilized in the estimation of supplies later in this plan.

Figure 3: Watersheds of the Subregion

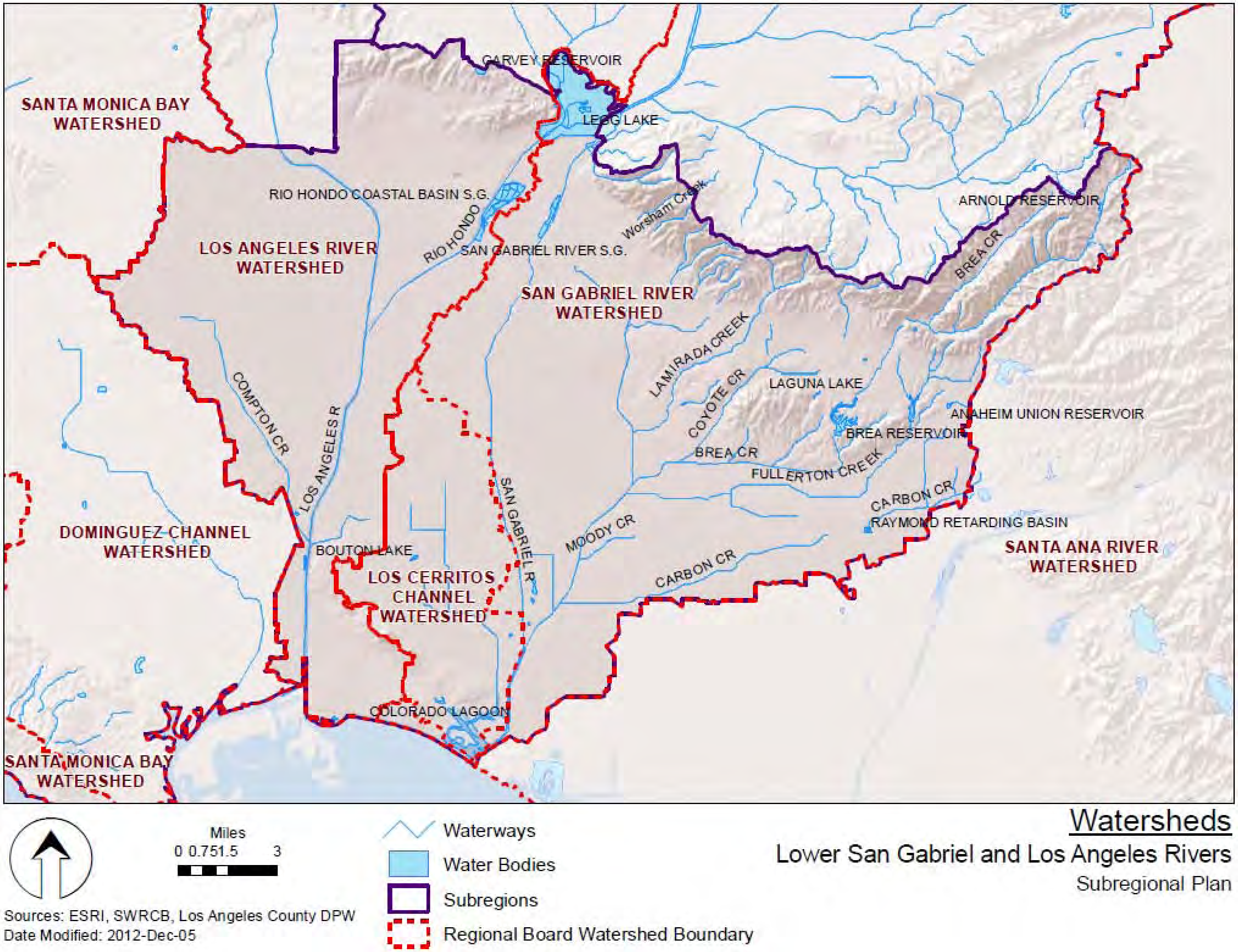


Figure 4: Wholesale Water Suppliers

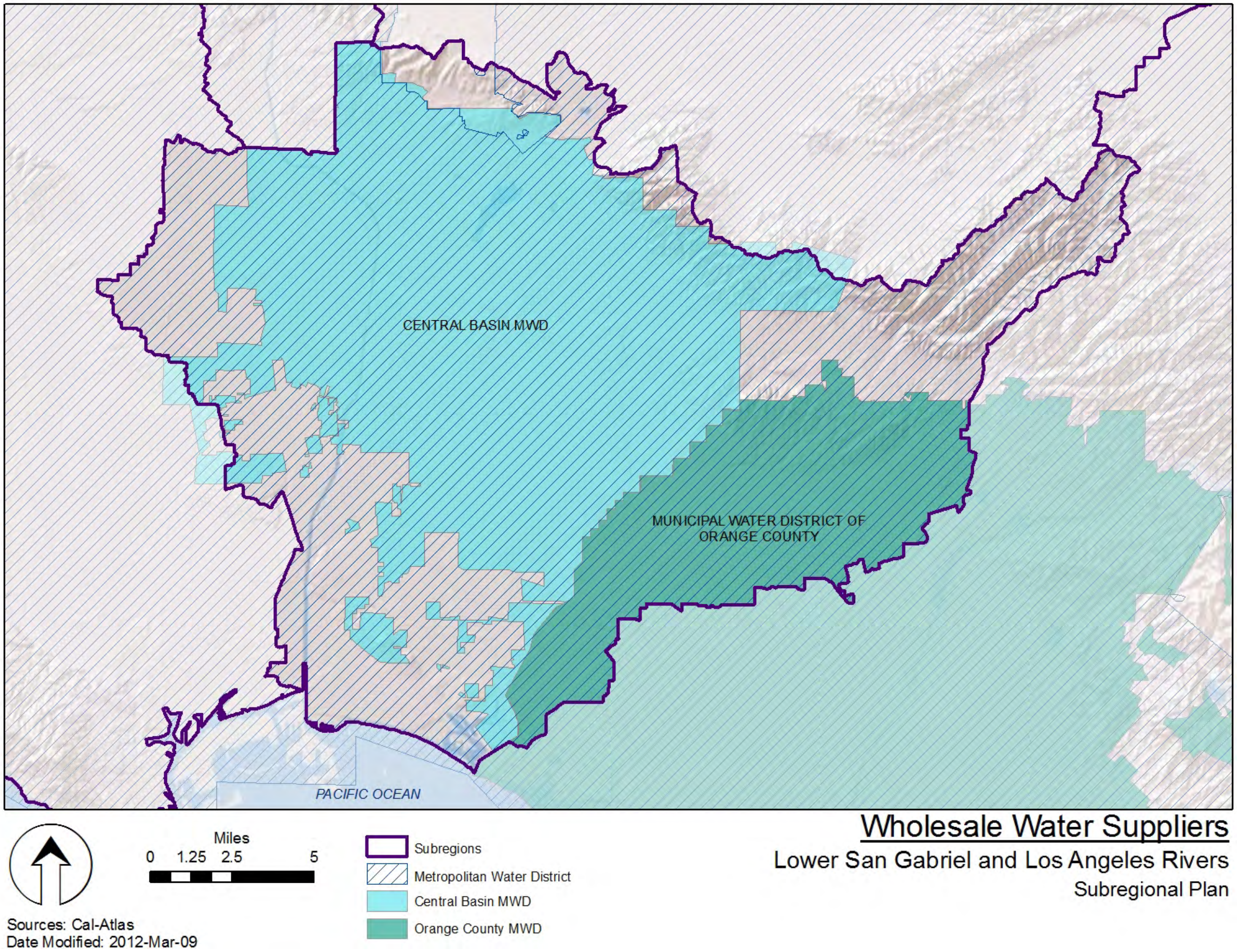
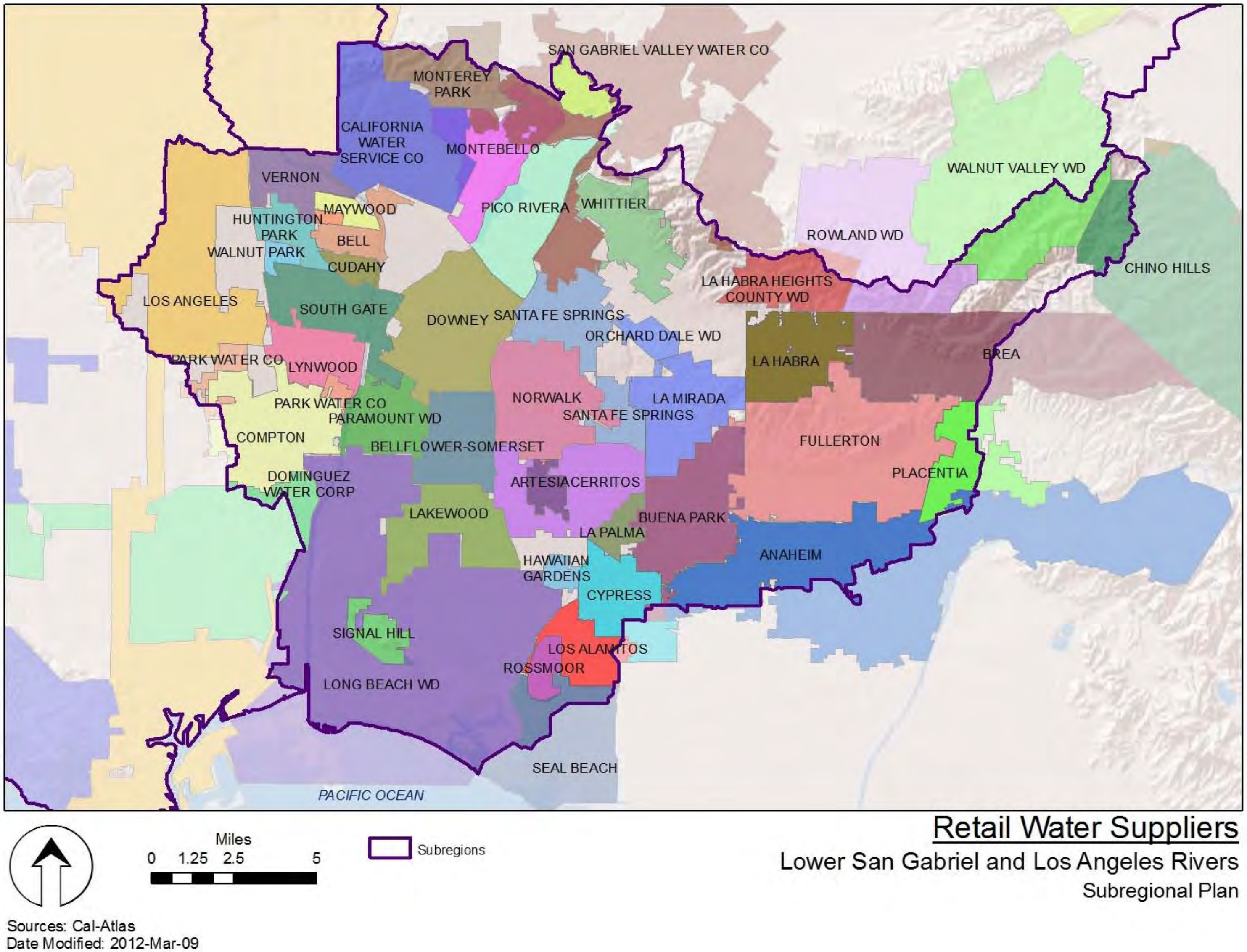


Figure 5: Retail Water Suppliers



2.2 Sources of Water Supply

The Lower San Gabriel and Los Angeles River Subregion depends primarily on groundwater, imported water and recycled water to meet its water demands. Water is imported through the California State Water Project (SWP), the Colorado River Aqueduct, and the Los Angeles Aqueducts. Major water supply sources are described below.

Sources of retail supply vary throughout the Subregion, as shown in Table 1. This table was developed based on 2010 Urban Water Management Plans (UWMPs) whose service areas cover a majority of the Subregion. These agencies include:

- City of Los Angeles (portion within Subregion)
- City of Long Beach
- City of Fullerton
- Central Basin MWD

In addition to retail supply, replenishment supply is needed to replenish the Central Coast groundwater basin and to use with injection wells serving as sea water barriers. Table 2 shows the projected supplies to be used to meet replenishment needs.

Table 1: Projected Supplies (acre-feet per year)

Supply	2010	2035
GW	261,000	266,000
IW	125,000	114,000
RW	30,000	39,000
Desalination	-	10,000
Conservation	-	3,000
Stormwater	-	1,000
Water Transfer	-	2,000
Total	**416,000**	**435,000**

Table 2: Projected Replenishment Supplies (acre-feet per year)[1]

	2010	2035
Imported Water	23,000	2,000
Recycled Water	41,000	62,000
Stormwater	52,000	52,000
Total	**116,000**	**116,000**

[1] Replenishment supplies based on 10-year average of replenishment in Coastal Plain area as reported in Los Angeles County Hydrologic reports. Included are groundwater basin recharge (100% contribution to groundwater supply) and sea water barrier injection (60% contribution to groundwater supply)

Surface Water

There is no direct potable use of surface water within this Subregion; however, surface water flow from the Los Angeles River, Rio Hondo and the San Gabriel River is used to recharge groundwater at spreading grounds which are discussed further in the groundwater section.

Groundwater

Groundwater is a major water supply in this Subregion, representing approximately 55% of water supplies in 2010. The primary groundwater basin is Central Basin, in addition to the West Coast Basin, La Habra Basin and Orange County Basin.

The Central Basin is adjudicated through the Central Basin Judgment, with the total amount of allowable extraction rights set at 217,367 AFY. The California Department of Water Resources serves as Watermaster for the Central Basin, while the Water Replenishment District (WRD) of Southern California is responsible for ensuring an adequate supply of replenishment water to offset groundwater production through monitoring, and various groundwater reliability programs and projects.

Groundwater recharge in the Central Basin occurs via existing and restored natural channel bottoms, percolation of rainwater (natural recharge), underflow from neighboring basins, irrigation, and other incidental recharge; however, natural recharge is typically insufficient to maintain basin water levels and current pumping levels due to the extent of impervious surfaces. To augment the groundwater which naturally recharges Central Basin, artificial recharge using river water, imported water, recycled water and runoff augments and blends with groundwater, and is eventually extracted for potable use. Artificial recharge facilities in the Central Basin include the following (LACDPW, 2011):

- Dominguez Gap Spreading Grounds – recharge controlled flows from the Los Angeles River and uncontrolled flows from storm drains
- Rio Hondo Coastal Spreading Grounds – recharge controlled releases from San Gabriel Canyon Dams, Santa Fe Dam and Whittier Narrows Dam, uncontrolled runoff via San Gabriel River and Rio Hondo channel, and imported and recycled water
- San Gabriel Coastal Spreading Grounds – recharge controlled and uncontrolled releases from San Gabriel Canyon Dams, Santa Fe Dam and Whittier Narrows Dam, and imported and recycled water
- San Gabriel River at Montebello Forebay – in-river recharge controlled releases from San Gabriel Canyon Dams, Santa Fe Dam and Whittier Narrows Dam, uncontrolled runoff via San Gabriel River, and imported and recycled water
- Alamitos Gap Barrier Project – injects imported water and recycled water to prevent seawater intrusion

The West Coast Basin, also adjudicated, lies mostly in the South Bay Subregion to the west, but a small portion lies in the Lower San Gabriel and Los Angeles Rivers Subregion. Like Central Basin, West Coast Basin is managed by the California Department of Water Resources and WRD. This basin is hydrologically connected to Central Basin, receiving underflow at the Dominguez Gap. Groundwater basin recharge can occur via existing and restored natural channel bottoms, percolation of rainwater irrigation, and other native incidental recharge ; however natural recharge is typically insufficient to maintain basin water levels and current pumping levels due to the extent of impervious surfaces and the presence of clay soils in parts of the Subregion. There are currently injection wells in place in the West Coast Basin which inject recycled water and imported water along the coast to form barriers to seawater intrusion in two locations (the Dominguez Gap and West Coast Basin Barriers). (West Basin MWD, 2011)

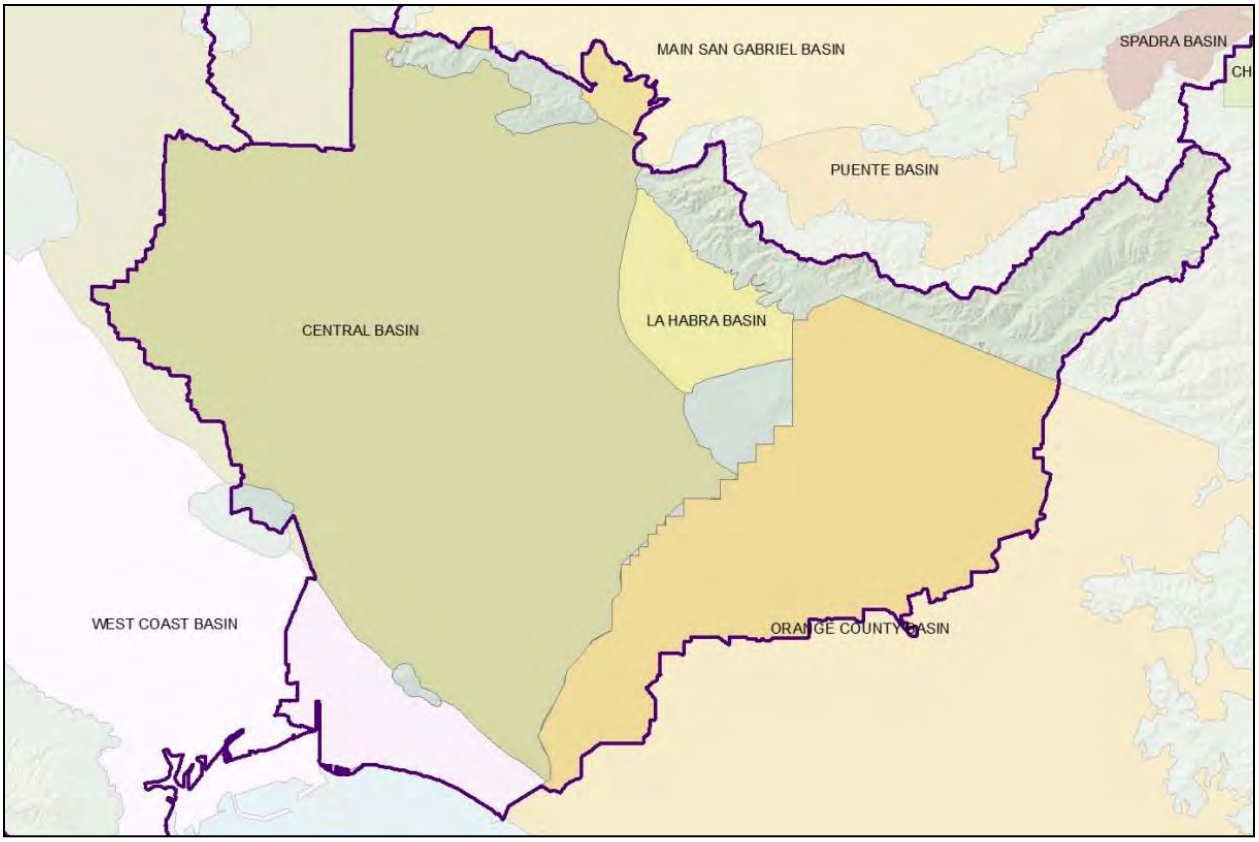
The Orange County Basin underlies the eastern portion of the southeastern portion of the Subregion, and is separated from the Central Basin boundary along Coyote Creek and the Los Angeles/Orange County line. This basin is adjudicated, and is managed by the Orange County Water District. Recharge to the Orange County Basin is primarily from the Santa Ana River through permeable sands and gravels within the forebay areas. Recharge also occurs through precipitation, irrigation, and other native incidental recharge. Artificial recharge activities include injection through wells at the Talbert and Alamitos seawater barriers, and spreading of imported and recycled water at spreading grounds. Artificial recharge facilities overlying the Orange County Basin allow for the recharge of Santa Ana River water, imported water, and recycled water. These facilities are located in the cities of Anaheim and Orange, as well as along the Santa Ana River. and include the following:

- Santa Ana River in the forebay areas
- Conrock and Warner Percolation Basins
- Burris Pit Percolation Basin
- Talbert seawater barrier
- Alamitos seawater barrier

La Habra Basin is located in northern Orange County, north of the Orange County Basin. Little groundwater production occurs in this basin due to low transmissivity and poor water quality caused by high TDS, sulfates, nitrates and color. The La Habra Basin is currently unmanaged.

In addition to the above discussed basins, some water agencies utilize groundwater pumped from the San Gabriel Basin to the northeast of the Subregion, including: the City of Whittier, California Domestic Water Company, San Gabriel Valley Water Company and Suburban Water Systems.

Figure 6: Groundwater Basins of the Lower San Gabriel and Los Angeles River Subregion



Imported Water

Imported water represents a large portion of supply within the Subregion. Water is imported from northern California via the SWP and from the Colorado River, and is made available to water users through Central Basin MWD and the Cities of Compton, Long Beach and Los Angeles. The City of Los Angeles also imports water through the Los Angeles Aqueduct from the Owens River-Mono Basin.

Recycled Water

Recycled water serves the Subregion both for non-potable reuse and for groundwater recharge. Recycled water demand is met by water reclamation plants both within the Subregion, and outside the Subregion, though only those water reclamation plants inside the Subregion's boundaries will be explored here.

Within this Subregion, recycled water is produced by the Sanitation Districts of Los Angeles County at the Whittier Narrows Water Reclamation Plant (WRP), Los Coyotes WRP and Long Beach WRP (shown in Figure 7). In total, these WRPs have a capacity of 77.5 million gallons per day (MGD) and produced approximately 53,200 AFY of recycled water in 2010. Of this, approximately 11,000 AFY were used for non-potable reuse, and 6,000 AFY were used at the Montebello Forebay for groundwater replenishment. It should be noted that some of the recycled water from the Whittier Narrow WRP is reused in the Upper San Gabriel and Rio Hondo Subregion. The remainder of the treated effluent is discharged to rivers and flows to the ocean.

Though just outside the Subregion, the San Jose Creek WRP's recycled water supplies are used extensively in the Subregion for groundwater recharge in the Montebello Forebay and for the non-potable reuse customers served by a number of wholesale and retail water purveyors. The San Jose WRP's capacity is 100 MGD, with supplies of approximately 42,000 AFY used for recharge and 6,000 AFY for non-potable reuse in 2010, though some non-potable reuse occurred in other subregions.

In addition to the above recycled water plants, recycled water may be supplied from plants outside of the Subregion, such as from West Basin MWD and the Municipal Water District of Orange County, but will not be discussed here. Recycled water plants across the Region are shown in Figure 7.

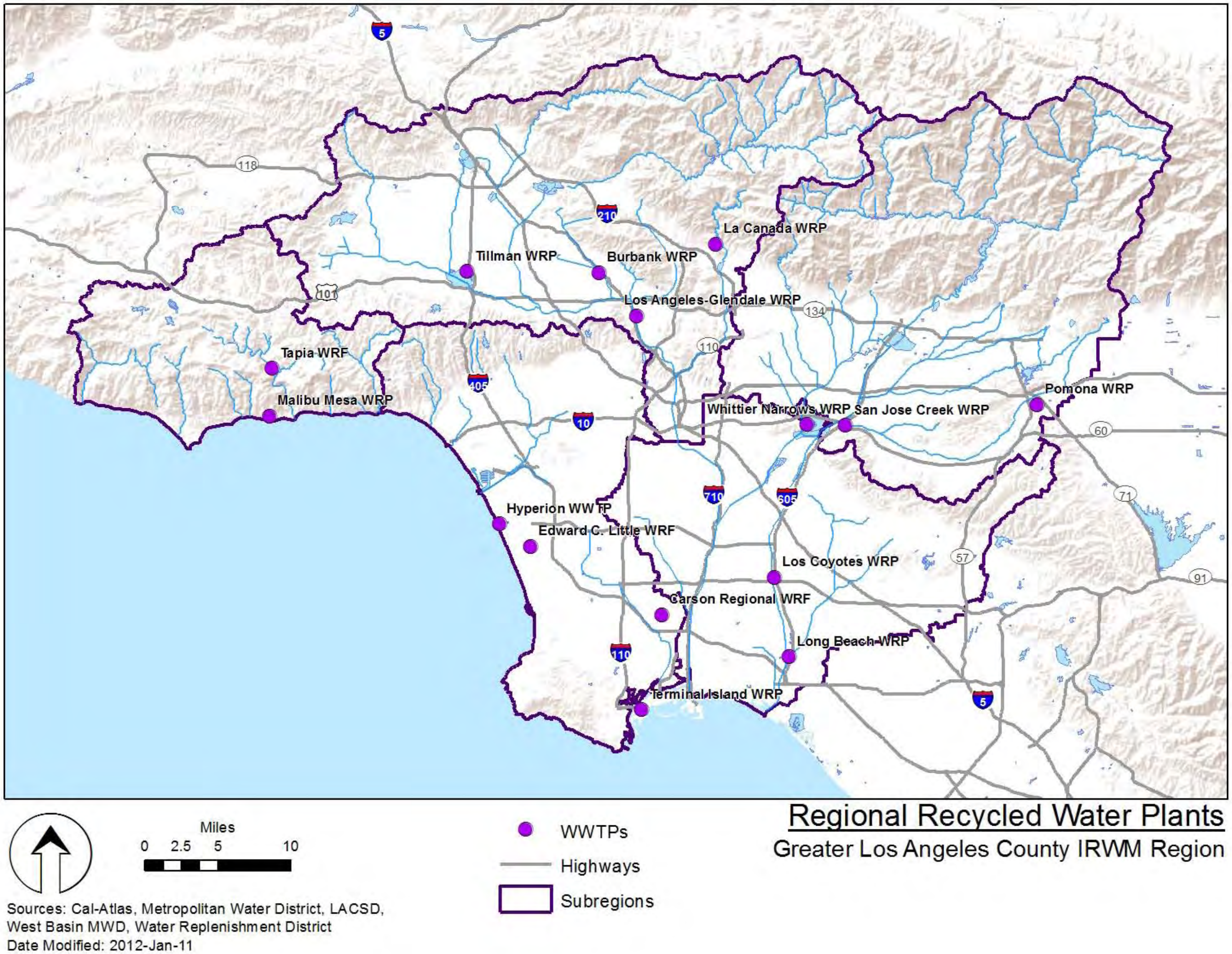
Desalination

Desalinated ocean water is not currently used as a supply source in this Subregion, but has been explored by various agencies, including a partnership of the Long Beach Water Department, the Los Angeles Department of Water and Power, and the U.S. Bureau of Reclamation. This partnership undertook research to assess the feasibility of ocean water desalination as a source of potable water through the use of a prototype desalination plant. Should the partnership move forward with a full-time production facility, a project would likely move forward in the next 10-15 years.

Rainwater-Stormwater Use

Stormwater use, also known as rainwater harvesting, is a method that can be used by municipalities both to add a source of supply to its water portfolio, and to reduce runoff that can contribute to flooding and water quality issues. The City of Los Angeles is planning on developing a Stormwater Capture Master Plan to increase the capture and use of stormwater, which would impact the portions of the Subregion intersecting the City of Los Angeles. The information contained in this master plan could be applied to the remaining areas in the Subregion to develop numerical targets.

Figure 7: Water Reclamation Facilities in the GLAC Region



2.3 Water Supply/Demand

As water agency boundaries are not aligned with the Subregional boundaries, an estimate of the actual Subregion's water supply and demand was not readily available for this Plan. Water supply and demand for the region was estimated based on review of 2010 Urban Water Management Plans (UWMPs).

Estimated demand projections for the Subregion are listed in Table 3. Demand was calculated using the 2010 UWMPs for City of Los Angeles, Long Beach Water Department, City of Fullerton, and Central Basin MWD as the service areas of these agencies provides sufficient coverage of the Subregion. All agencies have incorporated water conservation measures into water planning and practice. This practice involves the implementation of best management practices (BMPs) as prescribed by the California Urban Water Conservation Council in order to meet the requirements of SBx7-7 (Steinberg, 2009), also known as the 20x2020 Plan. Member agencies of MWD assist the Subregion by implementing incentive programs that provide rebates to water conservation and recycled water use projects and programs.

Table 3: Subregion Demand Projections (acre-feet per year)

Water District	2010	2015	2020	2025	2030	2035
City of Los Angeles[2]	98,000	108,000	112,000	114,000	116,000	115,000
Long Beach	54,000	55,000	55,000	55,000	55,000	55,000
Fullerton	28,000	32,000	33,000	33,000	33,000	33,000
Central Basin MWD	244,000	267,000	273,000	281,000	283,000	285,000
Total	**424,000**	**462,000**	**473,000**	**483,000**	**487,000**	**488,000**

2.4 Water Quality

The GLAC Region has suffered water quality degradation of varying degrees due to sources associated with urbanization, including the use of chemicals, fertilizers, industrial solvents, automobiles and household projects. Both surface water and groundwater quality have been impacted by this degradation which can be classified as either point or nonpoint sources. Regulations are in place to control both types of sources.

The Federal Water Pollution Control Act Amendments of 1972, amended in 1977, are commonly known as the Clean Water Act. The Clean Water Act established the basic structure for regulating discharges of pollutants into the waters of the United Sates and gave the USEPA the authority to implement pollution control programs. In California, per the Porter Cologne Water Quality Control Act of 1969, responsibility for protecting water quality rests with the State Water Resources Control Board (SWRCB) and Regional Water Quality Control Boards (RWQCBs).

The SWRCB sets statewide policies and develops regulations for the implementation of water quality control programs mandated by state and federal statutes and regulations. The RWQCBs develop and implement Basin Plans designed to preserve and enhance water quality. The determination of whether water quality is impaired is based on the designated beneficial uses of individual water bodies, which are established in the Basin Plan. As mandated by Section 303(d) of the Federal Clean Water Act, the SWRCB maintains and updates a list of "impaired" water bodies that exceed state and federal water quality standards. To address these impairments, the RWQCBs identify the maximum amount of pollutants that may be discharged on a daily basis without impairing the designated beneficial uses, and

[2] Approximately 18% of the Lower San Gabriel and Los Angeles River region is located within the City of Los Angeles, therefore only 18% of the City of Los Angeles 2010 UWMP water demand values were accounted for.

are known as Total Maximum Daily Loads (TMDLs). In addition to development of the TMDLs the RWQCBs develop and implement the NPDES permits for discharges from wastewater treatment and water reclamation plants of treated wastewater effluent to surface water bodies.

The Subregion has 303(d) listings related to both human activities and natural sources. Human activity produces poor water quality due to trash, nutrients from wastewater treatment effluent, metals, and toxic pollutants. These pollutants can be carried in stormwater runoff and through point source discharges, impacting streams, canyon ecosystems, and eventually beaches and offshore waters. Natural sources of contaminants primarily include minerals and metals from underlying local geology.

Even though agencies and cities in the Subregion have significantly reduced pollutants that are discharged to water bodies from individual point sources since the Clean Water Act was established, many of the major water bodies are still considered impaired due to trash, bacteria, nutrients, metals, and toxic pollutants. Water quality issues affecting the Subregion's local surface waters and groundwater basins are discussed below.

Surface Water Quality

The watersheds in the Subregion serve many beneficial uses including: municipal and domestic supplies, groundwater recharges, recreation, wildlife habitat, warm freshwater habitat, wetland habitat, industrial process supply, preservation of rare and endangered species, shellfish harvesting, fish migration, and fish spawning. Typically, surface water quality is better in the headwaters and upper portions of watershed, and is degraded by urban and stormwater runoff closer to the Pacific Ocean. As a result, the major watersheds in the Subregion, (lower Los Angeles River and Lower San Gabriel River), and receiving waters are 303(d) listed for several constituents, as shown in Table 4 and Table 5. (SWRCB, 2010)

The locations of permitted dischargers are shown in Figure 8. Please note that Figure 8 does not show MS4 and Caltrans discharges as these are non-point discharge permits.

Investigations are needed to determine natural background levels for some listings which may not be due to anthropogenic causes. However, the reports written in support of the Subregion's TMDLs conduct a source assessment for each impairment, and determine the major sources of each, as listed below:

- **Los Angeles River Bacteria TMDL:** Dry and wet weather stormwater system discharges, wildlife, direct human discharge, septic systems, re-growth or re-suspension of sediments
- **Los Angeles River Metals TMDL:** Dry weather: Publically owned treatment works (POTWs) including Tillman WRP, LA-Glendale WRP and Burbank WRP, tributary flows, groundwater discharge and flows from other permitted NPDES discharges; wet weather: storm flow through permitted storm sewer systems; atmospheric deposition, natural geologic conditions
- **Los Angeles River Nutrient TMDL:** Discharges from POTWs, including Tillman WRP, LA-Glendale WRP and Burbank WRP, urban runoff, stormwater, groundwater discharge
- **Trash TMDL for the Los Angeles River Watershed:** Stormwater discharges, direct deposition by people or wind
- **Legg Lake Trash TMDL:** Litter from adjacent areas, roadways and direct dumping and deposition, storm drains
- **San Gabriel River Metals and Selenium TMDL:** Dry weather: Storm drains, WRPs, power plants; Wet weather: stormwater runoff through permitted storm sewer systems, Caltrans permit, general construction storm permits, and industrial storm permits; draining of open space areas, atmospheric deposition
- **San Gabriel River East Fork Trash TMDL:** Picnicking and camping

- **Colorado Lagoon Pesticides, PAHs, PCBs, Metals, etc. TMDL:** Urban runoff and stormwater discharges from municipal storm sewer systems and Caltrans, sediment loading caused by runoff from urban, recreational park areas, atmospheric deposition
- **Los Cerritos Channel Metals TMDL:** Permitted stormwater discharges, atmospheric deposition
- **Long Beach City Beaches and Los Angeles River Estuary TMDLs for Indicator Bacteria:** Storm sewer discharge permittees, Caltrans facilities, vessels covered under the VGP, industrial and construct stormwater permittees, general NPDES permits, various nonpoint sources such as dogs on beaches, recreational vehicle parks, marina slip activities, waterfowl, human beach use
- **El Dorado Parks Lakes Multiple TMDLs:** Runoff, irrigation, groundwater and potable water inputs used for supplemental water additions, atmospheric deposition
- **North, Center, and Legg Lake Multiple TMDLs:** Permitted stormwater discharges, irrigation, groundwater used for supplemental water additions to maintain lake level, groundwater discharge from a Superfund site, atmospheric deposition

Table 4: 303(d) Listed Waters with Adopted TMDLs

303(d) Listed Waters and Impairments[1]	TMDL
Colorado Lagoon	
Chlordane	Colorado Lagoon Pesticides, PAHs, PCBs, Metals etc. TMDL
Dieldrin	
PCBs	
DDT	
Metals: Lead, Zinc	
PAHs	
Sediment Toxicity	
Benthic Community Effects	
Compton Creek	
Bacteria	Los Angeles River Bacteria TMDL
Metals: Copper, Lead	Los Angeles River Metals TMDL
Trash	Trash TMDL for the Los Angeles River Watershed
Nutrients: pH	Los Angeles River Nutrient TMDL
Coyote Creek	
Metals: Copper, Lead, Selenium, Zinc	San Gabriel River Metals and Selenium TMDL
Los Angeles River	
Nutrients: Ammonia, Nutrients (Algae), pH	Los Angeles River Nutrient TMDL
Bacteria	Los Angeles River Bacteria TMDL
Metals: Copper, Lead, Zinc, Cadmium	Los Angeles River Metals TMDL
Trash	Trash TMDL for the Los Angeles River Watershed
Los Angeles River Estuary	
Trash	Trash TMDL for the Los Angeles River Watershed
Bacteria	Long Beach City Beaches and Los Angeles River Estuary TMDLs for Indicator Bacteria
Rio Hondo	
Nutrients: Ammonia, Nutrients (Algae), pH	Los Angeles River Nutrient TMDL
Bacteria	Los Angeles River Bacteria TMDL
Metals: Copper, Lead, Zinc, Cadmium	Los Angeles River Metals TMDL
Trash	Trash TMDL for the Los Angeles River Watershed
San Gabriel River	
Trash	San Gabriel East Fork Trash TMDL
Metals: Copper, Lead, Zinc, Selenium	San Gabriel River Metals and Selenium TMDL

303(d) Listed Waters and Impairments[1]	TMDL
San Gabriel River Estuary	
Metals: Copper, Nickel	San Gabriel River Metals and Selenium TMDL
Legg Lake	
Trash	Legg Lake Trash TMDL
Nutrients: ammonia, odor, pH	North, Center and Legg Lake TMDLs
Metals: copper, lead	
Los Cerritos Channel	
Metals: copper, lead, zinc	Los Cerritos Channel Metals TMDL
El Dorado Park Lakes	
Nutrients: algae, ammonia, eutrophic, pH	El Dorado Park Lakes TMDLs
Metals: Mercury	
Lead	No TMDL determined necessary by EPA
Copper	Cleanup and Abatement Order established for the City of Long Beach

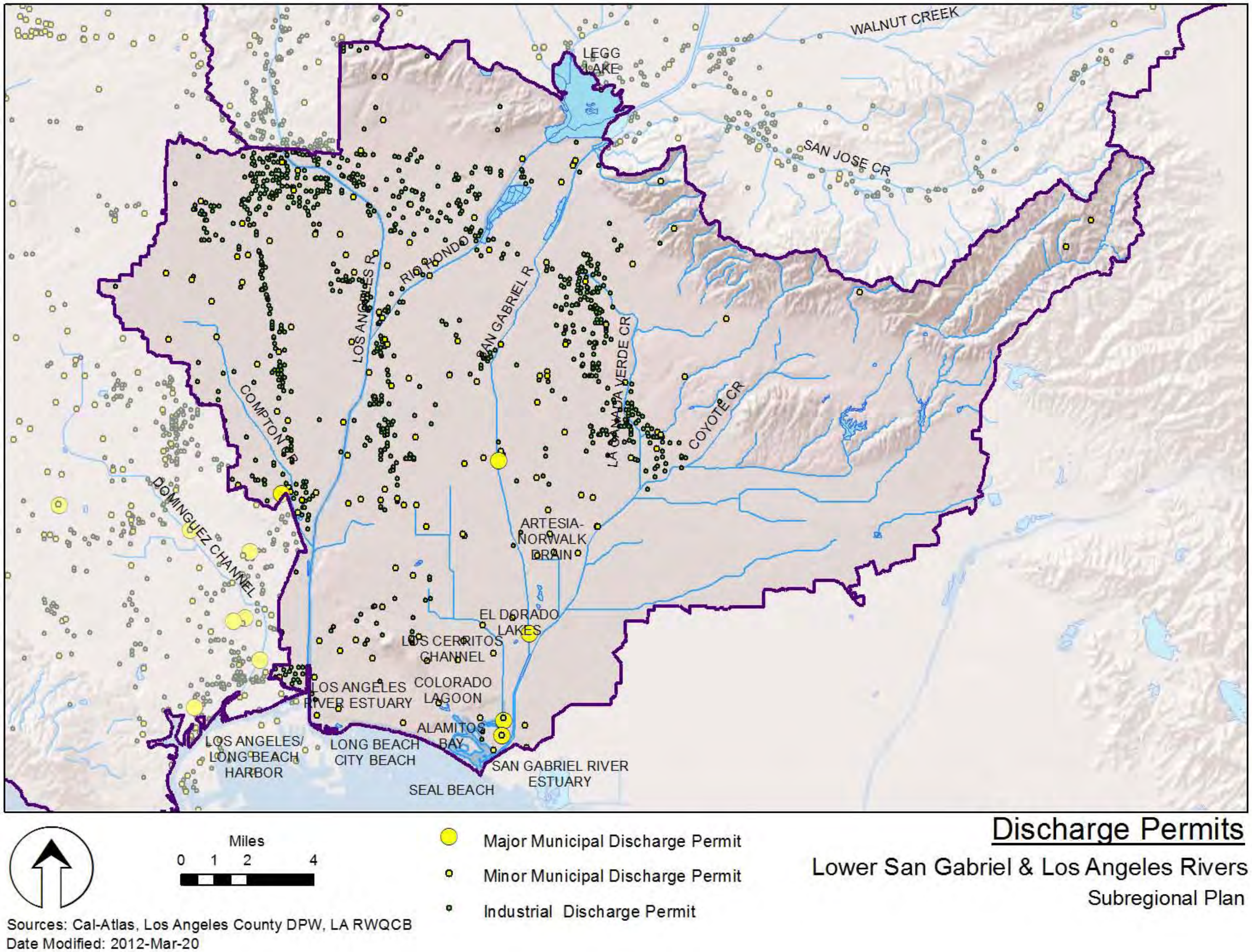
1. According to the US EPA's 2010 Integrated Report (Clean Water Act Section 303(d) List / 305(b) Report

Table 5: 303(d) Listed Waters without Adopted TMDLs

303(d) Listed Waters and Impairments[1]		
Alamitos Bay		
Bacteria		
Compton Creek		
Benthic Community Effects		
Coyote Creek		
Diazinon	Toxicity	Nutrients: Ammonia, pH
Bacteria		
Los Angeles River		
Cyanide	DDT	Oil
Diazinon	Dieldrin	Dibenz[a,h]anthracene
Los Angeles River Estuary		
Chlordane	PCBs	DDT
Sediment Toxicity		
Los Cerritos Channel		
Ammonia	DEHP	Chlordane
Bacteria	Trash	pH
Rio Hondo		
Cyanide	Oil	Diazinon
San Gabriel River		
Bacteria	Cyanide	pH
San Gabriel River Estuary		
Dioxin	Oxygen, Dissolved	
San Pedro Bay		
Chlordane	DDT	PCBs
Sediment Toxicity	ChemA	Bacteria
Nitrogen/Nitrate	Toxaphene	Toxicity

1. According to the US EPA's 2010 Integrated Report (Clean Water Act Section 303(d) List / 305(b) Report

Figure 8: Permitted Dischargers as of 2011



Groundwater Quality

Groundwater quality varies throughout the Subregion, based on naturally occurring conditions, historical land use patterns, and groundwater extraction patterns. Poor groundwater quality can be attributed to several factors including over-drafting of groundwater basins (sometimes resulting in seawater intrusion), industrial discharges, agricultural chemical usage, legacy contaminants in urban runoff, and naturally occurring constituents. The cost of treating these contaminants is often significant, and for some improperly disposed chemicals, effective treatment has not yet been identified.

Central Basin is generally of good quality but has some localized areas of poor quality, primarily along the basin margins and in those aquifers affected by seawater intrusion. As stated previously, WRD monitors and manages both levels and water quality in Central Basin. The primary constituents of concern in this basin include: TDS, VOCs, perchlorate, nitrate, iron, manganese, and chromium. WRD has determined through its monitoring and sampling program that special interest constituents, including arsenic, hexavalent chromium, MTBE, total organic carbon, color and perchlorate, do not pose a substantive threat to the basin. (MWD, 2007)

In order to mitigate localized groundwater quality problems, WRD established a Safe Drinking Water Program to provide pumpers with wellhead treatment equipment to remove VOCs from the groundwater which has restored over 30,000 AFY of groundwater to beneficial use. Seawater intrusion is controlled in the basin through the Alamitos Gap Barrier Project run by the Los Angeles County Department of Public Works. (WRD, 2012)

West Coast Basin has high levels of TDS in the Torrance/Hawthorne area, which are outside the Subregion, that can be attributed to both sea-water intrusion and naturally occurring soil and geologic conditions in the region. Increases in groundwater TDS concentrations are primarily attributed to seawater intrusion, but are also a function of the recharge of storm and urban runoff, imported water, and incidental recharge. Seawater intrusion is attributed to the extraction of groundwater above natural replenishment levels. To reduce this, Los Angeles County operates and maintains two seawater intrusion barrier systems along the coast that utilize recycled water and imported water to reduce the seawater intrusion in coastal aquifers. Additionally, West Basin MWD and WRD operate desalting facilities to reduce these high TDS levels. (MWD, 2011)

Water quality in the Orange County Basin is managed by the Santa Ana Water Project Authority (SAWPA). In addition to quality issues (including high TDS) due to seawater intrusion, this basin's constituents of concern include: nitrate, VOCs, perchlorate, color, and NDMA. There are several groundwater treatment projects within the basin, though they don't fall within this Subregion. (MWD, 2011)

Near-Shore Ocean Water Quality

There are several indicators of coastal water quality. One of the most publicized is the annual report by Heal the Bay. The annual report evaluates California beaches from Memorial Day to Labor Day giving them a grade of A to F based on tests for bacterial pollution, which indicate how likely the water is to make swimmers sick. Statewide, 92% of California beaches earned A or B grades over the summer, the same as last year, according to the 2011 report. Additionally, constituents such as PCBs, metals, DDT and other pesticides, and PAHs have been found in coastal waters.

2.5 Environmental Resources

Due to the Subregion being highly urbanized, with its rivers engineered to protect homes and businesses from flooding, large areas of wetland have been lost. Despite their altered state, the Subregion's channels still serve as habitat for wildlife.

2.5.1 Habitats

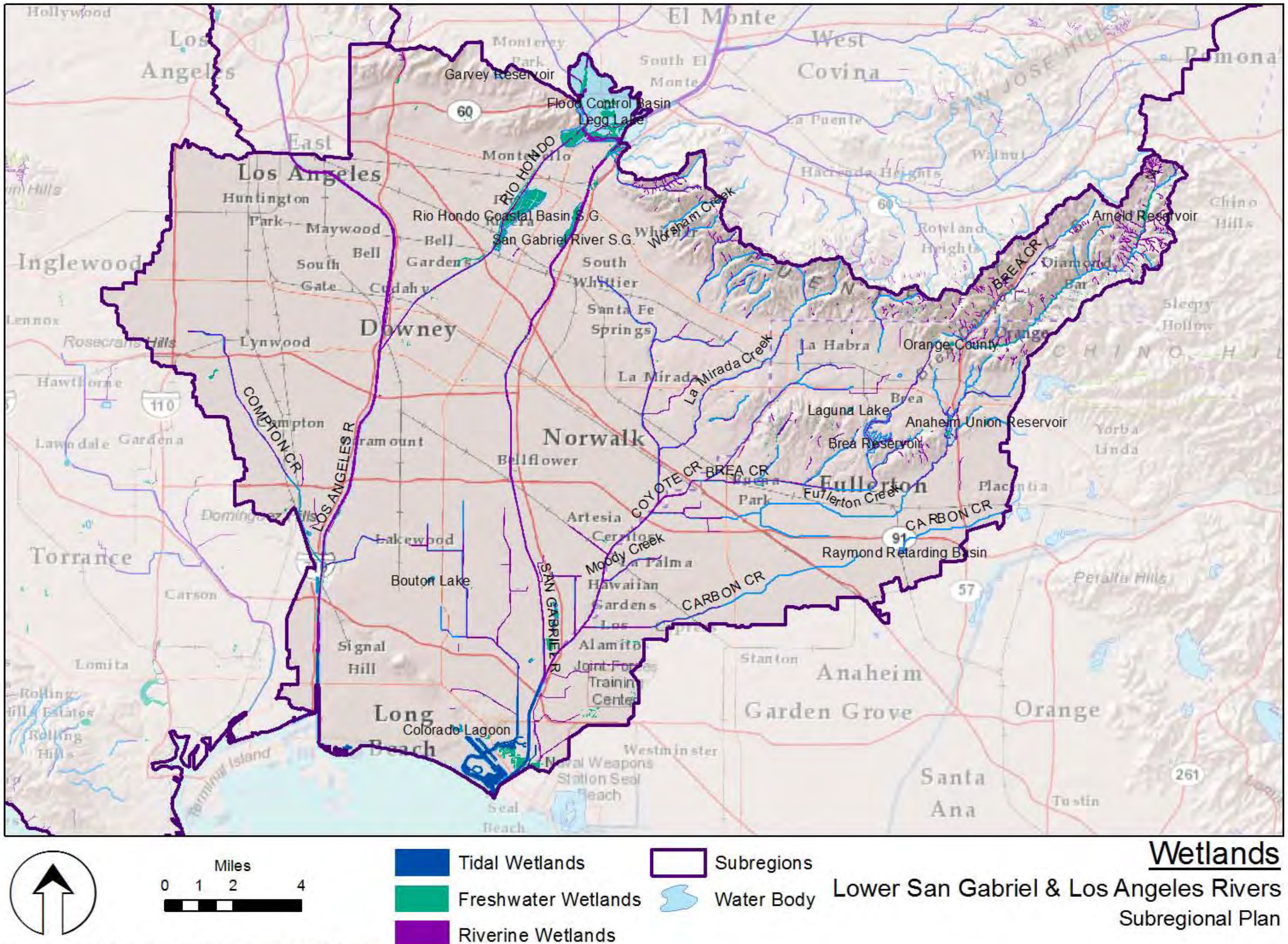
The lower watersheds of the Los Angeles and San Gabriel Rivers has been found by biological condition assessments to be more degraded, have fewer feeding strategies, and a dominance of organisms more tolerant of pollution than the upper watersheds.

Most of the Subregion's wetland habitats have been destroyed or converted to other habitat, and much of the remaining habitat has been degraded by poor water quality or other human activities. Despite this, some areas of wetland habitat still exist, as shown in Figure 9. Three types of wetland can be found in the Subregion including:

- **Tidal wetlands:** Wetland habitats that are inundated by tides, either seasonally or year-round. Marine harbors, a man-made habitat, are also considered tidal wetlands for the purposes of this Subregional Plan.
- **Freshwater wetlands:** Wetlands such as depressional marshes, lakes and ponds. For the purposes of this Subregional Plan, freshwater wetlands include man-made habitats such as flood control basins and ponds which may include areas of freshwater wetlands. It is important to note that although some spreading grounds and some stormwater Best Management Practices such as detention basins, swales and depressional areas, also provide ecosystem benefits, they belong under a separate category and should not be subject to the same protection criteria.
- **Riverine wetlands:** Streambed and wetlands associated with rivers and streams, including upper and lower riverine habitats and dry washes. Man-made habitats considered riverine wetlands include concrete-lined channels and soft-bottomed channels. Note that "riparian" is sometimes used to mean riverine wetlands.

In addition to wetland habitat, upland habitat is a valuable resource to ecosystems in the Subregion as it serves as a linkage between wetland habitats. Within the Subregion, these habitats include the Los Angeles Coastal Plain and the Puente Hills. A majority of the coastal plain has been urbanized, which inhibits linkage between wetlands. The Puente Hills, located in the north eastern portion of the Subregion, are by contrast mostly open space mostly free of development, but impacted by invasive species and water quality issues. The Puente Hills provide habitat linkages to the Cleveland National Forest. (RWQCB, 2011)

Figure 9: Existing Wetland Habitat



Sources: Cal-Atlas, Los Angeles County DPW & DRP,
National Wetlands Inventory
Date Modified: 2012-Jan-10

2.5.2 Significant Ecological Areas

Los Angeles County developed the concept of significant ecological areas in the 1970s in conjunction with adopting the original general plan for the County.

The Significant Ecological Area (SEA) Program is a component of the Los Angeles County Conservation/Open Space Element in their General Plan. This program is a resource identification tool that indicates the existence of important biological resources. SEAs are not preserves, but are areas where the County deems it important to facilitate a balance between limited development and resource conservation. Limited development activities are reviewed closely in these areas where site design is a key element in conserving fragile resources such as streams, oak woodlands, and threatened or endangered species and their habitat.

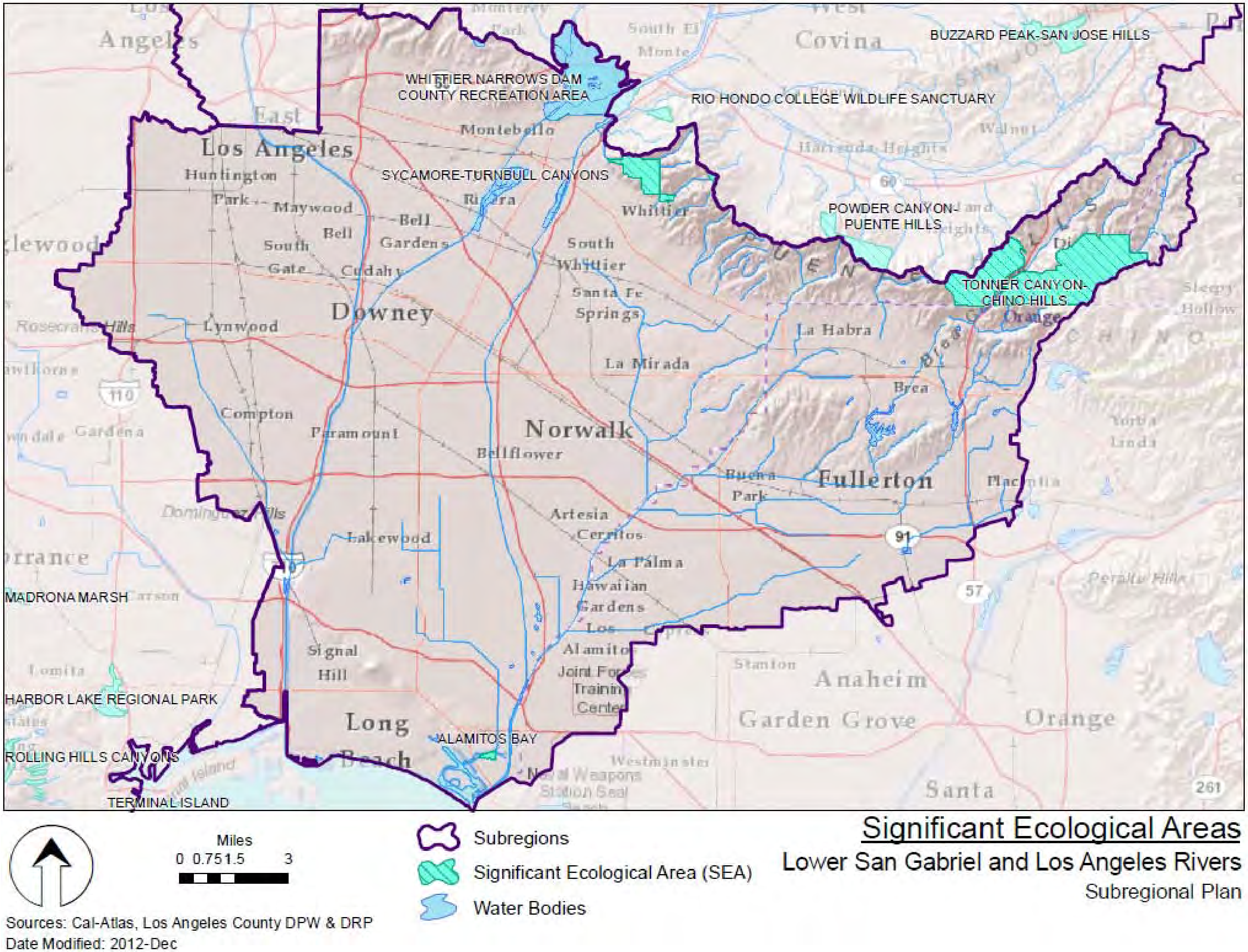
Proposed development is governed by SEA regulations. The regulations, currently under review, do not preclude development, but allow limited, controlled development that does not jeopardize the unique biotic diversity within the County. The SEA conditional use permit requires development activities be reviewed by the Significant Ecological Area Technical Advisory Committee (SEATAC). Additional information about regulatory requirements is available on the Los Angeles County website. (Los Angeles County Planning, 2012, http://planning.lacounty.gov/sea/faqs).

Within the Subregion, SEAs include:

- Whittier Narrows Dam County Recreation Area
- Sycamore-Turnbull Canyons
- Powder Canyon-Puente Hills
- Tonner Canyon-Chino Hills
- Alamitos Bay

These SEAs can be seen in Figure 10.

Figure 10: Significant Ecological Areas of the Lower San Gabriel and Los Angeles Subregion



2.5.3 Ecological Processes

The open space areas in the northern and-eastern portions of the Subregion known as the Puente-Chino Hills Wildlife Corridor is an unbroken zone of natural habitat extending nearly 31 miles from the Cleveland National Forest in Orange County to the West end of the Puente Hills above Whittier Narrows (LSA, 2007). This is a biologically rich area that provides critical habitat to endangered species and upland habitat, and connectivity between various habitat types.

The wetland and upland habitats found in the Subregion provide a number of ecosystem services including biodiversity support, flood damage reduction, carbon sequestration, pollutant reduction in runoff, consumptive use support (such as hunting and fishing), and non-consumptive use support (such as bird watching) (Brauman et al., 2007).

In addition to ecosystem services which may improve water supply and water quality, major ecological processes may impact water resources, and are listed below.

Fire

Fire is an integral and necessary part of the natural environment and plays a role in shaping the landscape, yet the management of most open space areas historically relied on fire suppression which has resulted in open spaces with varying fuel loads. Catastrophic wildfire events can denude hillsides which create opportunities for invasive plants and increase the potential for subsequent rains to result in debris flows that erode the landscape and can clog stream channels, damage structures, and injure inhabitants in the canyons and lower foothill areas. In recent years, more enlightened open space management practices have attempted to incorporate fire as a natural force for renewal while minimizing risks to lives and property.

Invasive Species

Invasive species in the Region have also substantially affected specific habitats and areas. Along with the rest of California, most of the Subregion’s native grasslands were long ago displaced by introduced species. The receptive climate has resulted in the widespread importation of plants from around the globe for landscaping. Some plant introductions have resulted in adverse impacts. In many undeveloped areas, non-native plants such as arundo (Arundo donax), tree of heaven (Alianthus altissima) tree tobacco (Nicotiana glauca), castor bean (Ricinus communis), salt cedar (Tamarix ramosissima) and cape ivy (Senecio mikanioides) are out-competing native. The removal of these particular species, which requires focused and repeated efforts, can provide substantial dividends in water savings and restored species diversity.

Slope Stability

The area in the northern portion of the Subregion is prone to slope stability problems such as landslides, mudslides, slumping and rockfalls. Shallow slope failure such as mudslides and slumping occur where graded cut and fill slopes have been inadequately constructed. Rockfalls are generally associated with seismic ground-shaking or rains washing out the ground containing large rocks and boulders.

2.5.4 Critical Habitat Areas

Critical habitat areas have been established by the endangered species act (ESA) to prevent the destruction or adverse modification of designated critical habitat of endangered and threatened plants and animals. The United States Fish and Wildlife Service (USFWS) through the Endangered Species Act (ESA) defines critical habitat as “a specific geographic area(s) that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection. Critical habitat may include an area that is not currently occupied by the species but that will be needed for its recovery.”

A critical habitat designation typically has no impact on property or developments that do not involve a Federal agency, such as a private landowner developing a property that involves no Federal funding or permit. However, when such funding or permit is needed, the impacts to critical habitat are considered during the consultation with the USFWS.

Within the Subregion, there is 9,350 acres of designated critical habitat defined for the Coast California gnatcatcher as shown in Figure 11.

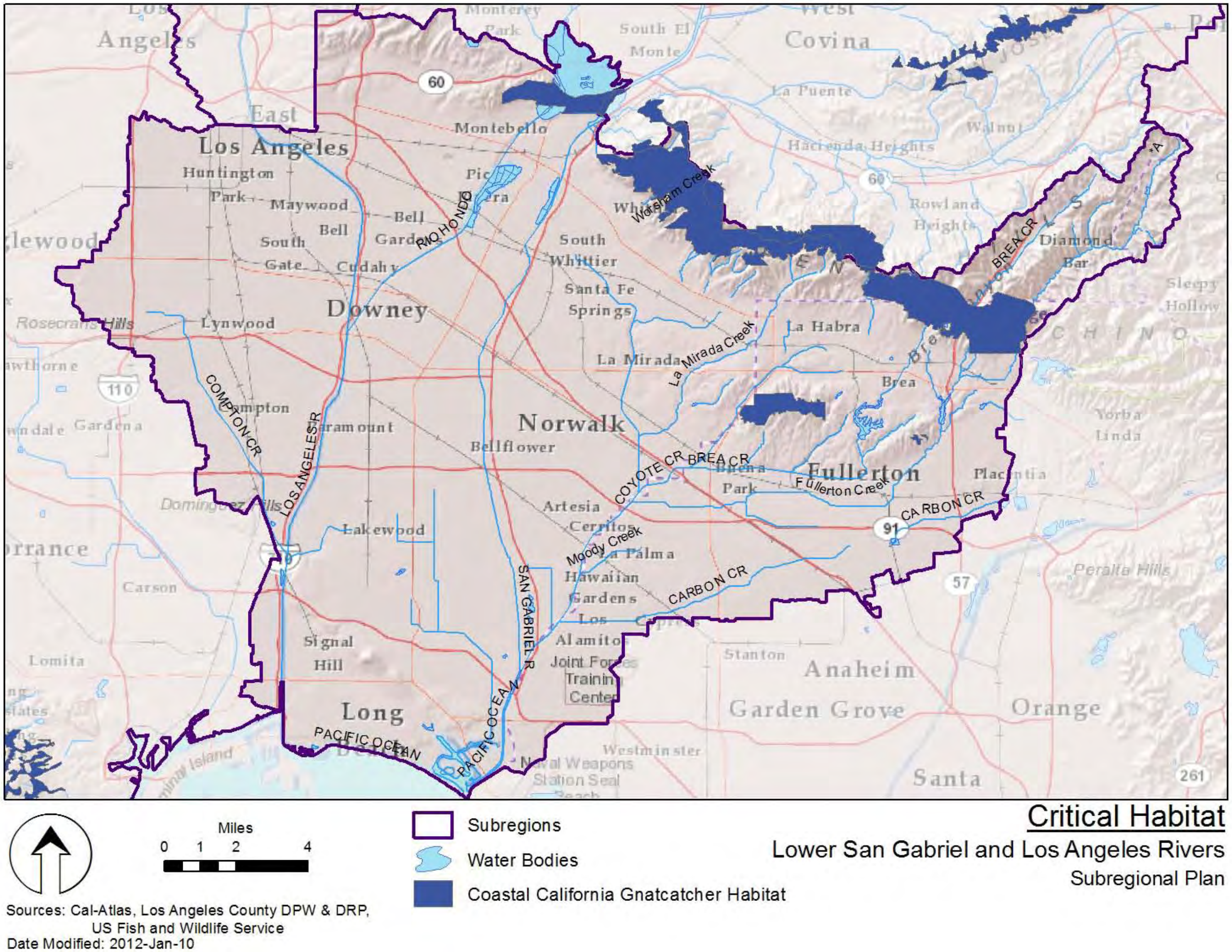
2.6 Open Space and Recreation

Open space and recreation area is limited in the Subregion due to its being highly developed. Parks, recreation and other open space in the Subregion can be seen in Figure 12. Acreage of recreation and open space lands within the Subregion is shown in Table 6. In total, of the Subregion's 231,000 acres, approximately 13,000 acres (or 6%) are open space or recreation land areas. A majority of the areas are developed urban park and recreation areas.

Table 6: Existing Recreation and Open Space Land Area

Land Type	Acres
Developed Urban Park and Recreation Area	7,000 acres
Open Space Lands	5,090 acres
Greenways	550 acres
Other/Miscellaneous	50 acres
Total Area in Subregion	**12,690 acres**

Figure 11: Critical Habitat Areas



2.7 Land Use

Land use within the Lower San Gabriel and Los Angeles River Subregion reflects the historic pattern of urbanization as most of the interior valley is occupied with residential, industrial, commercial, and institutional uses while most of the foothills and mountains are principally open space. The overall land use breakdown is shown in Table 7. The greatest areas of land use are residential, commercial and industrial.

Land use types may include the following:

- Residential: duplexes and triplexes, single family residential, apartments and condominiums, trailer parks, mobile home courts and subdivisions
- Commercial: parking facilities, colleges and universities, commercial recreation, correctional facilities, elementary/middle/high schools, fire stations, government offices, office use, hotels and motels, health care facilities, military air fields, military bases, military vacant area, strip development, police and sheriff stations, pre-schools and day care centers, shopping malls, religious facilities, retail centers, skyscrapers, special care facilities, and trade schools
- Industrial: chemical processing, metal processing, manufacturing and assembly, mineral extractions, motion picture, open storage, packing houses and grain elevators, petroleum refining and processing, research and development, wholesaling and warehousing
- Transportation and Communication: airports, bus terminals and yards, communication facilities, electrical power facilities, freeways and major roads, harbor facilities, improved flood waterways and structures, maintenance yards, mixed transportation and utility, natural gas and petroleum facilities, navigation aids, park and ride lots, railroads, solid and liquid waste disposal facilities, truck terminals, water storage and transfer facilities
- Open Space and Recreation: beach parks, cemeteries, golf courses, developed and undeveloped parks, parks and recreation, specimen gardens and arboreta, wildlife preserves and sanctuaries
- Other Vacant Land: Urban vacant, abandoned orchards and vineyards, vacant undifferentiated, and vacant land with limited improvements

Table 7: Land Use in the Lower San Gabriel and Los Angeles River Subregion

Land Use Type	Acres	Percentage
Vacant	31,674	11%
Residential	134,533	47%
Commercial	36,999	13%
Industrial	35,602	12%
Transportation, Utilities	19,935	7%
Open Space / Recreation	11,104	4%
Agriculture	3,208	1%
Mixed Urban	221	<1%
Water	11,148	4%
No Data	606	<1%
Total	**287,880**	**100%**

Figure 12: Parks, Recreation and Other Open Space

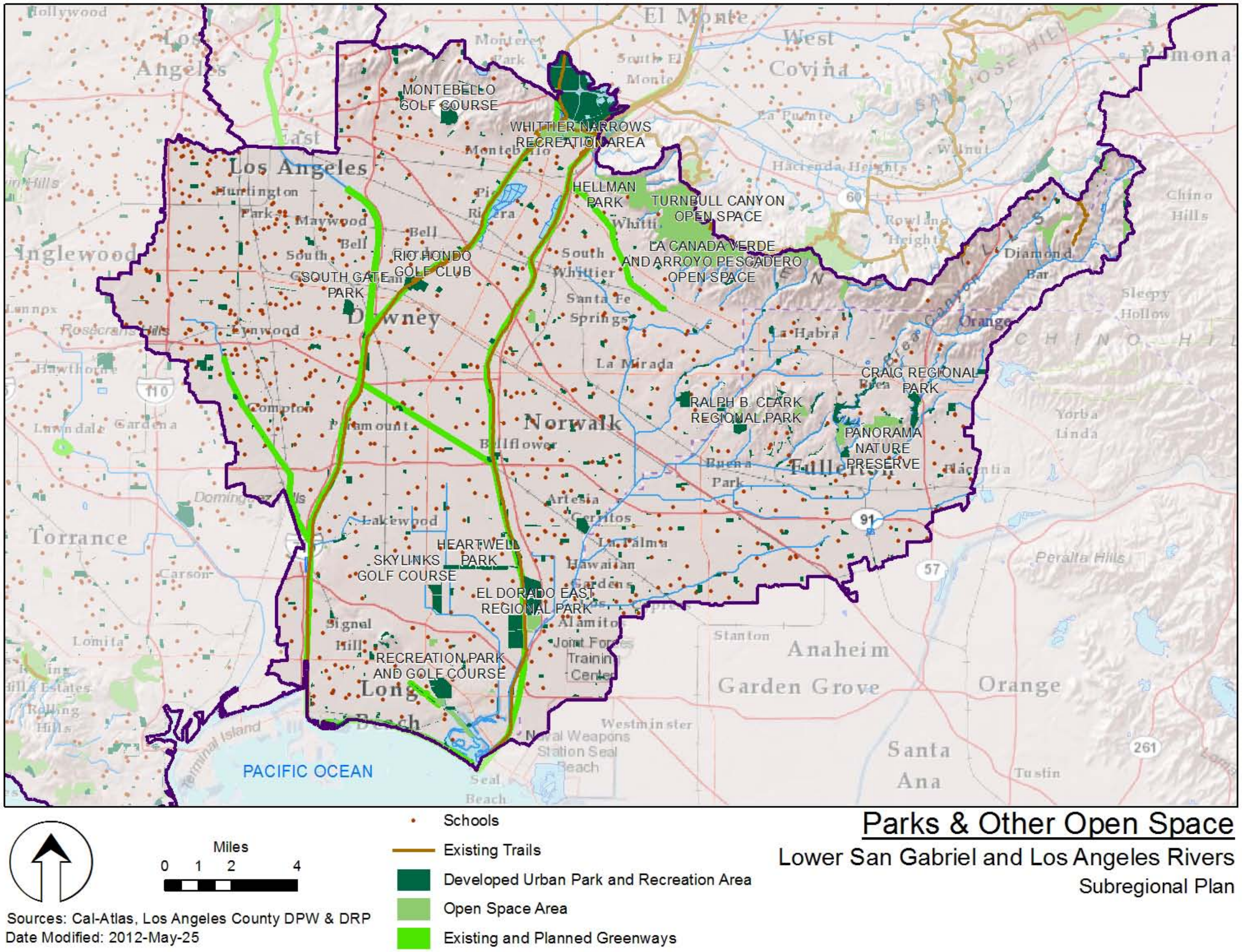
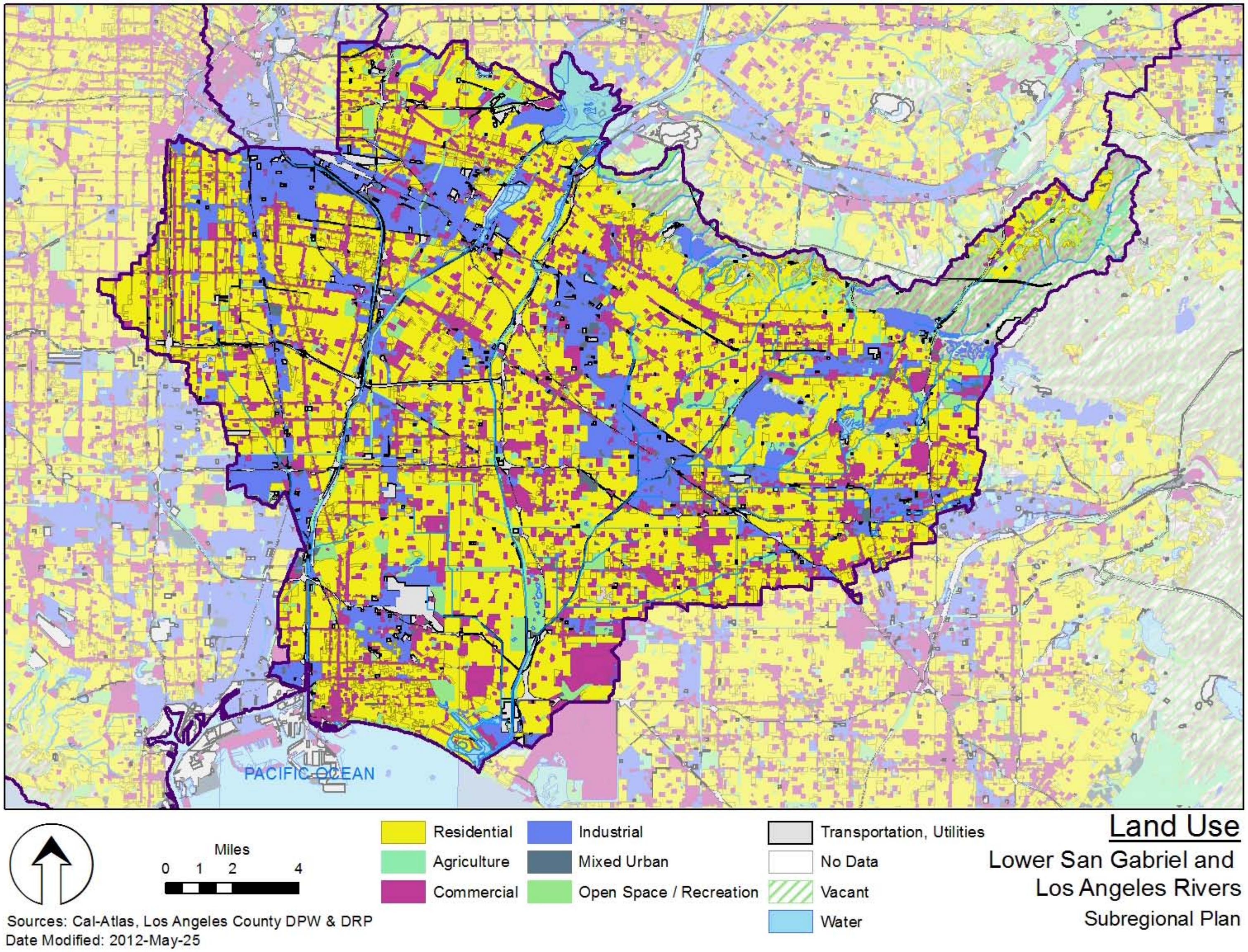


Figure 13: Land Use



3 Subregional Objectives and Targets

This section identifies the objectives for the Subregion and establishes quantified planning targets to the 2035 planning horizon that can be used to gauge success in meeting the objectives.

3.1 Objective and Target Development

The Greater Los Angeles County Regional IRWM Plan has developed regional goals, objectives, and targets. To assist the region in meeting these, objectives and targets have been developed for the Subregion. These objectives and targets are intended to help guide improvements to water supply, water quality, habitat, open space, and flood management to meet the Region's objectives and targets through Subregional planning.

Five objectives have been articulated, based on recent water resource planning documents. Workgroups composed of Stakeholders from within the Region were involved in establishing the Plan's objectives and targets. To establish quantifiable benchmarks for implementation of the plan, planning targets were defined based on much discussion within the regional workgroup. Objectives for five water resource areas were identified for the Subregion, which are discussed below (and summarized in Table 8).

3.2 Water Supply Objective and Targets

Optimizing local water supply resources is vital for the Subregion to reduce its reliance on imported water and improve reliability of local water supplies should imported water supplies be reduced or interrupted due to environmental and/or political reasons. The Subregion plans on achieving this objective by conserving water through water use efficiency measures, creating an additional ability to pump groundwater, increasing the indirect potable reuse and non-potable reuse of recycled water, increasing ocean desalination, and increasing the infiltration, capture, and use of stormwater. In total, water supply targets will yield an additional 66,000 AFY of local supply for direct use, and 45,000 AFY of local supply for groundwater recharge.

To develop supply targets, water supply planning documents for agencies whose service areas cover a majority of the Subregion were examined for potential supply projects, and planned increases in supply between the years 2010 and 2035. The water supply targets for each Subregion were discussed in the *Water Supply Targets TM*, included as Appendix B.

3.3 Water Quality Objective and Targets

Improving the quality of urban and stormwater runoff will reduce or eliminate impairment of rivers, beaches, and other water bodies within and downstream of the Subregion. Improving the quality of urban and stormwater runoff would also make these local water supplies available for groundwater recharge. Additionally, the Subregion will continue to improve groundwater and protect drinking water quality to ensure a reliable water supply.

The Subregion plans on achieving these objectives by increasing the capacity to capture and treat runoff and prevent certain dry weather flows (see table above). The water quality target was determined by setting a goal of capturing ¾" of storms over the Subregion. The Subregion's target is to develop 14,400 AF of new stormwater capture capacity (or equivalent). An emphasis will be given to the higher priority catchments which will be determined by project-specific characteristics provided by the project proponent, including land use in the proposed project area, runoff and downstream impairments. It will be possible for the stormwater-related supply targets to overlap the surface water quality target.

The assumptions and calculations used to determine this target and catchment prioritization can be found in the *Surface Water Quality Objectives and Targets TM* attached as Appendix C.

3.4 Habitat Objective and Targets

Protecting, restoring, and enhancing the Subregion's native habitats is vital to preserving areas that will contribute to the natural recharge of precipitation and improve downstream water quality. Additionally, the protection, restoration, and enhancement of upland habitat, wetland/marsh habitat, riparian habitat and buffer areas will help restore natural ecosystem processes and preserve long-term species diversity. Subregional targets for habitat were not developed, but Regional habitat target development is discussed in the *Open Space for Habitat and Recreation Plan* included as Appendix D.

3.5 Open Space and Recreation Objective and Targets

Open space and recreation areas provide space for native vegetation to create habitat and passive recreational opportunities for the community. In addition, open space and recreation areas may preserve or expand the area available for natural groundwater recharge (though only in the forebay areas), improve surface water quality to the extent that these open spaces filter, retain, or detain stormwater runoff, and provide opportunities to reuse treated runoff for irrigation. Subregional targets for open space and recreation were not developed, but Regional open space and recreation target development is discussed in the *Open Space for Habitat and Recreation Plan* included as Appendix D.

3.6 Flood Management Objective and Targets

Improved integrated flood management systems can help reduce the risk of flooding, and protect lives and property. The Subregion plans on meeting this objective by reducing 4,090 acres of local unmet drainage needs. The local unmet drainage target was determined by looking at Special Flood Hazard Areas (SFHAs), also known as flood plains, as defined by FEMA, compared to land uses and the presence of structures. Detailed assumptions and calculations used to develop the Subregion's flood target can be found in the *Flood Management Objectives and Targets TM* attached as Appendix E.

Table 8: Subregion Objectives and Planning Targets

Objectives		Regional Planning Targets
Improve Water Supply		
Optimize local water resources to reduce the Subregion's reliance on imported water.	Water Use Efficiency	Conserve 19,000 AFY of water by 2035 through water use efficiency and conservation measures.
	Ground Water	Create ability to pump an additional 17,000 AFY using a combination of treatment, recharge, and storage access.
	Recycled Water	Increase indirect potable reuse of recycled water by 24,000 AFY. Increase non-potable reuse of recycled water by 18,000 AFY.
	Ocean Desalination	Increase ocean desalination by 5,000 AFY.
	Stormwater	Increase capture and use of stormwater runoff by 7,000 AFY that is currently lost to the ocean. Increase stormwater infiltration by 21,000 AFY.
Improve Water Quality		
Improve water quality of receiving water through enhanced stormwater capture.	Runoff (Wet Weather Flows)	Develop[3] 14,400 AF of new stormwater capture capacity (or equivalent) spatially dispersed to reduce region-wide pollutant loads, emphasizing higher priority areas[4].
Enhance Habitat		
Protect, restore, and enhance natural processes and habitats.	Habitat targets were not developed to the subregional level – only to the regional level.	
Enhance Open Space and Recreation		
Increase watershed friendly recreational space for all communities.	Open space and recreation targets were not developed to the subregional level – only to the regional level.	
Improve Flood Management		
Reduce flood risk in flood prone areas by either increasing protection or decreasing needs using integrated flood management approaches.	Sediment Management and Integrated Flood Planning	Reduce flood risk in 4,090 acres of flood prone areas by either increasing protection or decreasing needs using integrated flood management approaches.

[3] Stormwater capture capacity assumes (1) providing storage volume equivalent to runoff from the 0.75", 24-hour design storm event, (2) designing BMPs to retain the captured volume to the maximum extent practicable via infiltration, evapotranspiration, or harvest and use, and (3) designing BMPs to provide effective treatment to address pollutants of concern for the remaining portion of the captured volume that is not retained. Projects deviating from these specifications may be demonstrated to be equivalent based on comparison of average annual volume captured and/or average annual pollutant load reduction for pollutants of concern. Pollutants of concern are defined as those pollutants expected to be generated from the land uses within the subwatershed and for which the downstream water bodies are impaired (TMDL, 303(d) listed).

[4] High priority areas will be determined based on project-specific characteristics such as project area land use, precipitation, imperviousness and downstream impairments.

4 Partnership and Multi-benefit Opportunities

Implementation of projects is the vehicle to attaining the objectives and planning targets discussed in Section 3. Integration and collaboration can help these projects achieve synergies and increase their cost-effectiveness in meeting multiple objectives. The GLAC IRWM Region provides a wealth of potential multi-benefit project opportunities for partnership projects including:

- **Local Supply Development:** Alternative supply development such as distributed stormwater capture projects are often too costly for a water supply agency to construct on their own for water supply purposes only. The near-term unit cost can be well in excess of the cost of imported water. However, partnerships often help to share the costs, thus providing opportunities for more complex, multi-benefit projects (such as water quality improvement) that otherwise might not be accomplished.
- **Improving Stormwater Quality:** In preparing this update of the IRWM Plan, a methodology to identify priority drainage areas based on their ability to improve water quality for the coastal and terrestrial waters was developed. Integrated projects that can provide water quality improvements can be cited relative to that prioritization to achieve the highest benefits.
- **Integrated Flood Management:** Earlier studies, such as the Sun Valley Watershed Management Plan (2004), demonstrated the potential for similar cost-effective synergies between flood control, stormwater quality management, water supply, parks creation and habitat opportunities. Flood control benefits usually achieved through significant traditional construction projects can sometimes be accomplished with alternative multi-benefit projects.
- **Open Space for Habitat and Recreation:** When habitat is targeted for restoration, there are often opportunities for cost-effective implementation of flood control, stormwater management and passive recreation (such as walking and biking trails) as well.

These benefit synergies and cost effectiveness outcomes can best be attained when the unique physical, demographic and agency service area attributes of the region are considered. The GLAC IRWMP has developed tools to assist the GLAC IRWM Region in identifying areas and partnerships conducive to both inter-subregional and intra-subregional integrated project development. This section discusses these tools as well as some preliminary analyses on the South Bay Subregion’s potential partnerships and integrated project opportunities.

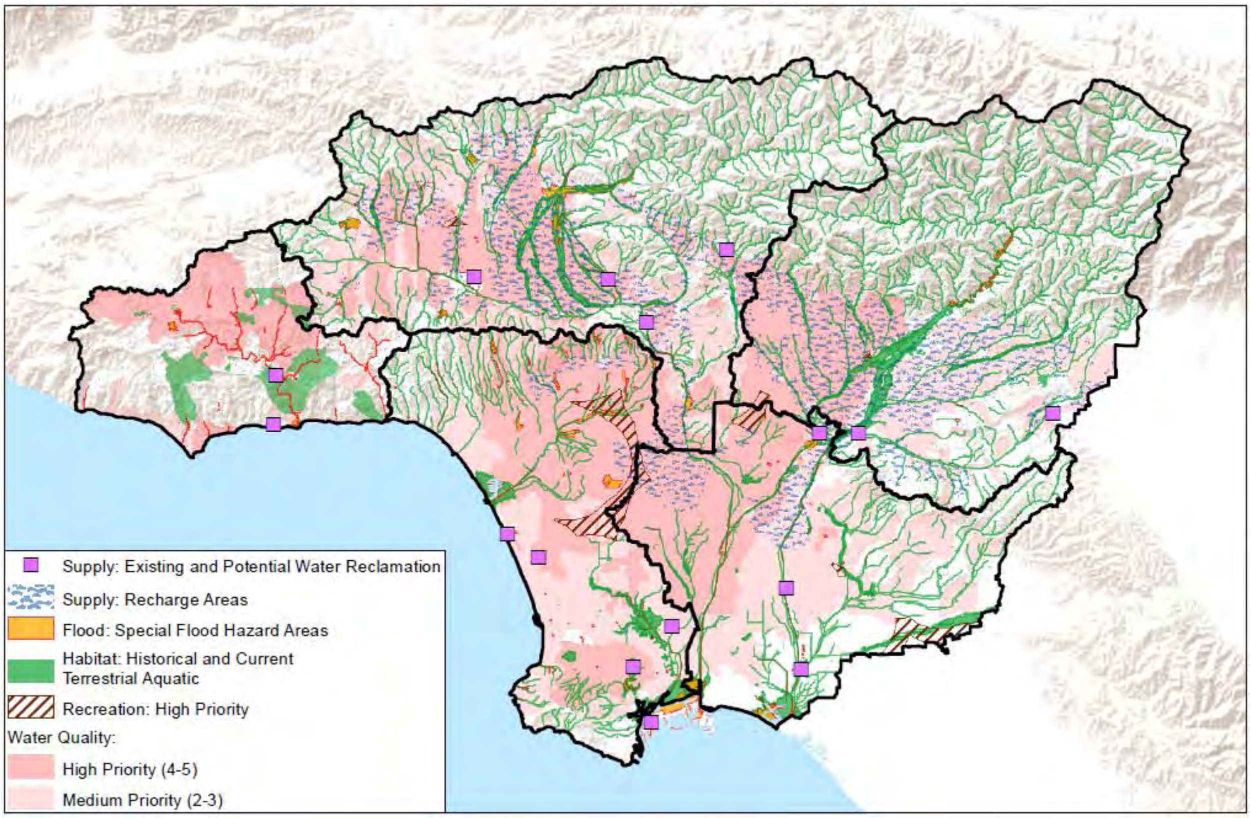
4.1 GLAC IRWMP Integration Process and Tools

As part of the objectives and targets update process, the GLAC Region compiled and developed several geo-referenced data layers to assist in spatially identifying priorities and potential opportunities to achieve water supply, water quality, habitat, recreation and flood management benefits. These data layers were initially used individually to determine the objectives and planning targets for each water management area. However, these datasets can also be overlaid to visually highlight areas with the greatest potential to provide multiple benefits. The resulting Potential Benefits Geodatabase (Geodatabase) can also align these areas relative to other layers containing agency service areas and jurisdictions – allowing for project proponents and partners to be identified.

Potential Benefits Geodatabase

The GLAC IRWMP Potential Benefits Geodatabase is a dynamic tool that should be updated as new data is made available in order to maintain its relevance in the IRWM planning context. However, in order to provide an analysis of potential integration and partnership opportunities for the 2013 GLAC IRWM Plan, current data layers were overlaid and analyzed. The key layers used are shown in Figure 14 and described in Table 11. It should be noted that these datasets may not be complete or in need of further refinement and therefore will be updated on an as-needed basis – which is part of the dynamic process previously described. Therefore, the Geo-database should only be used as an initial step in identifying multi-benefit potential and by no means used to invalidate the potential for achieving benefits in other areas.

Figure 14: GLAC Region Potential Benefits Geodatabase Layers



Using the Geodatabase

The Geodatabase is a dynamic visual tool. The data layers and maps shown in this Section are only some of a multitude of ways to package and view the datasets to help with the integration process. It is important to note that not all data that could be useful in identifying integration and partnership potential for the region is easily viewed spatially in this format. Therefore the Geodatabase should only be used as one of several potential integration tools or methods.

The Geodatabase can also be used to identify the potential for further integration between existing projects included in an IRWMP. Currently the GLAC Region has web-based project database (OPTI) that geo-references all projects included in the IRWM. As part of the 2013 Plan Update, this dataset of projects will eventually be updated and prioritized. This resulting project dataset could be included as a layer in the Geodatabase or conversely, the existing Geodatabase layers could be uploaded to OPTI for public viewing and made available to OPTI users. In the future, additional layers, such as groundwater quality and general plan areas, can be added to the Geodatabase to enhance the ability of project proponents to identify integration opportunities. Either way, by overlaying the current projects on top of the potential benefit layers, additional benefits could be added to existing project or linked to other projects and proponents through those benefits.

Table 9: Potential Benefit Geodatabase Layers

Data Layer	Description
Supply: Recharge Areas[1]	Shows areas where soils suitable for recharging are above supply aquifer recharge zones. Thereby indicating that water infiltrating in these areas has the potential to increase groundwater supplies.
Supply: Existing and Potential Water Reclamation[2]	Shows locations of existing wastewater and water reclamation plants.
Flood: Special Flood Hazard Areas[3]	Shows some of the areas that would benefit from increased drainage to alleviate flooding potential.
Habitat: Historical and Current Terrestrial Aquatic[4]	Shows the combined current and historical habitat areas that would indicate the potential for aquatic habitat protection, enhancement, or restoration benefits to be derived. (Note: North Santa Monica Bay Subregion did not have similar data so it shows Significant Ecological Areas instead[5].)
Recreation: High Priority[6]	Shows areas that have the greatest need for open space recreation given the distance from current open space recreation sites.
Water Quality: Medium and High Priority[7]	Shows watershed areas with medium and high priority and therefore relative potential to improve surface water quality.

[1] Created using Los Angeles County's groundwater basins shapefile overlaid with soils and known forebays shapefiles

[2] Created by RMC Water and Environment for the Los Angeles Department of Water and Power's Recycled Water Master Planning program to show sources of wastewater that could be made available for recycled water use.

[3] Created by Federal Emergency Management Agency to define areas at high risk for flooding (subject to inundation by the 1% annual chance flood event) and where national floodplain management regulations must be enforced.

[4] From *Regional restoration goals for wetland resources in the Greater Los Angeles Drainage Area: A landscape-level comparison of recent historic and current conditions using GIS* (C. Rairdan, 1998) and additional current terrestrial aquatic habitat is based on the extent of current habitat derived from the National Wetlands Inventory.

[5] Significant Ecological Areas are those areas defined by Los Angeles County as having ecologically important land and water systems that support valuable habitat for plants and animals.

[6] Created for the *GLAC IRWM Open Space for Habitat and Recreation Plan (2012)*, and shows where there is less than one acre of park or recreation area per one thousand residents.

[7] Created for the *GLAC IRWM Surface Water Quality Targets TM (2012)*, which ranked catchments based on TMDLs, 303(d) listings and catchments that drain into Areas of Special Biological Significance (ASBS).

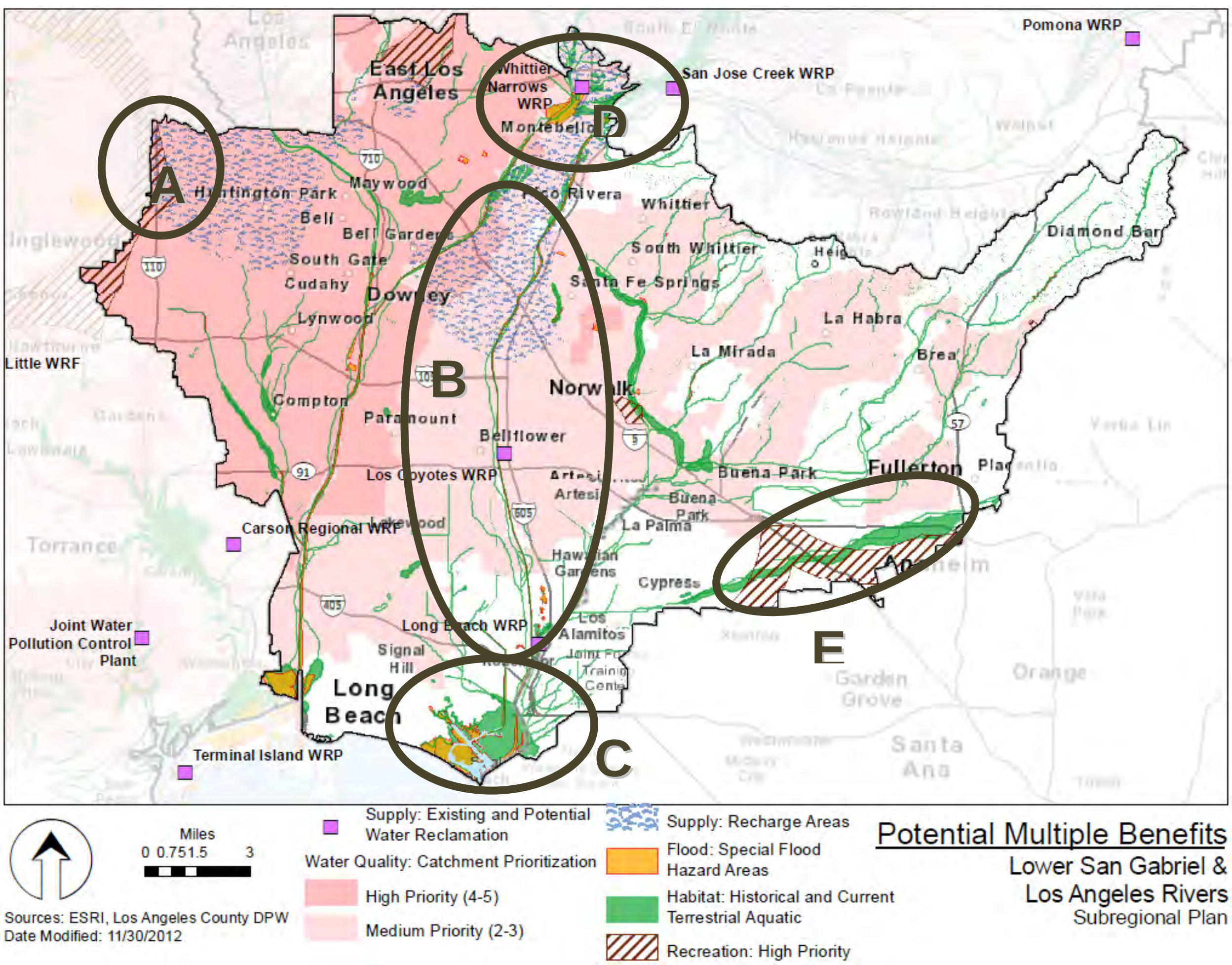
4.2 Integration Opportunities in Lower Los Angeles and San Gabriel Subregion

Planning for the GLAC Region is primarily done on a subregional level, given that each subregion has a unique set of physical characteristics and stakeholders that create opportunities for project identification and collaboration. Therefore, the Geodatabase layers are more useful when examined and discussed on a subregional scale. Figure 15 focuses on the Lower San Gabriel and Los Angeles River Subregion and highlights just a few unique areas within the subregion that have potential for generating multiple benefit projects. These areas described here are meant to provide examples of potential multiple benefits areas and are not meant to be a comprehensive inventory of opportunities. As subregions move forward to identify potential projects, it will be necessary to examine localized site characteristics (such as land uses) to confirm that it will be possible to meet the potential benefits discussed below.

- There is a relatively high need for recreational open space in three different areas.
- There are critical recharge areas for the Central Basin in the upper Subregion (where the hydrolgeology is the most favorable for recharge) while the majority of pumping is done in the southern portion of the basin.
- The western portion of the Subregion has high priority drainage areas for water quality improvements that also overlap some of the recharge areas.
- There are coastal areas that could provide both flood control and habitat benefits.
- There are several sources of recycled water supply that could be further utilized as local supply, though it should be noted that this could be limited by contractual agreements for existing and future recycled water supplies.

The following sections highlight a few areas in the Subregion where integration and partnership opportunities could be found based upon the Geodatabase layers and multiple benefit analysis performed.

Figure 15: Lower Los Angeles & San Gabriel Subregion Potential Multiple-Benefits



A: South Central Los Angeles Area Recreation, Recharge, Stormwater Quality Benefits

There are areas with the potential for groundwater recharge in the northwestern area of the subwatershed (South Central Los Angeles) overlying the Central Basin. Additionally, there are park-poor areas which also overlay high priority stormwater management catch basins. These recharge areas predominately lie within high priority areas for water quality improvements. Given that this area is heavily urbanized, it would be well suited for decentralized stormwater capture and use projects as well as infiltration BMP's that could achieve water quality and groundwater water supply benefits. Because it is park-poor, finding locations that can be converted from industrial use to parkland with infiltration for stormwater (where industrial areas border residential areas) shows promise. Care would need to be taken in the heavily industrialized areas that soils are not contaminated before infiltration is encouraged here.

Partnerships between WRD, Central Basin MWD and the City of Los Angeles, and cities such as Vernon and Huntington Park as well as unincorporated Los Angeles County could result in integrated projects.

B. Central Basin Recharge and Pumping

The majority of pumping demand needs are in the southern more heavily urbanized portion of the Subregion, however replenishment is conducted at the northern forebay recharge facilities. Although there are both underutilized recycled water and stormwater supplies available, the ability to infiltrate more supply is limited by the rapidity at which supplies can be pumped to ensure that mounding does not become an issue. Pumping in closer proximity to the recharge could prevent mounding. Partnership projects that would seek to create a recharge and pumping balance could be explored between the southern Central Basin pumpers and the WRD.

C. Lower San Gabriel River Watershed and Seal Beach Habitat Improvements and Flood

The mouth of the San Gabriel River provides opportunities for integrated project development that could result in achieving habitat and flood control benefits. Integrated flood management projects would become even more beneficial as a way to adapt to sea level rise as a result of climate change. Partnership opportunities exist between LACFCD, the City of Long Beach and the City of Seal Beach.

D. Intra-Regional Montebello Forebay Recharge and Open Space

The San Gabriel River Valley narrows in the Montebello area which also provides the dividing line between the Upper San Gabriel and Rio Hondo Subregion and the Lower Los Angeles and San Gabriel Subregion. This area is also the main recharge forebay for the Central Basin where several spreading ground facilities are located. Although somewhat urbanized relative to other densities in the Region, this area also provides a great deal of open space given those facilities. Preserving and further enhancing the spreading capacity is critical to meeting supply goals, as well as water quality goals. Increased stormwater infiltration will lessen the amount of contaminants able to be transported further downstream. If there are projects that could also incorporate both habitat and recreation elements without compromising these primary functions, there is the potential for achieving further integrated and beneficial results.

Recycled water supplies in this area could be further maximized for increased recharge and supply benefits. Partnerships with WRD, LACSD, LACFCD, Central Basin MWD, Central Basin pumpers and overlying cities could also benefit from above ground open space.

E. Anaheim and Fullerton Recreational and Habitat Open Space

There is a significant band of priority area for recreational open space in this swath of Orange County overlapping a wetlands and habitat area. Water supply or quality projects in this area could be developed to include both recreation ad habitat components to achieve those benefits. Partnership opportunities exist for the Mountains and Rivers Conservancy or similar conservancies in Orange County along with the Cities of Anaheim and Fullerton.

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Appendix A - Regional Imported Water Information

State Water Project

The SWP is a system of reservoirs, pumps and aqueducts that carries water from Lake Oroville and other facilities north of Sacramento to the Sacramento-San Joaquin Delta and then transports that water to central and southern California. Environmental concerns in the Sacramento-San Joaquin Delta have limited the volume of water that can be pumped from the SWP. The potential impact of further declines in ecological indicators in the Bay-Delta system on SWP water deliveries is unclear. Uncertainty about the long-term stability of the levee system surrounding the Delta system raises concerns about the ability to transfer water via the Bay-Delta to the SWP.

The MWD contract with the Department of Water Resources (DWR), operator of the SWP, is for 1,911,500 acre-feet/year. However, MWD projects a minimum dry year supply from the SWP of 370,000 acre-feet/year, and average annual deliveries of 1.4 million acre-feet/ year. These amounts do not include water which may become available from transfer and storage programs, or Delta improvements.

MWD began receiving water from the SWP in 1972. The infrastructure built for the project has become an important water management tool for moving not only annual deliveries from the SWP but also transfer water from other entities. MWD, among others, has agreements in place to store water at a number of groundwater basins along the aqueduct, primarily in Kern County. When needed, the project facilities can be used to stored move water to southern California.

Colorado River Aqueduct

California water agencies are entitled to 4.4 million acre-feet/year of Colorado River water. Of this amount, the first three priorities totaling 3.85 million acre-feet/year are assigned in aggregate to the agricultural agencies along the river. MWD's fourth priority entitlement is 550,000 acre-feet per year. Until a few years ago MWD routinely had access to 1.2 million acre-feet/year because Arizona and Nevada had not been using their full entitlement and the Colorado River flow was often adequate enough to yield surplus water to MWD. According to its 2010 Regional UWMP, MWD intends to obtain a full 1.2 million acre-feet/year when possible through water management programs with agricultural and other holders. MWD delivers the available water via the 242-mile Colorado River Aqueduct, completed in 1941, which has a capacity of 1.2 million acre-feet per year.

The Quantification Settlement Agreement (QSA), executed in 2003, affirms the state's right to 4.4 million acre-feet per year, though water allotments to California from the Colorado River could be reduced during future droughts along the Colorado River watershed as other states increase their diversions in accord with their authorized entitlements. California's Colorado River Water Use Plan and the QSA provide the numeric baseline to measure conservation and transfer water programs (such as the lining of existing earthen canals) thus enabling the shifting of some water from agricultural use to urban use. Since the signing of the QSA, water conservation measures have been implemented including the agriculture-to-urban transfer of conserved water from Imperial Valley to San Diego, agricultural land fallowing with Palo Verde, and the lining of the All-American Canal.

Appendix B - Water Supply Targets TM

Appendix C - Water Quality Targets TM

Appendix D - Open Space for Habitat and Recreation Plan

Appendix E - Flood Targets TM