CHAPTER 3

Watershed Identification
(SWRP Guidelines Section VI.A)

SWRP Checklist Guidelines

- ☒ Plan identifies watershed and subwatershed(s) for storm water resource planning
- ☒ Plan is developed on a watershed basis, using boundaries as delineated by USGS, CalWater, USGS Hydrologic Unit designations, or an applicable integrated regional water management group, and includes a description and boundary map of each watershed and sub-watershed.
- ☒ Plan includes an explanation of why the watershed(s) and sub-watershed(s) are appropriate for storm water management with a multiple-benefit watershed approach.
- ☒ Plan describes the internal boundaries within the watershed (boundaries of municipalities; service areas of individual water, wastewater, and land use agencies, including those not involved in the Plan; groundwater basin boundaries, etc.; preferably provided in a geographic information system shape file).
- ☒ Plan describes the water quality priorities within the watershed based on, at a minimum, applicable TMDLs and consideration of water body-pollutant combinations listed on the State's Clean Water Act Section 303(d) list of water quality limited segments (a.k.a impaired waters list).
- ☒ Plan describes the general quality and identification of surface and ground water resources within the watershed (preferably provided in a geographic information system shape file).
- ☒ Plan describes the local entity or entities that provide potable water supplies and the estimated volume of potable water provided by the water suppliers.
- ☒ Plan includes map(s) showing location of native habitats, creeks, lakes, rivers, parks, and other natural or open space within the sub-watershed boundaries.
- ☒ Plan identifies (quantitative, if possible) the natural watershed processes that occur within the sub-watershed and a description of how those processes have been disrupted.

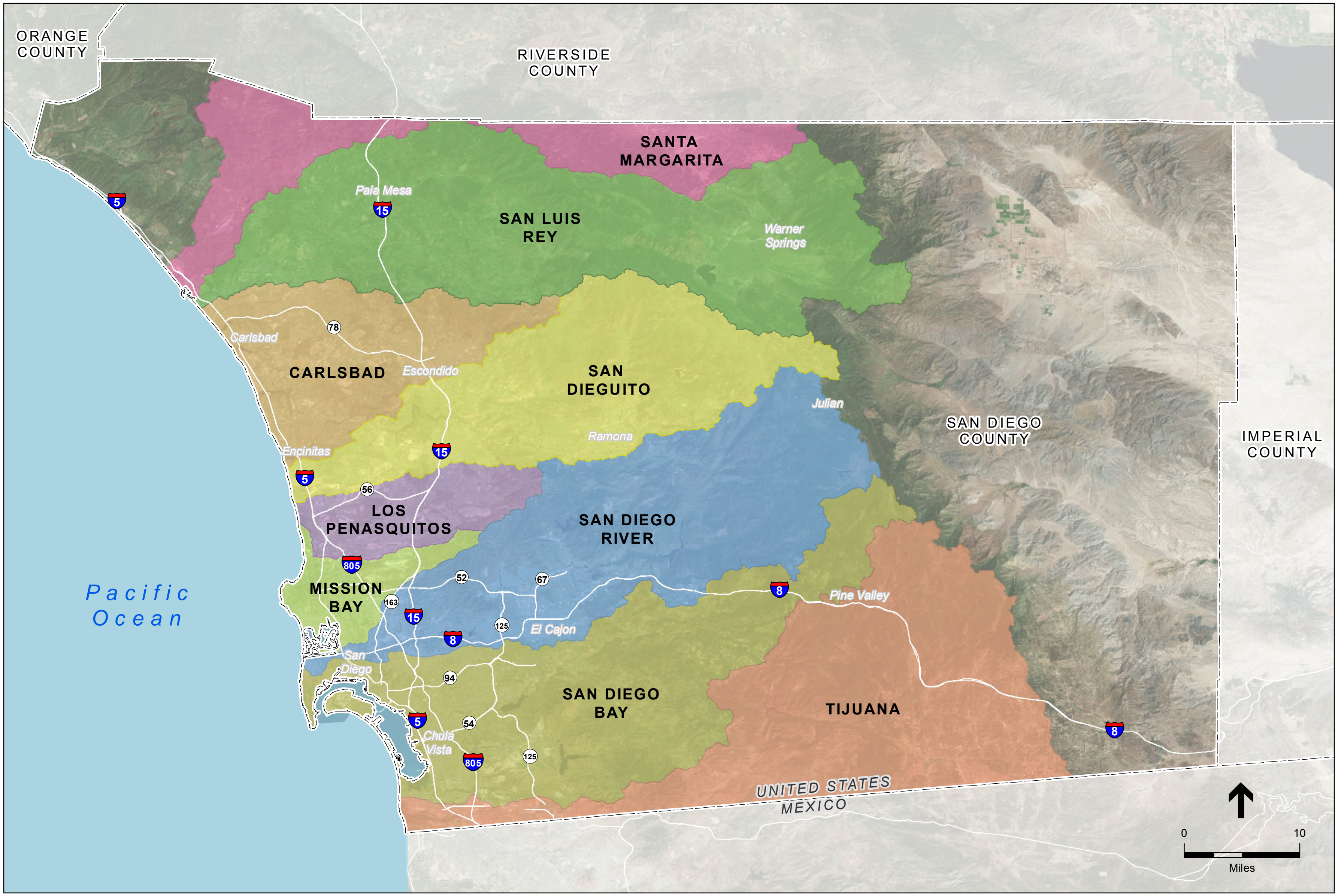
The SWRP addresses nine WMAs within San Diego County (Figure 3-1). The WMAs are defined by the Municipal Storm Water Permit Order 2001-01. Table 3-1 shows the HUs and hydrologic areas (HAs) that comprise each watershed management area. The San Juan WMA was not included in this document since the portion of the watershed in San Diego County is within federal jurisdiction at Camp Pendleton.

As described in Chapter 3.2 of the IRWM Plan, the WMAs are appropriate for watershed management because they take into account RWQCB jurisdictions, political jurisdictions, physical and hydrologic characteristics, the imported water supply service area, and wastewater service considerations. Each of the watershed management areas flows from higher elevations in the east, to coastal waters (e.g., lagoons, estuaries, bays) in the west. They all see seasonal surface flow from rain events in the winter and spring months, and are much drier in the summer, with irrigation and urban and agricultural runoff dominating the surface flows.

This section provides the current WMA conditions and priorities based on the current WQIPs as background to the rest of this document. As water quality conditions and priorities may change in the future, including updates to the State 303(d) list, the WQIPs will be updated in accordance with the MS4 Permit. As future listing in the SWRP requires identification of a project's prioritization in the most current WQIP for project with water quality benefits, updates to priority water quality conditions and goals will be reflected in SWRP listed projects.

TABLE 3-1
WATERSHED MANAGEMENT AREAS

Hydrologic Unit	Hydrologic Areas	Watershed Management Area
Santa Margarita (902.00)	Ysidora (902.10) De Luz (902.20) Pechanga (902.50) Aguanga (902.80) Oakgrove (902.90)	Santa Margarita River
San Luis Rey (903.00)	Lower San Luis Rey (903.10) Monserate (903.20) Warner Valley (903.30)	San Luis Rey River
Carlsbad (904.00)	Loma Alta (904.10) Buena Vista Creek (904.20) Agua Hedionda (904.30) Encinas (904.40) San Marcos (904.50) Escondido Creek (904.60)	Carlsbad
San Dieguito (905.00)	Solana Beach (905.10) Hodges (905.20) San Pasqual (905.30) Santa Maria Valley (905.40) Santa Ysabel (905.50)	San Dieguito River
Peñasquitos (906.00)	Miramar Reservoir (906.10) Poway (906.20) Scripps (906.30)	Los Peñasquitos
Peñasquitos (906.00)	Miramar (906.40) Tecolote (906.50) Vacation Isle (906.60) Fiesta Island (906.70) Mission Bay (906.80)	Mission Bay
San Diego (907.00)	Lower San Diego (907.10) San Vicente (907.20) El Capitan (907.30) Boulder Creek (907.40)	San Diego River
Pueblo San Diego (908.00)	Point Loma (908.10) San Diego Mesa (908.20) National City (908.30)	San Diego Bay
Sweetwater (909.00)	Lower Sweetwater (909.10) Middle Sweetwater (909.20) Upper Sweetwater (909.30)	San Diego Bay
Otay (910.00)	Coronado (910.10) Otay (910.20) Dulzura (910.30)	San Diego Bay
Tijuana (911.00)	Tijuana Valley (911.10) Potrero (911.20) Barrett Lake (911.30) Monument (911.40) Morena (911.50) Cottonwood (911.60) Cameron (911.70) Campo (911.80)	Tijuana River



SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

Figure 3-1
San Diego County Watershed Management Areas

3.1 Santa Margarita River

3.1.1 Santa Margarita River Watershed Management Area Description

The Santa Margarita River WMA (HU 902.00) is the largest WMA assessed in the SWRP[1], encompassing 494,396 acres, with approximately 75 percent of the watershed lying in Riverside County and the remaining 25 percent in the northern portion of San Diego County. The County of San Diego is the sole San Diego Region Copermittee with land jurisdiction in the Santa Margarita River WMA (Figure 3-2).

The WMA extends from the Palomar Range in the northeast, to the Santa Margarita Lagoon along the coast, and consists of nine HAs, five of which are in San Diego County: Ysidora (902.10), De Luz (902.20), Pechanga (902.50), Aguanga (902.80), and Oak Grove (902.90). These HAs are also broken down into 33 hydrologic subareas (HSAs), 15 of which are in San Diego County. The HUs and HAs for the Santa Margarita River WMA are shown in a map provided in Figure 3-3. This SWRP covers only the portion of Santa Margarita River WMA that is within San Diego County and not the portions that extend into Riverside County.

The Santa Margarita River WMA consists of a single major drainage, the Santa Margarita River, which is fed by several smaller tributaries, including De Luz, Sandia, and Rainbow Creeks in San Diego County (Figure 3-4).

3.1.2 Land Use

Land use within the full Santa Margarita River WMA (both San Diego and Riverside Counties) is classified primarily as undeveloped (61 percent). Other land use classifications include residential (10 percent), agriculture (9 percent), military (8 percent), and open space/parks and recreation (7 percent). Commercial, industrial, public facility, transportation, under construction, and water land uses each make up less than 2 percent of the remaining land use acreage (Weston, 2012).

Figure 3-5 shows the division of land by agency, including the Camp Pendleton Marine Corps Base and Falbrook Naval Weapons Station, which occupy approximately 8 percent of the watershed area in the southwestern portion of the watershed. Two tribal nations live within the WMA as well: the Pechanga Reservation and the Pauma and Yuima Reservation. Additionally, portions of the WMA are managed as the Cleveland National Forest and by the Bureau of Land Management (BLM).

[1] The Tijuana WMA is the largest of the WMAs included in the SWRP, at 1.1 million acres. However, only the portion of the Tijuana WMA falling within the United States, in San Diego County, were included in the SWRP (299,263 acres).

3.1.3 Water Quality

3.1.3.1 Applicable TMDLs and Special Biological Habitats

Santa Margarita River WMA TMDLs

TMDLs identify the total pollutant loading that a receiving water can accept and still meet water quality standards. The RWQCB is required to develop TMDLs or follow an alternative regulatory process to address 303(d) listed impairments. Since the 2006 SWRCB Section 303(d) list was published, several pollutants/stressors to the Santa Margarita River WMA water bodies have been delisted. These include Sandia Creek (manganese and nitrogen), Temecula Creek (nitrogen), and Long Canyon Creek (total dissolved solids (TDS)).

On February 9, 2005, the SDRWQCB adopted Resolution No. R9-2005-0036, an Amendment to the Water Quality Control Plan for the San Diego Basin to Incorporate TMDLs for Total Nitrogen and Total Phosphorus in the Rainbow Creek Watershed. The TMDLs for total nitrogen and total phosphorus discharges into Rainbow Creek were calculated to be 1,658 and 165 kilograms per year, respectively. Attainment of these targets requires a 74 percent reduction in total nitrogen loading and an 85 percent reduction in total phosphorus loading from the watershed. The TMDL was approved by the SWRCB in November 2005 and by the United States Environmental Protection Agency (USEPA) on March 22, 2006, and it became effective under State law on February 1, 2006, the date of Office of Administrative Law approval (Weston, 2012).

The Santa Margarita Lagoon was studied in response to Investigation Order R9-2006-076. The TMDL for this lagoon is scheduled to be completed by January of 2019. Additionally, this lagoon was assessed as part of Bight ’08 Regional Study using the sediment quality objective assessment. A nutrient management plan is under development for the Lagoon.

TABLE 3-2
TMDLS IN THE SANTA MARGARITA RIVER WMA

Sub Watershed	Water Body Name	Pollutant	Adoption Date
Santa Margarita HU	Rainbow Creek	Nitrogen and Phosphorus	February 9, 2005
Santa Margarita HU	Santa Margarita Lagoon	Nutrients/Eutrophication	In Progress

3.1.3.2 Priority Water Quality Conditions

The WQIP for the Santa Margarita River WMA is currently under development. Priority and high priority water quality conditions for this WMA have not yet been identified through the WQIP process. Potential environmental water quality issues in the Santa Margarita River WMA include surface water and groundwater quality degradation, habitat loss, invasive species, and channel bed erosion (San Diego County, 2009). The 2010 SWRCB Section 303(d) list was adopted by the SWRCB on August 4, 2010, and was finalized by the USEPA on October 11, 2011. The several step process for identifying priority and high priority water quality conditions include review of the SWRCB Section 303(d) listings and the TMDLs approved or planned for impaired segments of the receiving waters (Section 3.1.3.1).

The upper portion of the watershed in Riverside County has been under continuous development, and pollutants/stressors within the watershed include eutrophic conditions, nutrients, pathogens, salinity, pesticides, metals/metalloids, toxicity, and other inorganics. Potential sources of these contaminants include urban runoff/storm sewers, agriculture/nurseries, septic tanks, natural sources, flow regulation/modification, and unknown point and nonpoint sources (SWRCB, 2010).

In addition to SWRCB Section 303(d) listings and TMDLs (Section 3.1.3.1), the results of the Copermittees annual water quality monitoring program and the 2011 Long Term Effectiveness Assessment (LTEA) (Weston, 2011) are also used in the development of the priority and high priority water quality conditions. These results include linkages between MS4 outfall water quality and potential contributions to recovering water quality. The results of annual monitoring and the LTEA have indicated the following linkages and water quality priorities for dry weather and wet weather water conditions:

- Dry Weather Flows
  - Nutrients, indicator bacteria, TDS, sulfate, and pH were identified as medium and high-priority constituents in dry weather MS4 flows.
  - Within the annual monitoring program monitored drainage area, nutrients (nitrate as N, nitrate/nitrite as N, total nitrogen, and total phosphorus) and TDS were identified as high priorities and indicator bacteria (fecal coliform and Enterococcus) was identified as a medium priority constituent in two MS4 outfalls during dry weather.
  - These results are consistent with historical data.
- Wet Weather Flows
  - The indicator bacteria fecal coliform, TDS, and TSS were identified as medium or high-priority constituents in wet weather MS4 flows.
  - Within the annual monitoring program monitored drainage area, fecal coliform and TDS were identified as high priority constituents in one MS4 outfall during wet weather.
  - These results are consistent with historical data.

These results with the Section 303(d) listing and TMDLs will be used to develop priority and high priority water quality conditions in the WQIP. Until the WQIP is finalized, the above water quality priorities may be used to identify and prioritize water quality opportunities in the Santa Margarita River WMA.

3.1.4 Water Resources and Systems

The San Diego County portion of the Santa Margarita River WMA lies within the jurisdiction of the SDCWA, which in 2015, provided the following imported water supplies to its member agencies located in the watershed: 8,000 acre-feet (AF) to Camp Pendleton U.S. Marine Corps (USMC) Base, 26,400 AF to the City of Oceanside, 12,300 AF to Fallbrook Public Utilities District (PUD), and 20,200 AF to Rainbow Municipal Water District (MWD) (SDCWA, 2015). Those agencies also function as wastewater agencies within the watershed (Figure 3-6). In addition, localized groundwater pumping and surface water diversions from the Santa Margarita River provide water supplies to Camp Pendleton and the unincorporated community of De Luz). The City of Oceanside treats up to 25 million gallons per day (MGD) of water received from the SDCWA and up 6 MGD of local brackish groundwater from the Mission Basin (City of Oceanside, 2017). The Rainbow MWD produces approximately 20,000 AF of water to serve its customers each year (Rainbow MWD, 2017).

Groundwater supplies are sourced from the Santa Margarita Valley Groundwater Basin (Figure 3-4) ((DWR, 2004m). Well yields in the basin range from 200 to 1,980 gallons per minute (gpm). Natural recharge of the alluvial aquifer is primarily from percolation in the Santa Margarita River, with smaller amounts contributed by infiltration of precipitation falling to the valley floor. The total storage capacity of the basin is estimated to be 61,600 AF. Groundwater in this basin is mainly sodium chloride in character, but sodium bicarbonate is also present. TDS concentrations ranged from 337 to 9,030 milligrams per liter (mg/L) in 1956. Groundwater in the northwestern part of the basin is largely suitable for domestic and irrigation uses (DWR, 2004m). Groundwater in the southwestern part of the basin is marginal to inferior for domestic and irrigation uses. Magnesium, sulfate, chloride, nitrate, and TDS concentrations are locally high for domestic use; whereas, chloride, boron, and TDS concentrations are locally high for irrigation use (DWR, 2004m). The Pauma Reservation uses groundwater wells on reservation lands (Rancho California Water District (RCWD), 2007).

3.1.5 Natural Resources

Figure 3-7 shows the parks and open space within the portion of the Santa Margarita River WMA located in San Diego County, including the Santa Margarita Preserve.

The Santa Margarita River is the longest free flowing, un-dammed river in Southern California and has largely escaped the development common to the region. It supports the largest populations of seven federally or state-listed endangered species (County of San Diego, 2008). Habitats within the Santa Margarita River WMA include chaparral, riparian woodlands, coastal marshes, oak woodlands, and montane habitats. The portion of the Santa Margarita River WMA located in San Diego County provides critical habitat for 8 species, including Thread-Leaved brodiaea, Least Bell’s vireo, San Diego fairy shrimp, Spreading navarretia, Arroyo Southwestern toad, Laguna Mountains skipper, and the Southwestern willow flycatcher, and the Western Snowy plover (Figure 3-7).

3.1.6 Watershed Processes

Despite its comparatively good condition, the Santa Margarita River WMA has been impacted by historic and current agricultural uses, as well as residential, commercial, and industrial development. The 2008 Santa Margarita Watershed Urban Runoff Management Plan (WURMP) (San Diego County, 2008a) focuses on reducing urban runoff and water quality concerns associated with urban runoff. Additionally, the WURMP (San Diego County, 2008a) noted that upstream channelization and other flood management efforts can lead to increased sedimentation downstream following a storm event. Since the Santa Margarita watershed spans two counties, cross-jurisdictional management is key to maintaining the existing quality of the watershed.

3.2 San Luis Rey River

3.2.1 San Luis Rey Watershed Management Area Description

The San Luis Rey River WMA (HU 903.00) encompasses 358,927 acres. Most of the WMA consists of County lands, with portions of Oceanside, and Vista, near the coast (Figure 3-8). The watershed extends from the Palomar and Hot Springs Mountains, as well as several other mountain ranges along the Anza Borrego Desert Park, to the Pacific Ocean in Oceanside. The San Luis Rey River WMA consists of three HAs: Lower San Luis Rey (903.10), Monserate (903.20), and Warner Valley (903.30) (Figure 3-9). These HAs are comprised of 11 HSAs.

The San Luis Rey River WMA consists of a single major drainage, the San Luis Rey River, which is fed by many smaller tributaries (Figure 3-10).

3.2.2 Land Use

Land use within the San Luis Rey River WMA is classified primarily as undeveloped (53 percent). Other land use classifications include residential (16 percent), agriculture (14 percent), parks (9 percent), military (3 percent), and transportation (2 percent). Commercial recreation, commercial, industrial, public facility, and water land uses each make up 1 percent or less of the land use acreage (Weston, 2012).

Figure 3-11 shows the division of land by agency, including a portion of the Camp Pendleton Marine Corps Base. Multiple tribal nations live within the WMA as well, including the Pauma and Yuima, Pala, Rincon, San Pasqual, La Jolla, Los Coyotes, and Santa Ysabel. Additionally, portions of the WMA are managed as the Cleveland National Forest and by the BLM, including BLM Lands and National BLM conservation areas.

3.2.3 Water Quality

3.2.3.1 Applicable TMDLs and Special Biological Habitats

San Luis Rey River WMA TMDLs

There is one TMDL for bacteria that has been adopted regionally and applies to receiving waters within the San Luis Rey River WMA—the Revised TMDL for Indicator Bacteria, Project 1—Twenty Beaches and Creeks in the San Diego Region. The receiving waters covered by the Bacteria TMDL are summarized in Table 3-3. There are no other TMDLs affecting the watershed that are currently in development by SWRCB.

TABLE 3-3
TMDLS IN THE SAN LUIS REY RIVER WMA

Sub Watershed	Water Body Name	Pollutant	Adoption Date
Lower San Luis HA	Pacific Ocean Shoreline at San Luis Rey River mouth	• Total Coliform • Fecal Coliform • Enterococcus	February 10, 2010

SOURCE: Larry Walker Associates (LWA), 2016a

Special Biological Habitats

Biological habitats of special significance are areas designated with the biological habitats of special significance beneficial use (BIOL). In the San Luis Rey River WMA, the following water bodies and areas are of special significance and can be classified as impaired for BIOL beneficial use:

- Pilgrim Creek
- San Luis Rey River
- Plaisted Creek

3.2.3.2 Priority Water Quality Conditions

The San Luis Rey River WMA WQIP (LWA, 2016a) provides a detailed description of the process for determining the Priority Water Quality Conditions for this WMA. The WQIP identified receiving water conditions and impacts from MS4 discharges to assess and develop a list of priority water quality conditions. An initial list of priority water quality conditions was developed and then compared with the public input that was provided during the October 7, 2013 workshop and the public data call. The priorities identified in previous planning documents were also considered. Many of the same concerns were provided during the workshop and were evident in the third-party data. Finally, the overall potential for improvement of MS4 discharges to affect conditions within the overall WMA was considered. The list of priority water quality conditions was then finalized on the basis of these factors. The final list of priority water quality conditions is presented in Table 3-4.

TABLE 3-4
PRIORITY WATER QUALITY CONDITIONS IN THE SAN LUIS REY RIVER WMA

Condition	Dry Weather	Wet Weather
Priority Water Quality Conditions	• Nitrogen and Phosphorus • Eutrophic Conditions • Total Dissolved Solids • Index of Biotic Integrity • Chloride • Toxicity	• Nitrogen and Phosphorus • Total Dissolved Solids • Toxicity

SOURCE: LWA, 2016a

3.2.3.3 Highest Priority Water Quality Conditions

The San Luis Rey River WMA WQIP (LWA, 2016a) provides the details of the process that assessed and identified the Highest Priority Water Quality Conditions based on the list of priority water quality conditions presented above in Table 3-4. The MS4 Permit provides the Copermittees with the discretion to justify the highest priority water quality conditions for program development and implementation on the basis of a number of factors, including the potential to improve watershed health, available resources, and best professional judgment.

According to the methodology, the highest priority water quality conditions are priority water quality conditions that either (1) are associated with a TMDL, Areas of Special Biological Significance (ASBS) requirements, or other water quality regulations, or (2) have been elevated to highest priority on the basis of an evaluation of additional selection criteria. Based on this assessment, the WQIP (LWA, 2016a) identified the impairment (by bacteria) of water contact recreation beneficial use (REC-1) at the Pacific Ocean Shoreline, at the San Luis Rey River mouth and also in the Lower San Luis Rey River (west of Interstate-15) as the highest priority water quality conditions (Table 3-5).

TABLE 3-5
HIGHEST PRIORITY WATER QUALITY CONDITIONS IN THE SAN LUIS REY RIVER WMA

Condition	Dry Weather	Wet Weather
Highest Priority Water Quality Conditions	• Bacteria at San Luis Rey River mouth • Bacteria in lower San Luis Rey River	• Bacteria at San Luis Rey River mouth • Bacteria in lower San Luis Rey River

SOURCE: LWA, 2016a

Priority water quality conditions not associated with regulatory drivers were further considered for elevation to a highest priority on the basis of four additional factors:

(1) The supporting data set is sufficient to adequately characterize the degree to which the priority water quality condition changes seasonally, and over the geographic area, to support its consideration as a highest priority water quality condition.

(2) Storm water/non-storm-water runoff is a predominant source for the priority water quality condition.

(3) The priority water quality condition is controllable by the Responsible Agencies.

(4) The priority water quality condition would not be addressed by strategies identified for other highest priority water quality conditions in the WQIP.

This analysis is presented in the San Luis Rey River WMA WQIP (LWA, 2016a) and determined that most of the priority water quality conditions will be addressed by strategies applicable to the highest priority water quality conditions, which justifies not elevating these conditions to highest priority.

3.2.4 Water Resources and Systems

The San Luis Rey River WMA lies within the jurisdiction of SDCWA which provides water to the following agencies located in the San Luis Rey River WMA on an annual basis: City of Oceanside (26,400 AF), Vista Irrigation District (ID) (17,800 AF), Vallecitos Water District (15,300 AF), Valley Center MWD (26,000 AF), Fallbrook PUD (12,300 AF), Rainbow MWD (20,200 AF), and Yuima MWD (4,900 AF) (SDCWA, 2015) (Figure 3-12). In addition, a small portion of the Camp Pendleton USMC Base is located within the San Luis Rey River WMA; the USMC is responsible for providing water services within Camp Pendleton. In addition, three of the tribal nations located within the San Luis Rey River Watershed have regulated Public Water

Systems that supply water to their respective reservations, including the Pala, La Jolla, and San Pasqual reservations. The Rincon reservation purchases raw water from Escondido and the Vista ID, and the San Pasqual reservation purchases treated water from Valley Center MWD.

There are two water supply reservoirs in the San Luis Rey River Watershed (Figure 3-10):

- Lake Henshaw, owned by Vista ID, can store up to 56,000 AF of surface water
- Turner Reservoir, owned by Valley Center MWD, can store up to 2,800 AF of surface water

Wastewater agencies within the San Luis Rey River WMA include the City of Oceanside, Fallbrook PUD, the Valley Center Community Services District (CSD), the City of Vista, Rainbow MWD, and the Pauma Valley CSD (Figure 3-12). The Pala Band of Mission Indians operates a tertiary wastewater treatment plant that serves most of the buildings located on the Pala Reservation.

Groundwater basins underlying the San Luis Rey River Watershed include the San Luis Rey Valley Basin, with an estimated total storage capacity of 240,000 AF (DWR, 1975); Warner Valley Basin, with an estimated total storage capacity of 550,000 AF (DWR, 1975); and Ranchita Town Area Basin, with an unknown estimated storage capacity (Figure 3-10).

In the San Luis Rey Valley Basin, water in this basin is of calcium-bicarbonate, calcium-sulfate-bicarbonate, and calcium-sulfate types, with a TDS content of 530 to 7,060 mg/L, and an average of approximately 1,258 mg/L (DWR, 2004j). Values for TDS ranged from 960 to 3,090 mg/L in 1983 (Izbicki, 1985). Groundwater in the Warner Valley Basin is predominantly sodium bicarbonate in character, though some calcium bicarbonate water is found in the southern part of the basin (DWR, 1967). Some sulfate and chloride rich water is found near Warner Hot Springs in the eastern part of the basin (DWR, 1967). Analyses of water sampled in the 1960s show a range in TDS content from 168 to 638 mg/L and an average about 304 mg/L (DWR, 1967). Water from one public supply well had a TDS content of 263 mg/L. Groundwater is generally rated suitable for irrigation and domestic uses except near Warner Hot Springs, where it is rated inferior for irrigation use because of sodium content and for domestic use because of high fluoride concentrations (DWR, 1967). Groundwater extracted from wells in the Ranchita Town Area Groundwater Basin is of sodium bicarbonate character and ranges in TDS content from about 250 to 500 mg/L (DWR, 1967). The water is classified as suitable for domestic and irrigation uses (DWR, 1967).

Flow down the San Luis Rey River and its tributaries and infiltration of runoff provide the majority of recharge for the basins. Vista ID and the City of Oceanside operate pumps in the Warner Valley and San Luis Rey Valley basins respectively.

3.2.5 Natural Resources

Figure 3-13 shows the parks and open space within the San Luis Rey River WMA, including Guajome Regional Park, San Luis Rey River Park, Keys Creek Preserve, Hellhole Canyon Preserve, Wilderness Gardens Preserve, Mount Olympus Preserve, Palomar Mountain, and Anza-Borrego Desert Park.

Figure 3-13 also shows that the San Luis Rey River WMA provides critical habitats for 7 species, including Thread-Leaved brodiaea, Least Bell's vireo, San Diego fairy shrimp, Spreading navarretia, Arroyo Southwestern toad, Laguna Mountains skipper, and the Southwestern willow flycatcher.

3.2.6 Watershed Processes

Prior to the 1960's, groundwater pumping in the western portion of the watershed led to lowering of groundwater levels, which led to seawater intrusion. Imported water eventually reduced the need to pump groundwater, however, increased development and increased irrigation with imported water has led to increased salt loading in the watershed and deteriorated groundwater quality.

The damming of the San Luis Rey River with the Henshaw Dam changed the hydrology of the river. Dams, water diversions, and flood control structures have had severe impacts on steelhead trout populations by cutting off access to upstream spawning and rearing habitats and reducing the flows necessary for trout immigration. Additionally, the Henshaw Dam and channelization of the San Luis Rey River has reduced transport and deposition of sand along the coast. Sand replenishment along the beaches is currently an important issue in the San Luis Rey River WMA.

3.3 Carlsbad

3.3.1 Carlsbad Watershed Management Area Description

The Carlsbad WMA is under the jurisdiction of several cities: Carlsbad, Escondido, San Marcos, Encinitas, Vista, Oceanside, and Solana Beach. The remaining area of the WMA is classified as unincorporated lands under County of San Diego jurisdiction (Figure 3-14). The watershed extends from above the headwaters of Lake Wohlford in the east to the Pacific Ocean in the west.

The Carlsbad WMA HU (904.00) encompasses 135,345 acres and consists of six HAs: Loma Alta (904.10), Buena Vista Creek (904.20), Agua Hedionda (904.30), Encinas (904.40), San Marcos (904.50), and Escondido Creek (904.60) (Figure 3-15).

The Carlsbad WMA contains several major stream systems that are each associated with one of the HAs. The Loma Alta Creek and Encinas Creek drain to the ocean, while Buena Vista Creek and Agua Hedionda Creek drain into their similarly named lagoons. San Marcos Creek drains into Batiquitos Lagoon and Escondido Creek drains into San Elijo Lagoon. The stream systems and other water features within the Carlsbad WMA are shown in Figure 3-16.

3.3.2 Land Use

Land use within the overall Carlsbad WMA is classified primarily as residential (36 percent), followed by open space/parks and recreation (18 percent), undeveloped land (16 percent), transportation (12 percent), agriculture (6 percent), industrial (3 percent), commercial (3 percent), and public facility (3 percent) uses. Commercial recreation, under construction, and water land uses make up less than 3 percent of the remaining acreage (Weston, 2012).

Figure 3-17 shows the division of land by agency. One tribal nation lives within the WMA on the San Pasqual Reservation. Additionally, a few small areas in the east of the WMA are managed by the BLM.

3.3.3 Water Quality

3.3.3.1 Applicable TMDLs and Special Biological Habitats

Carlsbad WMA TMDLs

Two TMDLs have been adopted in the Carlsbad WMA, including the Loma Alta Slough Bacteria TMDL (SDRWQCB, 2014) and the Revised TMDL for Indicator Bacteria, Project 1—Twenty Beaches and Creeks TMDL (SDRWQCB, 2010), which covers the shoreline along the San Marcos HA. Additionally, several lagoons and Agua Hedionda creek are on the Section 303(d) List of Water Quality Limited Segments for water quality impairments due to nutrients / eutrophication, bacteria, sediment/siltation, TDS, or a combination of these pollutants. TMDLs are in progress to address these impairments. The list of TMDLs adopted or in progress for the Carlsbad WMA is presented in Table 3-6.

TABLE 3-6
TMDLS IN THE CARLSBAD WMA

Subwatershed	Water Body Name	Pollutant	TMDL Adoption Date
Loma Alta (904.10)	Loma Alta Slough	Total Coliform Fecal Coliform Enterococcus	June 26, 2014
Loma Alta (904.10)	Loma Alta Slough	Nutrients/Eutrophication	In progress
Loma Alta (904.10)	Pacific Ocean Shoreline at Loma Alta Creek Mouth	Bacteria	In progress
Buena Vista Creek (904.20)	Buena Vista Lagoon	Nutrients/Eutrophication Sedimentation/Siltation Bacteria	In progress
Buena Vista Creek (904.20)	Pacific Ocean Shoreline adjacent to Buena Vista Lagoon	Bacteria	In progress
Agua Hedionda (904.30)	Lower Agua Hedionda Creek	TDS	In progress
San Marcos (904.50)	Pacific Ocean Shoreline	Bacteria	February 10, 2010
Escondido Creek (904.60)	San Elijo Lagoon	Nutrients/Eutrophication Sedimentation/Siltation Bacteria	In progress
Escondido Creek (904.60)	Pacific Ocean Shoreline at San Elijo Lagoon	Bacteria	N/A

SOURCE: Mikhail Ogawa Engineering (MOE), 2014

Special Biological Habitats

In the Carlsbad WMA, the following water bodies and areas are of special significance and can be classified as impaired for BIOL beneficial use:

- Pacific Ocean from Loma Alta HA
- Buena Vista Lagoon and Pacific Ocean from Lower Buena Vista Creek HA
- Agua Hedionda Lagoon, Agua Hedionda Creek, the Pacific Ocean, and Santa Ysabel Creek in the Agua Hedionda HA
- Batiquitos Lagoon and the Pacific Ocean in the Lower San Marcos HA
- San Elijo Lagoon, Escondido Creek, and the Pacific Ocean in the Escondido Creek HA

3.3.3.2 Priority Water Quality Conditions

The Carlsbad WMA WQIP (MOE, 2014) provides a detailed description of the process for determining the Priority Water Quality Conditions for this WMA. The WQIP identified receiving water conditions and impacts from MS4 discharges to assess and develop a list of priority water quality conditions. Priority water quality conditions are defined as receiving water conditions for which there is evidence that MS4 discharges may cause or contribute to the condition. An initial list of priority water quality conditions was developed and then compared with the public input that was provided during the July 2014 and November 2014 public workshops. The priorities identified in previous planning documents were also considered. Many of the same concerns were provided during the workshop and were evident in the third-party data. Finally, the overall potential for improvement of MS4 discharges to affect conditions within the overall WMA was considered. The list of priority water quality conditions was then finalized on the basis of these factors. The final list of priority water quality conditions is presented in Table 3-7.

TABLE 3-7
PRIORITY WATER QUALITY CONDITIONS IN THE CARLSBAD WMA

Water Body	Dry Weather	Wet Weather
All water bodies within the WMA	• Trash	• Trash
All water bodies within the WMA	• Riparian Habitat	• Riparian Habitat
Loma Alta Slough	• Eutrophic • Indicator Bacteria	• Indicator Bacteria
Loma Alta Creek	• Toxicity	
Pacific Ocean Shoreline at Loma Alta Creek Mouth	• Indicator Bacteria	• Indicator Bacteria
Buena Vista Lagoon	• Indicator Bacteria • Sediment/Siltation • Nutrients	• Indicator Bacteria • Sediment/Siltation
Agua Hedionda Creek	• Indicator Bacteria • Nutrients Category	• Indicator Bacteria • Toxicity • Nutrients Category
Buena Creek	• Nitrate and Nitrite	
Pacific Ocean Shoreline at Moonlight Beach	• Indicator Bacteria	• Indicator Bacteria
San Marcos Creek, Lower	• Nutrients	
Encinitas Creek	• Toxicity	
San Marcos Lake	• Nutrients	• Nutrients

San Marcos Creek- Upper	• Nutrients	• Nutrients
San Marcos Creek- Upper below Via Vera Cruz	• Indicator Bacteria	• Indicator Bacteria
Escondido Creek	• Toxicity • Nutrients Category	• Indicator Bacteria • Nutrients Category
San Elijo Lagoon	• Indicator Bacteria • Sediment/Siltation N/A • Eutrophic	• Sediment/Siltation N/A

SOURCE: MOE, 2014

3.3.3.3 Highest Priority Water Quality Conditions

The Carlsbad WMA WQIP (MOE, 2014) presents the process that assessed and identified the Highest Priority Water Quality Conditions based on the list of priority water quality conditions presented above in Table 3-7. The Carlsbad WMA WQIP (MOE, 2014) used a similar method to the San Luis Rey River WMA WQIP (LWA, 2016a) as discussed in Section 3.2.3.3. The highest priority water quality conditions for the Carlsbad WMA are provided in Table 3-8.

TABLE 3-8
HIGHEST PRIORITY WATER QUALITY CONDITIONS IN THE CARLSBAD WMA

Water Body	Dry Weather	Wet Weather
Loma Alta Slough	• Bacteria at San Luis Rey River mouth • Bacteria in lower San Luis Rey River	• Bacteria at San Luis Rey River mouth • Bacteria in lower San Luis Rey River
Buena Vista Lagoon	• Nitrogen and Phosphorus • Eutrophic Conditions • Total Dissolved Solids • Index of Biotic Integrity • Chloride • Toxicity	• Nitrogen and Phosphorus • Total Dissolved Solids • Toxicity
Agua Hedionda		
Pacific Ocean Shoreline at Moonlight Beach	• Bacteria	• Bacteria
San Marcos Creek	• Nutrients	• Nutrients
Escondido Creek	• Riparian Habitat Degradation	• Riparian Habitat Degradation

SOURCE: MOE, 2014

3.3.4 Water Resources and Systems

SDCWA supplies water to ten water agencies in the Carlsbad WMA: 22,300 AF to City of Escondido annually, 26,400 AF to City of Oceanside, 20,600 AF to Carlsbad MWD, 22,000 AF to Olivenhain MWD, 5,700 AF to Rincon del Diablo MWD, 11,200 AF to Santa Fe ID, 7,100 AF to San Dieguito WD, 15,300 AF to Vallecitos WD, 26,000 AF to Valley Center MWD and 17,800 AF to Vista ID (SDCWA, 2015). The San Pasqual Band of Indians operates a Public

Water System and also purchases water from the Valley Center MWD. As such, within the Carlsbad Watershed there is a large amount of imported water use and limited amounts of other water supplies.

The Carlsbad Watershed is home to three potable water treatment plants: Escondido/Vista (capacity of 65 MGD), McCollom (capacity of 34 MGD), and Badger (capacity of 40 MGD). Water produced at these plants comes from storage or surface water in both the Carlsbad Watershed and the San Dieguito Watershed, and may be used outside the Carlsbad Watershed (RWMG, 2013).

A Carlsbad desalination facility opened on December 14, 2015 in Carlsbad, California, adjacent to the north end of the Encina Power Station. SDCWA is the recipient of the fresh water produced by the plant, which has an estimated output of 50 MGD.

Wastewater systems within the Carlsbad WMA include the Buena Sanitation District, the Leucadia Wastewater District, the Solana Beach Sanitation District, and the Rancho Santa Fe CSD. The La Salina Wastewater Treatment Plant treats sewage from areas west of I-5, downtown and along the coast. La Salina also treats waste to the secondary level by conventional biological treatment followed by clarification. The Encina Water Pollution Control Facility treats about 22 MGD of wastewater, with a capacity of over 40 MGD. Figure 3-18 shows a map of the water agencies and wastewater agencies within the Carlsbad WMA.

There are five major surface water bodies, which are used to store water, in the Carlsbad WMA (Figure 3-16):

- Lake Wohlford, owned by the City of Escondido, can store up to 6,506 AF of surface water.
- Dixon Lake, owned by the City of Escondido, can store up to 2,606 AF of surface and imported water.
- Lake San Marcos, a privately-owned lake, stores surface water and has a capacity of 480 AF.
- Olivenhain Reservoir, owned by SDCWA, stores up to 24,375 AF of natural runoff and water from Lake Hodges Reservoir (located in the San Dieguito River WMA).
- San Dieguito Reservoir, owned by the San Dieguito WD and the Santa Fe ID, stores up to 883 AF of imported water from SDCWA.

Groundwater basins underlying the Carlsbad Watershed include the Batiquitos Lagoon Basin (capacity unknown), San Elijo Valley Basin (capacity unknown), San Marcos Valley Basin (capacity unknown), and Escondido Valley Basin (estimated total storage capacity 24,000 AF (DWR, 1975)) (Figure 3-16).

In the Batiquitos Lagoon Basin, groundwater is predominantly sodium chloride in character and has an average TDS content of about 1,280 mg/L with a range from about 788 to 2,362 mg/L (DWR, 1967). The groundwater in this basin was rated inferior for irrigation because of high chloride content and marginal for domestic use because of high sulfate and TDS concentrations (DWR, 1967; DWR, 2004a).

In the San Elijo Valley Basin, groundwater mineral content is variable, depending on the source unit. Water from the eastern portion of the basin is of a mixed sodium, calcium, chloride, and sulfate character. In the western part of the basin, the water is of sodium-chloride character. TDS concentration ranges from 1,170 to 5,090 mg/L, with concentrations lowest in the eastern part of the basin and increasing toward the west (DWR, 2004i).

In the San Marcos Valley Basin, groundwater is chiefly magnesium chloride character in the northern part of the basin and sodium chloride in the southwestern part of the basin (DWR, 1967). TDS content measured prior to 1967 ranged between 500 and 750 mg/L; groundwater was rated suitable for domestic use and marginal for irrigation in the northern part of the basin, but inferior in the south (DWR, 1967; DWR, 2004k).

In the Escondido Valley Basin, groundwater is generally sodium chloride in type, with subordinate amounts of magnesium, calcium, bicarbonate, and nitrate ions (DWR, 1967). TDS content ranges from 250 to more than 5,000 mg/L (DWR, 1967). Local sources of groundwater in this basin are categorized as suitable to inferior for domestic use. The water categorized as inferior typically contains high nitrate, TDS, or sulfate content (DWR, 1967; DWR, 2004c).

Major recharge areas within the aforementioned groundwater basins include corresponding rivers or creeks and their tributaries as well as through stormwater infiltration.

3.3.5 Natural Resources

Figure 3-19 shows the parks and open space within the Carlsbad WMA, including Bottle Peak Preserve, Brengle Terrace Park, Buena Vista Park, Daley Ranch Park, Double Peak Regional Park, Escondido Creek, Hosp Grove Park, Lake Wohlford Park, Poinsettia Park, Sage Hill Preserve, San Elijo Lagoon Ecological Reserve, and Val Sereno Preserve. Areas of the watershed designated under the MSCP are also shown.

Figure 3-19 shows the critical habitat for six species within the Carlsbad WMA, including Thread-leaved brodiaea, San Diego fairy shrimp, Spreading navarretia, Riverside fairy shrimp, Southwestern willow flycatcher, and Western snowy plover.

Remaining native habitats within the watershed primarily include upland vegetation consisting of coastal sage scrub, chaparral scrub, and small areas of oak woodlands. In addition, the watershed contains native grasslands, riparian forests/woodlands, riparian scrubs, marsh/wetlands, and open water areas.

All four of the coastal lagoons located in the Carlsbad WMA (Agua Hedionda, Batiquitos, Buena Vista, and San Elijo) are important natural resources located within the Carlsbad Watershed (Figure 3-16).

3.3.6 Watershed Processes

The Carlsbad Watershed has water quality-related issues that are typical of areas with high urban development. Potential impacts to the watershed’s water bodies and lagoons due to urbanization and highway development include increased sedimentation and water quality issues. Urbanization also increases the amount of invasive species in the watershed, which can jeopardize native species and habitats. Although other issues may exist within the watershed, the Carlsbad WURMP (San Diego County, 2008b), which has a goal of reducing discharge of pollutants from MS4s, lists sedimentation, nutrient loading, and bacteria and pathogens as the primary management issues within the Carlsbad Watershed.

Due to urban development, many of the surface water bodies that drain into the watershed's lakes and lagoons have been channelized or otherwise modified, which causes increased sedimentation entering these water bodies Sedimentation has been linked to bacteria loading, as sediments may provide a breeding location for bacteria. Bacteria-related issues have led to temporary closures of recreational areas as well as impacts to natural resources (RWMG, 2013).

3.4 San Dieguito

3.4.1 San Dieguito Watershed Management Area Description

The San Dieguito River WMA includes portions of the City of Del Mar, the City of Escondido, the City of Poway, the City of San Diego, the City of Solana Beach, and unincorporated areas of San Diego County (Figure 3-20). The watershed extends from the Volcan Mountains in the east to San Dieguito Lagoon and the Pacific Ocean in the west.

The WMA drains an area of approximately 221,320 acres in west-central San Diego County, and consists of five HAs: Solana Beach (905.10), Hodges (905.20), San Pasqual (905.30), Santa Maria Valley (905.40), and Santa Ysabel (905.50). These five HAs are divided into 23 HSAs (Figure 3-21).

The San Dieguito River is the primary drainage in the watershed, with headwaters originating in the Witch Creek Basin. There are multiple tributaries that join the San Dieguito River, which all ultimately flow into the Pacific Ocean via the San Dieguito Lagoon (Figure 3-22).

3.4.2 Land Use

Land use within the San Dieguito River WMA is classified primarily as vacant and undeveloped land (39 percent). Other major land use classifications are open space/parks and recreation (22 percent), residential (18 percent), and agriculture (14 percent). Transportation, commercial, industrial, public facility, under construction, and water land use classifications combined comprise the remaining 7 percent of the watershed (San Diego County Association of Governments (SANDAG), 2009).

Figure 3-23 shows the division of land by agency. Two tribal nations live within the WMA on the Mesa Grande and the Santa Ysabel Reservations. Additionally, portions of the WMA are managed as the Cleveland National Forest and by the BLM, including BLM national conservation areas.

3.4.3 Water Quality

3.4.3.1 Applicable TMDLs and Special Biological Habitats

San Dieguito River WMA TMDLs

One TMDL has been developed in the San Dieguito River WMA: the Revised TMDL for Indicator Bacteria, Project 1—Twenty Beaches and Creeks in the San Diego Region (Table 3-9). The 2010 303(d) listing individually analyzed for the bacteria indicators (Enterococcus, fecal coliform, and total coliform) and identified total coliform as impairing the shellfish beneficial use at the mouth of the San Dieguito Lagoon (SDRWQCB, 2010).

All 2010 303(d) listings, whether a TMDL has been completed or is scheduled, were identified as receiving water conditions for the WQIP. Table 3-9 summarizes the 2010 303(d) listed impaired water bodies and the TMDLs in the San Dieguito River WMA, and the pollutants listed as causing the impairment.

TABLE 3-9
TMDLS AND WATER QUALITY LIMITED SEGMENTS IN THE SAN DIEGUITO RIVER WMA

Subwatershed	Water Body Name	Pollutant or Stressor	TMDL Adoption Date
Santa Ysabel (905.50)	Upper Santa Ysabel	• Toxicity	To be developed
Santa Ysabel (905.50)	Sutherland Reservoir	• Color • Iron • Manganese • Total nitrogen as N and pH	To be developed
San Pasqual (905.30)	Cloverdale Creek	• Total dissolved solids (TDS) • Phosphorus	To be developed
Hodges (905.20)	Green Valley Creek	• Sulfates • Chloride • Manganese • Phentachlorophenol (PCP)	To be developed
Hodges (905.20)	Kit Carson Creek	• TDS • PCP	To be developed
Hodges (905.20)	Lake Hodges	• Color • Manganese • Mercury • Nitrogen • Phosphorus • Turbidity • pH	To be developed
Solana Beach (905.10)	San Dieguito River	• Enterococcus • Fecal coliform • Nitrogen • Phosphorus • TDS • Toxicity	To be developed
Solana Beach (905.10)	Pacific Ocean Shoreline at San Dieguito Lagoon Mouth	• Total coliform	February 10, 2010
Solana Beach (905.10)	Pacific Ocean Shoreline at San Dieguito Lagoon Mouth	• Total coliform	To be developed

Special Biological Habitats

In the San Dieguito River WMA, the following water bodies and areas are of special significance and can be classified as (1) impaired for BIOL beneficial use; (2) impaired for other beneficial use(s); or (3) not impaired or not assessed:

- Impairment of BIOL:
  - None
- Impairment of other beneficial use(s):
  - Pacific Ocean Shoreline at the San Dieguito Lagoon Mouth (2010 303(d) listed for impairment of Shellfish Harvesting beneficial use (SHELL) due to total coliform)
- Not impaired or have not been assessed:
  - San Dieguito Lagoon
  - Blue Sky Ecological Reserve
  - Boden Canyon Ecological Reserve
  - Lake Hodges Ecological Reserve

3.4.3.2 Priority Water Quality Conditions

The San Dieguito River WMA WQIP (AMEC, 2015a) provides a detailed description of the process for determining the Priority Water Quality Conditions for this WMA. The WQIP identified receiving water conditions and impacts from MS4 discharges to assess and develop a list of priority water quality conditions. Priority water quality conditions are defined as receiving water conditions for which there is evidence that MS4 discharges may cause or contribute to the condition. An initial list of priority water quality conditions was developed and then compared with the public input that was provided during the September 5, 2013, workshop and the public data call. The priorities identified in previous planning documents were also considered. Many of the same concerns were provided during the workshop and were evident in the third-party data. Finally, the overall potential for improvement of MS4 discharges to affect conditions within the overall WMA was considered. The list of priority water quality conditions was then finalized on the basis of these factors. The final list of priority water quality conditions is presented in Table 3-10.

TABLE 3-10
PRIORITY WATER QUALITY CONDITIONS IN THE SAN DIEGUITO RIVER WMA

Water Body	Dry Weather	Wet Weather
San Dieguito River Above Sutherland Reservoir	• Color	• Color
Cloverdale Creek	• Eutrophic conditions (phosphorus) • TDS	
Green Valley Creek	• Chlorinefates • Sulfates	• Chlorine
Carson Creek	• TDS	

Felicita Creek	• TDS	
Lake Hodges	• Enterococcus • Color • Eutrophic conditions (nitrogen and phosphorus)	• Fecal coliform • Color
San Dieguito River	• Indicator Bacteria (Enterococcus and fecal coliform) • Toxicity • TDS • Eutrophic conditions (nitrogen)	• Indicator Bacteria (Enterococcus and fecal coliform) • Toxicity
Pacific Ocean Shoreline at San Dieguito Lagoon Mouth	• Indicator Bacteria (Enterococcus and fecal coliform)	• Indicator Bacteria (Enterococcus and fecal coliform)

SOURCE: AMEC, 2015a

3.4.3.3 Highest Priority Water Quality Conditions

The San Dieguito River WMA WQIP (AMEC, 2015a) provides the details of the process that assessed and identified the Highest Priority Water Quality Conditions based on the list of priority water quality conditions presented above in Table 3-10. The San Dieguito River WMA WQIP (AMEC, 2015a) used a similar method to the San Luis Rey River WMA WQIP (LWA, 2016a) as discussed in Section 3.2.3.3. The highest priority water quality conditions are presented in Table 3-11.

TABLE 3-11
HIGHEST PRIORITY WATER QUALITY CONDITIONS IN THE SAN DIEGUITO RIVER WMA

Highest Priority Condition	Dry Weather	Wet Weather
Potential Impairment of REC-1 at Pacific Ocean Shoreline	Indicator bacteria at San Dieguito River above Lake Hodges	Indicator bacteria at San Dieguito River above Lake Hodges
Potential Impairment of REC-1 at Pacific Ocean shoreline		Indicator bacteria at San Dieguito River below Lake Hodges

SOURCE: AMEC, 2015a

3.4.4 Water Resources and Systems

There are four water supply reservoirs within the San Dieguito Watershed, which contain either imported water or surface water runoff, or a combination of both sources. Each reservoir is summarized below (Figure 3-22):

- Sutherland Reservoir, owned by the City of San Diego, can store up to 29,508 AF of natural runoff.
- Lake Ramona, owned by the Ramona MWD, can store up to 12,000 AF of imported water from SDCWA.

- Lake Poway, owned by the City of Poway, can store up to 3,330 AF of imported water from SDCWA.
- Hodges Reservoir, owned by the City of San Diego, can store up to 30,633 AF of natural runoff and imported water from SDCWA.

SDCWA provides water to the following member agencies in the San Dieguito Watershed: Santa Fe ID (11,200 AF annually), San Dieguito WD (7,100 AF), Olivenhain MWD (22,200 AF), City of San Diego (191,700 AF), Rincon del Diablo MWD (8,900 AF), City of Poway (11,100 AF), and Ramona MWD (6,100 AF) (SDCWA, 2015). Two potable water treatment facilities are located in the San Dieguito Watershed: Bargar, which can treat up to 4 MGD potable water and Berglund, which can produce up to 24 MGD (RWMG, 2013). The Bargar filtration plant was built to treat water from Sutherland Reservoir. However, in order to comply with city regulations that require maintaining a specific water elevation in the lake and due to unreliable rainfall and runoff, water was not always available for treatment at the Bargar plant. The cost to treat a small amount of water was much higher than purchasing treated water from imported suppliers, so Bargar is not currently in operation.

Wastewater systems within the San Dieguito River WMA include the Solana Beach Sanitation District and the Rancho Santa Fe CSD, the Fairbanks Ranch CSD, and the Whispering Palms CSD.

The San Pasqual Academy Wastewater Treatment Plant treats domestic wastewater generated from the Academy campus and has a capacity of 0.05 MGD. The Rancho Santa Fe Wastewater Treatment Plant has an average flow of 0.35 MGD and a rated capacity of 0.45 MGD, and generally provides treatment services for Rancho Santa Fe and other surrounding communities in the unincorporated areas of the county. The Fairbanks Ranch Water Pollution Control Facility treats an average wastewater flow of 0.16 MGD. Whispering Palms Water Reclamation Facility treats an average wastewater flow of 0.26 MGD.

Figure 3-24 shows a map of the water agencies and wastewater agencies within the San Dieguito River WMA.

Groundwater basins underlying the San Dieguito Watershed include the San Pasqual Valley (estimated storage capacity of 63,000 AF (Izbicki, 1983) and 73,000 AF (DWR, 1975)), the Santa Maria Valley (estimated storage capacity of 77,000 AF (DWR 1975)), the San Dieguito Valley (estimated storage capacity of 52,000 AF (Izbicki, 1983) and 63,000 AF (DWR, 1975)), and the Pamo Valley (capacity unknown). The majority of the San Pasqual Valley groundwater basin is owned by the City of San Diego. While public water supply is not currently developed from the San Pasqual basin, the basin represents a potential source of local water supply (RWMG, 2013).

Groundwater in the San Pasqual Valley Basin is of mixed character. In the eastern part of the valley, groundwater is mainly calcium bicarbonate character with TDS content mostly less than 500 mg/L. In the western part of the valley, groundwater is dominantly sodium chloride in character with sulfate as a prominent minor anion (Izbicki, 1983). TDS concentration in the basin ranges from 350 to 1,790 mg/L. Nitrate concentration ranges up to 91.7 mg/L; elevated nitrate concentration is widespread (DWR, 2004l).

Groundwater in the Santa Maria Valley Basin is predominately sodium chloride in character; however, water of sodium sulfate and sodium bicarbonate character is found in the northern part of the basin (DWR, 1967). The most prevalent combinations of major cations are sodium-magnesium-calcium, sodium-calcium-magnesium, and sodium, and the most common major anion combinations are bicarbonate-chloride, chloride-bicarbonate, and chloride. Analyses of groundwater from this basin conducted in the 1960s indicate that TDS content can range from 164 to 1,287 mg/L and average about 456 mg/L (DWR, 1967). This groundwater was rated as generally suitable for domestic and irrigation uses (DWR, 1967). Water from two public supply wells had TDS concentrations of 590 and 750 mg/L (DWR, 2004n). Sulfate, nitrate, and TDS concentrations are high for domestic use (DWR, 1975) and locally high chloride content produced water rated as marginal for irrigation (DWR, 1967). High nitrate concentrations are more common in the central and eastern parts of the basin (DWR, 2004n).

Groundwater in the Pamo Valley Basin is calcium bicarbonate in character and rated suitable for domestic and irrigation uses. TDS content ranges from 279 to 455 mg/L and averages about 369 mg/L (DWR, 1967; DWR, 2004f).

Recharge of the groundwater basins occurs through infiltration and percolation of flows from the San Dieguito River and other ephemeral streams.

The San Dieguito Watershed also has facilities that are part of SDCWA's Emergency Storage Project. The Hodges Reservoir Project connected the Hodges Reservoir to Olivenhain Reservoir (located in the Carlsbad Watershed) through pipelines and pump stations, which provides multiple benefits including a more resilient water supply and flood protection.

3.4.5 Natural Resources

Figure 3-25 shows the parks and open space within the San Dieguito River WMA, including Black Mountain Park, Carmel Valley Open Space, San Dieguito Regional Park, Kit Carson Park, Mt. Woodson Open Space, Ramona Grassland Preserve, San Pasqual Trails Open Space, Santa Fe Valley Preserve, Santa Ysabel East Preserve, Santa Ysabel West Preserve, Simon Preserve, Volcan Mountain Wilderness Preserve. Areas of the watershed designated under the MSCP are also shown on Figure 3-25.

Due to relatively undeveloped nature of the San Dieguito Watershed, the watershed contains a diverse array of habitats that range from Volcan Mountain in the east to the San Dieguito Lagoon and Pacific Ocean in the west. There are several natural areas within the watershed, including the 55-mile long, 80,000 acre San Dieguito River Park, the 150 acre San Dieguito Lagoon, and natural areas associated with the watershed's surface water reservoirs (RWMG, 2013).

The San Dieguito River WMA also provides critical habitat for six species, including Thread leaved brodiaea, San Diego fairy shrimp, Spreading navarretia, Arroyo Southwestern toad, Southwestern willow flycatcher, and Western snowy plover (Figure 3-25).

3.4.6 Watershed Processes

Although the San Dieguito River WMA is a largely undeveloped watershed, it still suffers from the impacts of urbanization. Stakeholders within the San Dieguito Watershed have identified a number of major issues and concerns, including physical and hydrologic modifications, water quality, invasive species, and flooding associated with local surface waters. Over-grazing has also been a concern in the San Dieguito Watershed because it has reduced tree regeneration, reduced vegetative cover, caused streambank destabilization, water quality degradation, and spread non-native weeds (RWMG, 2013).

3.5 Los Peñasquitos

3.5.1 Los Peñasquitos Watershed Management Area Description

The Los Peñasquitos WMA is located within west-central San Diego County and includes portions of the City of San Diego, the City of Poway, and the City of Del Mar, as well as unincorporated areas of San Diego County (Figure 3-26). The area extends from the foothills east of the City of Poway to the coastal plain where the watershed drains into Los Peñasquitos Lagoon before flowing into the Pacific Ocean through a narrow mouth at Torrey Pines State Beach.

The Los Peñasquitos WMA (HU 906.00) is 60,424 acres and encompasses the drainage areas of Los Peñasquitos Creek (37,028 acres), Carmel Creek (11,180 acres), and Carroll Canyon Creek (11,004 acres). The remaining 1,107 acres is composed of the lagoon and coastal drainages. The Los Peñasquitos WMA consists of two HAs: Miramar Reservoir (906.10) and Poway (906.20) (Weston, 2012). The HAs are shown on Figure 3-27.

Figure 3-28 shows a map of the major water features within the Los Peñasquitos WMA. The Miramar Reservoir HA comprises the western portion of the WMA and contains the drainage areas of Carmel Creek, Carroll Canyon Creek, and the lower portion of the Los Peñasquitos Creek. The Poway HA, located to the east, is covered entirely by the upper portion of the Los Peñasquitos Creek subwatershed. The drainage areas of the three creeks flow to Los Peñasquitos Lagoon.

3.5.2 Land Use

Land use within the Los Peñasquitos WMA is classified primarily as open space/parks and recreation (31 percent), residential (27 percent), vacant and undeveloped land (12 percent), transportation (13 percent), and industrial (7 percent). Other land use classifications within the watershed, each comprising 3 percent or less of the total land use, include agriculture, commercial, commercial recreation, military, public facility, under construction, and water (SANDAG, 2009).

Figure 3-29 shows the division of land by agency. A portion of the WMA is operated by the U.S. Fish and Wildlife Service as wildlife refuge land.

3.5.3 Water Quality

3.5.3.1 Applicable TMDLs and Special Biological Habitats

Los Peñasquitos WMA TMDLs

Two TMDLs have been adopted in the Los Peñasquitos WMA. The Pacific Ocean Shoreline at Torrey Pines State Beach at Del Mar was 303(d) listed in 2010 for total coliform as impairing shellfish beneficial use. The Sediment TMDL for the Lagoon was adopted on June 13, 2012 (SDRWQCB, 2012a). Table 3-12 summarizes the impaired 2010 303(d) listed water bodies in the Los Peñasquitos WMA.

TABLE 3-12
TMDLS AND WATER QUALITY LIMITED SEGMENTS IN THE LOS PEÑASQUITOS WMA

Subwatershed	Water Body Name	Pollutant	TMDL Adoption Date
Miramar Reservoir (906.10)	Miramar Reservoir	Total nitrogen as N	To be developed
Miramar Reservoir (906.10)	Soledad Canyon	Sediment toxicity	To be developed
Miramar Reservoir (906.10)	Soledad Canyon	Selenium	To be developed
Miramar Reservoir (906.10)	Los Peñasquitos Creek	Enterococcus, fecal coliform, selenium, total dissolved solids (TDS), and total nitrogen as N	To be developed
Miramar Reservoir (906.10)	Los Peñasquitos Lagoon	Toxicity	To be developed
Miramar Reservoir (906.10)	Los Peñasquitos Lagoon	Sedimentation and siltation	June 13, 2012
Miramar Reservoir (906.10)	Pacific Ocean Shoreline at Torrey Pines State Beach, Del Mar	Bacteria	February 10, 2010
Miramar Reservoir (906.10)	Pacific Ocean Shoreline at Los Peñasquitos River Mouth	Total coliform	To be developed
Poway (906.20)	Poway Creek	Selenium and toxicity	To be developed

Special Biological Habitats

In the Los Peñasquitos WMA, the following water bodies and areas are of special significance and can be classified as (1) impaired for BIOL beneficial use; (2) impaired for other beneficial use(s); or (3) not impaired or assessed (AMEC, 2015b):

- Impairment of BIOL:
  - Los Peñasquitos Lagoon (2010 303(d) listed for sedimentation and siltation)
- Impairment of other beneficial use(s):
  - Pacific Ocean Shoreline at Los Peñasquitos River Mouth (2010 303(d) listed for impairment of Shellfish Harvesting (SHELL) due to total coliform)

  - Los Peñasquitos Creek (2010 303(d) listed for impairment of warm freshwater habitat beneficial use (WARM) because of *Enterococcus*, fecal coliform, and total nitrogen, and impairment of agricultural supply beneficial use (AGR) due to TDS)
- Not impaired or assessed:
  - Del Mar Mesa/Lopez Ridge Ecological Reserve
  - Meadowbrook Ecological Reserve

3.5.3.2 Priority Water Quality Conditions

The Los Peñasquitos WMA WQIP (AMEC, 2015b) provides a more detailed description of the process for determining the Priority Water Quality Conditions for this WMA. An initial list of priority water quality conditions was developed in the WQIP by comparing receiving water conditions with evidence of MS4 contributions. The initial list was then compared with the public input that was provided during the September 4, 2013 workshop and the public data call. The priorities identified in previous planning documents were also considered. Many of the same concerns were provided during the workshop and were evident in the third-party data. Finally, the overall potential for improvement of MS4 discharges to affect conditions within the overall WMA was considered. The list of priority water quality conditions was then finalized on the basis of these factors. The final list of priority water quality conditions is presented in Table 3-13.

TABLE 3-13
PRIORITY WATER QUALITY CONDITIONS IN THE LOS PEÑASQUITOS WMA

Water Body	Wet Weather	Dry Weather
Miramar Reservoir	• Impairment of WARM due to eutrophic conditions (total nitrogen as N)	
Soledad Canyon Creek	• Impairment of WARM due to selenium	• Impairment of WARM due to selenium
Soledad Canyon Creek		• Elevated *Enterococcus* near NPDES • monitoring locations
Soledad Canyon Creek	• Elevated fecal coliform near NPDES • monitoring locations	
Soledad Canyon Creek		• Elevated TDS near NPDES monitoring • locations
Poway Creek	• Impairment of WARM due to selenium and • toxicity	• Impairment of WARM due to selenium and • toxicity
Los Peñasquitos Creek	• Impairment of WARM due to Enterococcus	• Impairment of WARM due to Enterococcus
	• Impairment of WARM due to fecal coliform	• Impairment of WARM due to fecal coliform
	• Impairment of WARM due to toxicity	• Impairment of WARM due to toxicity
		• Impairment of WARM due to eutrophication • (total nitrogen)

Water Body	Wet Weather	Dry Weather
		• Elevated total phosphorus and dissolved • phosphorus near NPDES monitoring locations
	• Impairment of AGR due to TDS	• Impairment of AGR due to TDS
Los Peñasquitos Lagoon	• Impairment of Estuarine Conditions (EST) and BIOL due to • hydromodification, siltation, and • sedimentation	
		• Impairment of (estuarine habitat) EST and BIOL due to freshwater discharges
		• Elevated Enterococcus near NPDES monitoring locations •
	• Elevated fecal coliform near NPDES monitoring locations	
	• Elevated TDS near NPDES monitoring • locations	
		• Elevated total phosphorus, dissolved • phosphorus, benthic algae, and total nitrogen near NPDES monitoring locations •
Pacific Ocean Shoreline at Torrey Pines State Beach at Del Mar	• Impairment of REC-1 due to indicator bacteria • (total coliform, fecal coliform, Enterococcus)	• Impairment of REC-1 due to indicator bacteria • (total coliform, fecal coliform, Enterococcus)
Pacific Ocean Shoreline Los Peñasquitos River Mouth	• Impairment of shellfish harvesting beneficial use (SHELL) due to total coliform	• Impairment of SHELL due to total coliform

SOURCE: AMEC, 2015b

3.5.3.3 Highest Priority Water Quality Conditions

The Los Peñasquitos WQIP (AMEC, 2015b) presents the process that assessed and identified the Highest Priority Water Quality Conditions based on the list of priority water quality conditions presented above in Table 3-13. The Los Peñasquitos WMA WQIP (AMEC, 2015b) used a similar method to the San Luis Rey River WMA WQIP (LWA, 2016a) as discussed in Section 3.2.3.3. The highest priority water quality conditions are presented in Table 3-14.

TABLE 3-14
HIGHEST PRIORITY WATER QUALITY CONDITIONS IN THE LOS PEÑASQUITOS WMA

Highest Priority Condition	Dry Weather	Wet Weather
Impairment of EST and BIOL in Los Peñasquitos Lagoon		• Hydromodification, • Siltation/ Sedimentation
Impairment of EST and BIOL in Los Peñasquitos Lagoon	• Freshwater Discharges	
Potential impairment of REC-1 along the Pacific Ocean Shoreline at Torrey Pines State Beach at Del Mar	• Indicator Bacteria	• Indicator Bacteria

SOURCE: AMEC, 2015b

3.5.4 Water Resources and Systems

The Los Peñasquitos WMA contains one water storage facility, Lake Miramar, and one groundwater basin, the Poway Valley basin.

There are three water agencies in the Los Peñasquitos WMA that receive water from SDCWA: City of Del Mar (receives 1,100 AF annually), City of San Diego (191,700 AF), and the City of Poway (11,100 AF) (SDCWA, 2015) (Figure 3-30).

Imported water is purchased from SDCWA and stored in the Miramar Reservoir. The reservoir has a capacity of 2,341 million gallons (MG) (CSD, 2011). Adjacent to the reservoir is Miramar Water Treatment Plant operated by the City of San Diego (Figure 3-30). The Miramar Plant produces 140 MGD, but has a 215 MGD total capacity (CSD, 2010).

Most of the wastewater in the Los Peñasquitos WMA is treated at Point Loma Wastewater Treatment Plant operated by the City of San Diego. The Point Loma Plant is located on the bluffs of Point Loma and treats approximately 175 MGD (CSD, 2012a). Wastewater is also treated at the North City Water Reclamation Plant, operated by the City of San Diego. The North City Plant can treat up to 30 MGD. Reclaimed water produced by the North City Plant is distributed to Mira Mesa, Miramar Ranch North, Scripps Ranch, Torrey Pines, and the City of Poway (CSD, 2012b).

The Poway Valley Groundwater Basin has two water bearing formations: the Alluvium and Residuum, and the Poway Group (DWR, 2004g). Groundwater in this basin is mainly sodium chloride in character and ranges in TDS content from about 750 to 1,500 mg/L (DWR, 1967). Calcium bicarbonate character water is found in wells near Beeler Creek. Water from one public supply well had a TDS content of 610 mg/L (DWR, 2004g). Recharge in the basin is mainly from direct precipitation on the valley flow and infiltration along Poway Creek, which flows into the basin from the east. Other sources of recharge include septic tank effluent and irrigation waters. It is estimated the Poway Valley Groundwater Basin contains 23,000 AF and is mainly used for agriculture and domestic uses (AMEC, 2005).

3.5.5 Natural Resources

Figure 3-31 shows the parks and open space within the Los Peñasquitos WMA, including the Los Peñasquitos Canyon Open Space, Black Mountain Park, Sycamore Canyon/Goodan Ranch Preserve, Poway Community Park, Silverset Neighborhood Park, Sabre Springs Open Space, Scripps Miramar Open Space, Canyon Hills Park, Mcgonigle Canyon Open Space, Del Mar Mesa, Mira Mesa Park, Mira Mesa Vernal Pool Open Space, Carroll Canyon Open Space, Campus Point Open Space, Shaw Valley Open Space, Ashley Falls Preserve, Solana Highlands Preserve, Sorrento Hills Open Space, Torrey Pines State Reserve. Areas of the watershed designated under the MSCP are also included in Figure 3-31.

The Los Peñasquitos WMA provides critical habitat for two species, including San Diego fairy shrimp and the Spreading navarretia (Figure 3-31).

3.5.6 Watershed Processes

Land use changes within the Los Peñasquitos WMA began in 1823 with the advent of cattle ranching. Over the subsequent decades, land within the WMA was cleared for cattle grazing, which enabled more sediment erosion during storm events (Cole and Wahl, 2000). Urban development, including the construction of Interstates 5 and 805, increased rapidly from 1966 through 1999 and undeveloped land decreased from 87 percent to 57 percent of the watershed area (White and Greer, 2006). These changes have led to increased pollutants loads within the watershed, increased erosion, and subsequent downstream sedimentation.

With the increase of impervious surfaces in the watershed, less stormwater can infiltrate into the ground, and more is instead directed to natural waterways or the MS4, where flows are consolidated and released through storm outfalls. This means that the peak (and total) flow in the creeks is greater and occurs more rapidly than under undeveloped conditions (with fewer impervious surfaces). This can cause significant erosion in the natural drainages and canyon walls, which receive these discharges, as the geomorphology shifts to transport the larger flow. The higher peak flows possess greater energy, which can mobilize greater amounts and sizes of sediment. Sedimentation rates in Los Peñasquitos Lagoon likely increased by an order of magnitude from 0.27 mm/year pre-settlement to 3.5 mm/year post-settlement because of affects associated with land use changes (Cole and Wahl, 2000). Additionally, increased freshwater inputs from urban sources have greatly impacted the health of Los Peñasquitos Lagoon, impairing water quality and contributing to the loss of native salt marsh through habitat conversion.

3.6 Mission Bay

3.6.1 Mission Bay Watershed Management Area Description

The Mission Bay WMA is located entirely within the City of San Diego jurisdiction. (Figure 3-32). The watershed extends from near Poway in the east to Mission Bay and the Pacific Ocean in the west.

The Mission Bay WMA (within the Los Peñasquitos HU 906.00) encompasses 43,268 acres. The watershed includes six HAs: Scripps (HA 906.30), Miramar (HA 906.40), Tecolote (HA 906.50), Vacation Isle (HA 906.60), Fiesta Island (HA 906.70), and Mission Bay (HA 906.80). The Scripps HA is included in the Mission Bay WMA although it technically also drains to the Los Peñasquitos WMA and to the Pacific Ocean as well (Figure 3-33).

The Mission Bay WMA includes two major drainages: the Rose Creek and Tecolote Creek. Rose Creek drains to the northeast corner of Mission Bay and Tecolote Creek drains to the southeast corner of the Bay.

3.6.2 Land Use

Land use within the Mission Bay WMA is classified primarily as open space/parks and recreation (26 percent), residential (26 percent), and transportation (16 percent). Other land use classifications include vacant and undeveloped land (6 percent), water (5 percent), public facility (5 percent), military (5 percent), industrial (4 percent), commercial (4 percent), and commercial recreation (3 percent). Agriculture and under construction land uses each make up less than 1 percent of the land use acreage (Weston, 2012).

Figure 3-35 shows the division of land by agency. Portions of the WMA are managed as a U.S. Fish and Wildlife Service (U) Wildlife Refuge.

3.6.3 Water Quality

3.6.3.1 Applicable TMDLs and Special Biological Habitats

Mission Bay WMA TMDLs

One TMDL (the Bacteria TMDL) has been adopted in the Mission Bay WMA. The receiving waters covered by the Bacteria TMDL are summarized in Table 3-15.

TABLE 3-15
TMDLS AND WATER QUALITY LIMITED SEGMENTS IN THE MISSION BAY WMA

Subwatershed	Water Body Name	Pollutant or Stressor	Adoption Date
Scripps (906.30)	Pacific Ocean Shoreline	• Bacteria	June 10, 2010
Scripps (906.30), Miramar (906.40), Tecolote (90.50)	Mission Bay Shoreline	• Bacteria	To be developed
Miramar (906.40)	Rose Creek	• Selenium • Toxicity	To be developed
Tecolote (906.50)	Mission Bay at mouth of Tecolote Creek	• Eutrophic • Lead	To be developed
Tecolote (906.50)	Tecolote Creek	• Indicator Bacteria	June 10, 2010
Tecolote (906.50)	Tecolote Creek	• Cadmium • Copper • Lead	To be developed

		• Nitrogen • Phosphorus • Selenium • Toxicity • Turbidity • Zinc	
Scripps (906.30)	Mission Bay at Quivira Basin	• Copper	To be developed
Tecolote (906.50)	Mission Bay Shoreline at Tecolote Shores	• Enterococcus • Total Coliform	To be developed

Special Biological Habitats

In the Mission Bay WMA, the following water body is of special significance:

- Pacific Ocean Shoreline at the La Jolla ASBS (ASBS Number 29)

3.6.3.2 Priority Water Quality Conditions

The Mission Bay WMA WQIP (AMEC, 2016) provides a detailed description of the process for determining the Priority Water Quality Conditions for this WMA. The WQIP identified receiving water conditions and impacts from MS4 discharges to assess and develop a list of priority water quality conditions. Priority water quality conditions are defined as receiving water conditions for which there is evidence that MS4 discharges may cause or contribute to the condition. An initial list of priority water quality conditions was developed and then compared with the public input that was provided during the September 7, 2013 workshop and the public data call. The priorities identified in previous planning documents were also considered. Many of the same concerns were provided during the workshop and were evident in the third-party data. Finally, the overall potential for improvement of MS4 discharges to affect conditions within the overall WMA was considered. The list of priority water quality conditions was then finalized on the basis of these factors. The final list of priority water quality conditions is presented in Table 3-16.

TABLE 3-16
PRIORITY WATER QUALITY CONDITIONS IN THE MISSION BAY WMA

Water Body	Dry Weather	Wet Weather
Mission Bay Shoreline at Campland	• Bacteria	• Bacteria
Mission Bay Shoreline at De Anza		• Bacteria
Mission Bay Shoreline at Leisure Lagoon	• Bacteria	• Bacteria
Mission Bay Shoreline at North Crown Point		• Bacteria
Mission Bay at Mouth of Rose Creek	• Potential eutrophic conditions (no pollutant specified) • Lead	• Lead
Mission Bay Shoreline at Visitor's Center		• Bacteria
Rose Creek	• Toxicity • TDS	• Toxicity • TSS

Water Body	Dry Weather	Wet Weather
Tecolote Creek	• Bacteria • Potential eutrophic conditions (Phosphorus) • Turbidity	• Bacteria • Turbidity
Mission Bay Shoreline at Tecolote Shores		• Bacteria
Area of Special Biological Significance, La Jolla Shores ASBS 29		• Bacteria • Copper • Sediment
Mission Bay Shoreline at Bahia Point		• Bacteria
Mission Bay Shoreline at Bonita Cove	• Bacteria	• Bacteria
Mission Bay Shoreline at Fanuel Park	• Bacteria	• Bacteria
Pacific Ocean Shoreline, Casa Beach (Children's Pool)		• Bacteria
Pacific Ocean Shoreline, La Jolla Cove	• Bacteria	• Bacteria
La Jolla Shores Beach at Avenida de la Playa	• Bacteria	• Bacteria
Pacific Ocean Shoreline, La Jolla Shores Beach at Caminito del Oro	• Bacteria	• Bacteria
Pacific Ocean Shoreline, La Jolla Shores Beach at El Paseo Grande	• Bacteria	• Bacteria
Pacific Ocean Shoreline, Pacific Beach at Grand Avenue	• Bacteria	• Bacteria
Pacific Ocean Shoreline, Pacific Beach at Pacific Beach Point	• Bacteria	• Bacteria
Pacific Ocean Shoreline, South Casa Beach at Coast Boulevard	• Bacteria	• Bacteria
Pacific Ocean Shoreline, Tourmaline Surf Park	• Bacteria	• Bacteria
Pacific Ocean Shoreline at Vallecitos Court		• Bacteria
Pacific Ocean Shoreline at La Jolla Shores Beach at Vallecitos		• Bacteria
Pacific Ocean Shoreline at Windansea Beach at Bonair Street	• Bacteria	• Bacteria
Pacific Ocean Shoreline at Windansea Beach at Palomar Ave.	• Bacteria	• Bacteria
Pacific Ocean Shoreline at Windansea Beach at Playa del Norte	• Bacteria	• Bacteria
Pacific Ocean Shoreline at Windansea Beach at Vista de la Playa	• Bacteria	• Bacteria
Pacific Ocean Shoreline at Whispering Sands Beach at Ravina Street	• Bacteria	• Bacteria

SOURCE: AMEC, 2016

3.6.3.3 Highest Priority Water Quality Conditions

The Mission Bay WMA WQIP (AMEC, 2016) provides the details of the process that assessed and identified the Highest Priority Water Quality Conditions based on the list of priority water quality conditions presented above in Table 3-16. The Mission Bay WMA WQIP (AMEC, 2016) used a similar method to San Luis Rey River WMA WQIP (LWA, 2016a) as discussed in Section 3.2.3.3. The highest priority water quality conditions are presented in Table 3-17.

TABLE 3-17
HIGHEST PRIORITY WATER QUALITY CONDITIONS IN THE MISSION BAY WMA

Highest Priority Condition	Dry Weather	Wet Weather
Impairment of REC-1 in Tecolote Creek	• Indicator bacteria in Tecolote Creek Subwatershed	• Indicator bacteria in Tecolote Creek Subwatershed
Impairment of ASBS 29	• N/A	• Sediment in Scripps Subwatershed
Potential Impairment of REC-1 at Pacific Ocean shoreline	• Indicator Bacteria in Scripps Subwatershed	• Indicator Bacteria in Scripps Subwatershed

SOURCE: AMEC, 2016c

3.6.4 Water Resources and Systems

No water supply agencies or reservoirs exist within the Mission Bay WMA.

A small portion of the Mission Valley Groundwater Basin exists under the southern portion of the WMA. The primary source of recharge for this basin is infiltration of stream flow from the San Diego River. In 1975 DWR estimated storage capacity to be 42,000 AF for this basin. In 1997 SDCWA estimated a total storage capacity of about 40,000 AF (DWR, 2004d). In the basin, magnesium and sulfate are high for domestic use. Chloride and TDS concentrations are high for domestic and irrigation use. Seawater intrusion is suspected (DWR, 1975; DWR, 2004d).

There is one wastewater treatment plant, the Metro Biosolids Center, which is located adjacent to the Miramar Landfill. The Metro Biosolids Center provides two treatment options: thickening and digestion of the raw solids generated at the North City Water Reclamation Plant, and the dewatering of the wet biosolids from both the Point Loma Wastewater Treatment Plant and North City Water Reclamation Plant. The facility produces dewatered biosolids.

Figure 3-34 shows a map of the water features within the Mission Bay WMA. Figure 3-36 shows a map of the water agencies and wastewater agencies within the Mission Bay WMA.

3.6.5 Natural Resources

Figure 3-37 shows the parks and open space within the Mission Bay WMA, including Hickman Field Park, Kate Sessions Memorial Park, Kearny Mesa Community Park, Kelly Street Preserve, La Jolla Heights Natural Park, Marian Bear Park, Mission Bay Athletic Area, Mission Bay Park, Mt. Acadia Park, Nobel Athletic Area, Rose Canyon Open Space, Tecolote Canyon Park, Torrey Pines State Preserve, and University Gardens Preserve.

The Mission Bay WMA provides critical habitat for two species: San Diego fairy shrimp and the Spreading navarretia (Figure 3-37).

3.6.6 Watershed Processes

In the 1940s, much of the existing coastal wetlands along Mission Bay was converted to a 4,000-acre aquatic park and residential land use area. Although Mission Bay Park is one of San Diego's principal tourism and leisure destinations, the development along the shores has led to water quality issues in the Bay and significant losses of wetlands.

Significant changes in the natural hydrology and geomorphology in the watershed have led to sedimentation issues in Mission Bay. Sources of sediment include erosion of canyon banks, exposed soils, bluffs, and scouring of stream banks, which have been exacerbated by land development in the watershed. Sediments enter Mission Bay from various sources, including Rose Creek, and impact water quality of the Bay.

The Kendall-Frost Marsh is located in the northeast corner of Mission Bay and receives flows containing urban runoff, pollutants, and sediments from stormwater outfalls. Historically, Rose Creek was connected to the marsh and provided freshwater inflows along with nutrients and sediment to the marsh. Since Rose Creek has been channelized, it no longer provides these necessary inputs to Kendall-Frost Marsh. The City of San Diego and the Audubon Society are currently looking at wetland restoration opportunities for the northeast corner of Mission Bay, including Kendall-Frost Marsh and Rose Creek.

3.7 San Diego River

3.7.1 San Diego River Watershed Management Area Description

The San Diego River WMA (HU 907) encompasses 277,554 acres. The San Diego River WMA consists of 75 percent County of San Diego unincorporated land. The remaining jurisdictional areas of the watershed include the City of El Cajon, City of La Mesa, City of San Diego, City of Santee, as well as several unincorporated jurisdictions (Figure 3-38). Although the County of San Diego generally would have land use authority in unincorporated areas, a significant percentage of this unincorporated area is under the jurisdiction of the federal government or sovereign Indian tribes and, thus, effectively outside the jurisdictional land use authority of the County.

The WMA consists of four HAs: Lower San Diego River (907.10), San Vicente (907.20), El Capitan (907.30), and Boulder Creek (907.40). These HAs are further broken down into 14 HSAs. The HUs and HAs for the San Diego River WMA are shown in Figure 3-39.

The San Diego River WMA consists of a single major drainage, the San Diego River, which flows through the entire WMA. Major San Diego River tributaries consist of Boulder Creek, Cedar Creek, Conejos Creek, Chocolate Creek, Los Coches Creek, San Vicente Creek, and Forester Creek (Figure 3-40).

3.7.2 Land Use

Land use within the San Diego River WMA is predominantly undeveloped (44 percent). Other land use classifications include open space/parks and recreation (23 percent), residential (19 percent), and transportation (6 percent). Agriculture, commercial, commercial recreation, industrial, military, public facility, and water land uses each make up less than 2 percent of the land use acreage (Weston, 2012).

Figure 3-41 shows the division of land by agency, including the military facilities at Marine Corps Air Station Miramar. The tribal nations of the Barona Band of Mission Indians, the Capitan Grande Group of Mission Indians, and the Inaja-Cosmit Band of Indians are located within the upper San Diego River Watershed. Part of the WMA is managed as the Cleveland National Forest. Additionally, portions of the WMA are managed by the BLM and categorized as BLM National conservation areas.

3.7.3 Water Quality

3.7.3.1 Applicable TMDLs and Special Biological Habitats

San Diego River WMA TMDLs

One TMDL, the Revised TMDL for Indicator Bacteria, Project 1—Twenty Beaches and Creeks in the San Diego Region (SDRWQCB, 2010), has been adopted in the San Diego River WMA. This covers bacteria in the Lower San Diego River as well as for Forester Creek. A draft TMDL is under development for Famosa Slough (SDRWQCB, 2016c). Table 3-18 summarizes the TMDLs and impaired 2010 303(d) listed water bodies in the San Diego River WMA and the pollutants listed as causing the impairment. The locations of these water bodies are mapped in Figure 3-40.

TABLE 3-18
TMDLS AND WATER QUALITY LIMITED SEGMENTS IN THE SAN DIEGO RIVER WMA

Sub Watershed	Water Body Name	Pollutant	Adoption Date
Lower San Diego (907.10)	Forester Creek	Bacteria	February 10, 2010
Lower San Diego (907.10)	Lower San Diego River	Bacteria	February 10, 2010
Lower San Diego (907.10)	Pacific Ocean Shoreline	Bacteria	February 10, 2010
Lower San Diego (907.10)	Famosa Slough	Eutrophication	In progress

Special Biological Habitats

In the San Diego River WMA, the following water bodies and areas are of special significance and can be classified as impaired for BIOL beneficial use:

- Rios Canyon
- San Diego River

3.7.3.2 Priority Water Quality Conditions

The San Diego River WMA WQIP (LWA, 2016b) provides a more detailed description of the process for determining the Priority Water Quality Conditions for this WMA. Priority water quality conditions are defined as receiving water conditions for which there is evidence that MS4 discharges may cause or contribute to the condition. An initial list of priority water quality conditions was developed in the San Diego River WMA WQIP (LWA, 2016b) by comparing receiving water conditions with evidence of MS4 contributions. The initial list was then compared with the public input that was provided during the October 3, 2013 and June 26, 2014 workshops and the public data call. The priorities identified in previous planning documents were also considered. Many of the same concerns were provided during the workshops and were evident in the third-party data. Finally, the overall potential for improvement of MS4 discharges to affect conditions within the overall WMA was considered. The list of priority water quality conditions was then finalized on the basis of these factors (Table 3-19).

TABLE 3-19
PRIORITY WATER QUALITY CONDITIONS IN THE SAN DIEGO RIVER WMA

Water Body	Dry Weather	Wet Weather
Famosa Slough and Channel	• Eutrophic	
Forester Creek	• Indicator Bacteria • Total Dissolved Solids	• Indicator Bacteria
Murray Reservoir	• Nitrogen	
Pacific Ocean Shoreline, at the San Diego River outlet, at Dog Beach	• Enterococcus • Total Coliform	• Enterococcus • Total Coliform
Lower San Diego River	• Enterococcus • Fecal Coliform • Nitrogen • Phosphorus • Total Dissolved Solids • IBI	• Enterococcus • Fecal Coliform
El Capitan Lake	• Phosphorus • Total Nitrogen as N	

SOURCE: LWA, 2016b

3.7.3.3 Highest Priority Water Quality Conditions

The San Diego River WMA WQIP (LWA, 2016b) presents the process that assessed and identified the Highest Priority Water Quality Conditions based on the list of priority water quality conditions presented above in Table 3-19. The San Diego River WMA WQIP (LWA, 2016b) used a similar method to the San Luis Rey River WMA WQIP (LWA, 2016a) as discussed in Section 3.2.3.3. The highest priority water quality conditions are presented in Table 3-20.

TABLE 3-20
HIGHEST PRIORITY WATER QUALITY CONDITIONS IN THE SAN DIEGO RIVER WMA

Water Body	Dry Weather	Wet Weather
Forester Creek	• Indicator Bacteria	• Indicator Bacteria
Pacific Ocean Shoreline, at the San Diego River outlet, at Dog Beach	• Enterococcus • Total Coliform	• Enterococcus • Total Coliform
Lower San Diego River	• Enterococcus • Fecal Coliform	• Enterococcus • Fecal Coliform

SOURCE: LWA, 2016b

3.7.4 Water Resources and Systems

The following watershed agencies in the San Diego River Watershed received water from SDCWA in 2015: City of San Diego (191,700 AF annually), Helix WD (31,100 AF), Padre Dam MWD (11,300 AF), Lakeside WD (3,700 AF), and Ramona MWD (6,100 AF) (SDCWA, 2015). Wastewater agencies include: City of San Diego, Padre Dam MWD, City of La Mesa, and City of El Cajon (Figure 3-42).

There are five reservoirs in the San Diego River WMA (Figure 3-40):

- El Capitan Reservoir, owned by the City of San Diego, can store up to 112,800 AF of surface water.
- San Vicente Reservoir, owned by the City of San Diego, can store up to 242,000 AF of both imported and surface water after project completion.
- Cuyamaca Reservoir, owned by Helix WD, can store up to 8,200 AF of surface water.
- Lake Jennings, owned by Helix WD, can store up to 9,800 AF of surface water.
- Lake Murray, owned by the City of San Diego, can store up to 4,800 AF of surface water.

Significant groundwater resources exist within the watershed, including the Mission Valley, San Diego River Valley, and El Cajon Valley groundwater basins (Figure 3-40). In 1975 DWR estimated the San Diego River Valley Groundwater Basin had a capacity of 97,000 AF. The total capacity of the El Cajon Valley groundwater basin is estimated to be about 32,500 AF (DWR, 1975). Groundwater use, however, is limited in downstream portions of the WMA due to high TDS concentrations. Additionally, a petroleum plume underneath Qualcomm Stadium and its parking lots impacts groundwater in Mission Valley.

3.7.5 Natural Resources

Figure 3-43 shows the parks and open space within the San Diego River WMA, including Anza-Borrego Desert State Park, Barnett Ranch Preserve, Boulder Oaks Preserve, Cuyamaca Mountain State Park, Mission Trails Open Space, Simon Preserve, Santa Ysabel East Preserve, and

Sycamore Canyon Open Space. Figure 3-43 also shows areas of the San Diego River WMA designated under the MSCP.

The San Diego River WMA provides critical habitat for five species, including Least Bell's vireo, San Diego fairy shrimp, Spreading navarretia, Arroyo Southwestern toad, and Southwestern willow flycatcher (Figure 3-43).

3.7.6 Watershed Processes

Major issues in the San Diego Watershed consist of urbanization and its effects on water quality, hydromodification, loss of habitat, and the presence of non-native species. Increased urban development has increased the impervious surface area in the watershed leading to increased urban runoff impacting surface water quality. Urbanization has, and will likely continue to affect the watershed hydrology and sediment transport patterns without proper management. Also at risk are the loss of native habitat in the watershed due to increased development and the presence of non-native invasive species. Invasive non-native plant species have been a significant problem of concern in the San Diego Watershed for many years. Many of the invasive non-native plants contribute to flooding, are a fire risk, and degrade native habitats.

Portions of the San Diego River have been altered and constrained due to heavy mining operations. Sand mining has impacted portions of the San Diego River by allowing sand to accumulate in the River, which creates ponding of water. Ponded water rapidly decreases its dissolved oxygen levels, negatively impacting aquatic life. Many mining operations in the San Diego River valley, however, are currently being phased out and restoration projects are underway.

3.8 San Diego Bay

3.8.1 San Diego Bay Watershed Management Area Description

The San Diego Bay WMA encompasses 282,584 acres and includes many jurisdictions, including the cities of San Diego, La Mesa, Lemon Grove, Chula Vista, Coronado, National City, Imperial Beach, the San Diego Unified Port District, the San Diego County Regional Airport Authority, and the County of San Diego. A map of the jurisdictions in the San Diego Bay WMA is provided in Figure 3-44. The watershed extends from the headwaters of the Sweetwater River in the east to San Diego Bay and the Pacific Ocean in the west.

The San Diego Bay WMA is different from other WMAs in San Diego County. The WMA comprises three very distinct HUs that are not hydrologically interconnected, but that have one final downstream receiving water body, namely San Diego Bay. The three HUs are Pueblo (908.00), Sweetwater (909.00), and Otay (910.00) (Figure 3-45). The Pueblo San Diego HU is comprised of three HAs: Point Loma (908.10), San Diego Mesa (908.20), and National City (908.30). The Sweetwater HU is comprised of three HAs: Lower Sweetwater (909.10), Middle Sweetwater (909.20), and Upper Sweetwater (909.30). The Otay HU is comprised of three HAs: Coronado (910.10), Otay (910.20), and Dulzura (910.30).

Major waterways within the San Diego Bay WMA include Otay River, Sweetwater River, Chollas Creek, Paradise Creek, Paleta Creek, and Switzer Creek (Figure 3-46).

3.8.2 Land Use

Land use within the overall San Diego Bay WMA is classified primarily as open space/parks and recreation (32 percent) and vacant and undeveloped land (25 percent). Other uses include residential (23 percent) and transportation (9 percent). Agriculture, commercial, commercial recreation, industrial, military, public facility, water, and under construction land uses each comprise 2 percent or less of the overall land use acreage (Weston, 2012).

Land use categories within the San Diego Bay WMA are shown on Figure 3-47, including multiple military facilities, including Naval Submarine Base San Diego, Fleet Anti-Submarine Warfare, Naval Base San Diego, Naval Amphibious Base Coronado, and Brown Field Naval Auxiliary Air Station. Four tribal nations live within the WMA: the Viejas, Cuyapaipe, Jamul Indian Village, and Sycuan Reservations. Portions of the WMA are managed as the Cleveland National Forest and the United States Fish and Wildlife Service (USFWS) Wildlife Refuge. Other parts of the WMA are managed by the BLM, including BLM Lands, BLM Wilderness Areas, and BLM National conservation areas.

3.8.3 Water Quality

3.8.3.1 Applicable TMDLs and Special Biological Habitats

San Diego Bay WMA TMDLs

Five TMDLs have been adopted in the San Diego Bay WMA. These include three for Chollas Creek (diazinon, metals, and bacteria), a copper TMDL for the Shelter Island Yacht Basin, and a Bacteria TMDL for multiple locations along the San Diego Bay shoreline. Table 3-21 summarizes the TMDLs that have been adopted or are in progress in the San Diego Bay WMA.

TABLE 3-21
TMDLS AND WATER QUALITY LIMITED SEGMENTS IN THE SAN DIEGO BAY WMA

Subwatershed	Water Body Name	Pollutant	Adoption Date
National City (908.10)	Chollas Creek	Diazinon	August 14, 2002
National City (908.30)	Chollas Creek	Copper, Lead, Zinc	June 13, 2007
National City (908.30)	Chollas Creek	Bacteria	February 10, 2010
Dulzura (908.10)	Shelter Island Yacht Basin	Copper	February 9, 2005
Dulzura (908.10), San Diego Mesa (908.20), National City (908.30), Lower Sweetwater (909.10)	San Diego Bay Shoreline	Bacteria	June 11, 2008
Dulzura (908.10), San Diego Mesa (908.20), National City (908.30), Lower Sweetwater (909.10), Coronado (910.10)	San Diego Bay	Marine Sediment	In progress

Special Biological Habitats

In the San Diego Bay WMA, the following water bodies and areas are of special significance and are classified as (1) impaired for BIOL beneficial use, (2) impaired for other beneficial use(s); or (3) not impaired:

- Impairment of BIOL:
  - None
- Impairment of other beneficial use(s):
  - San Diego Bay: 303(d)-listed for impaired Commercial, and Sport Fishing (COMM) (Polychloric Biphenyls (PCBs));
  - San Diego Bay Shoreline, North of 24th Street Marine Terminal: 303(d)-listed for impaired marine habitats beneficial use (MAR) (benthic community effects and sediment toxicity);
  - San Diego Bay Shoreline, Seventh Street Channel: 303(d)-listed for impaired MAR (benthic community effects and sediment toxicity);
  - Pacific Ocean Shoreline, Point Loma HA, at Bermuda Avenue: 303(d)-listed for impaired REC-1 and SHELL (total coliform);
  - San Diego Bay Shoreline, at Americas Cup Harbor: 303(d)-listed for impaired EST (copper);
  - San Diego Bay Shoreline, near Submarine Base: 303(d)-listed for impaired MAR (benthic community effects, sediment toxicity, and toxicity);
  - San Diego Bay Shoreline, Shelter Island Shoreline Park: 303(d)-listed for impaired REC-1 (Enterococcus, fecal coliform, and total coliform);
  - San Diego Bay, Shelter Island Yacht Basin: 303(d)-listed for impaired EST (dissolved copper);
  - San Diego Bay Shoreline, 32nd St. San Diego Naval Station: 303(d) listed for impaired (benthic community effects and sediment toxicity);
  - San Diego Bay Shoreline, at Harbor Island (East Basin): 303(d) listed for EST (copper);
  - San Diego Bay Shoreline, at Harbor Island (West Basin): 303(d)-listed for impaired EST (copper);
  - San Diego Bay Shoreline, at Marriott Marina: 303(d)-listed for impaired EST (copper);
  - San Diego Bay Shoreline, at Spanish Landing: 303(d)-listed for impaired REC-1 and SHELL (total coliform);
    - San Diego Bay Shoreline, Between Sampson and 28th Streets: 303(d)-listed for impaired MAR (copper and Polycyclic aromatic hydrocarbons (PAHs)), commercial and sport fishing beneficial use (COMM) (mercury and PCBs), and WARM (zinc);
  - San Diego Bay Shoreline, Downtown Anchorage: 303(d)-listed for impaired MAR (benthic community effects and sediment toxicity);

  - San Diego Bay Shoreline, G Street Pier: 303(d)-listed for impaired REC-1 and SHELL (total coliform);
  - San Diego Bay Shoreline, near Chollas Creek: 303(d)-listed for impaired MAR (benthic community effects and sediment toxicity);
  - San Diego Bay Shoreline, near Coronado Bridge: 303(d)-listed for impaired MAR (benthic community effects and sediment toxicity);
  - San Diego Bay Shoreline, near Switzer Creek: 303(d)-listed for impaired MAR (chlordane and PAHs);
  - San Diego Bay Shoreline, Vicinity of B St and Broadway Piers: 303(d)-listed for impaired MAR (Benthic community effects and sediment toxicity and REC-1 and SHELL (total coliform);
  - San Diego Bay Shoreline, at Bayside Park (J Street): 303(d)-listed for impaired REC-1 (Enterococcus and total coliform);
  - San Diego Bay Shoreline, Chula Vista Marina: 303(d)-listed for impaired EST (copper);
  - Pacific Ocean Shoreline, Coronado HA, at Silver Strand (north end, Oceanside): 303(d)-listed for impaired REC-1 (Enterococcus);
  - Pacific Ocean Shoreline, Imperial Beach Pier: 303(d)-listed for impaired REC-1 (fecal coliform and total coliform) and COMM (PCBs);
  - Pacific Ocean Shoreline, Otay Valley HA, at Carnation Ave and Camp Surf Jetty: 303(d)-listed for impaired REC-1 (total coliform);
  - San Diego Bay Shoreline, at Coronado Cays: 303(d)-listed for impaired EST (copper);
  - San Diego Bay Shoreline, at Glorietta Bay: 303(d)-listed for impaired EST (copper);
  - San Diego Bay Shoreline, Tidelands Park: 303(d)-listed for impaired REC-1 (Enterococcus and total coliform); and
  - Jamul Creek: 303(d)-listed for impaired WARM (toxicity).
- Not impaired:
  - San Diego Bay National Wildlife Refuge (NWR)–Sweetwater Marsh Unit; and
  - San Diego Bay NWR–South Bay Unit.

3.8.3.2 Priority Water Quality Conditions

The San Diego Bay WMA WQIP (SDBRP, 2016) provides a detailed description of the process for determining the Priority Water Quality Conditions for this WMA. Priority water quality conditions are defined as receiving water conditions for which there is evidence that MS4 discharges may cause or contribute to the condition. An initial list of priority water quality conditions was developed in the San Diego Bay WMA WQIP (SDBRP, 2016) by comparing receiving water conditions with evidence of MS4 contributions. The initial list was then compared with the public input that was provided during the September 5, 2013 workshop and the public data call. The priorities identified in previous planning documents were also considered. Many of the same concerns were provided during the workshop and were evident in the third-party data. Finally, the overall potential for improvement of MS4 discharges to affect conditions within the overall WMA was considered. The list of priority water quality conditions was then finalized on the basis of these factors. The final list of priority water quality conditions is presented in Table 3-22.

TABLE 3-22
PRIORITY WATER QUALITY CONDITIONS IN THE SAN DIEGO BAY WMA

HA/HAS, Water Body	Dry Weather	Wet Weather
Point Loma/908.1, Shelter Island Yacht Basin	• Metals (Dissolved Copper),	• Metals (Dissolved Copper),
Point Loma/908.1, Shelter Island Shoreline Park	• Bacteria	• Bacteria
Pueblo, San Diego Mesa/908.22, Chollas Creek	• Metals (Dissolved Copper, zinc, and lead)	• Metals (Dissolved Copper, zinc, and lead)
San Diego Mesa/908.22, Chollas Creek		• Bacteria
San Diego Mesa/908.22, Chollas Creek	• Diazinon	• Diazinon
San Diego Mesa/908.22, Chollas Creek	• Phosphorus	• Total Nitrogen
San Diego Mesa/908.22, Chollas Creek	• Trash	• Trash
San Diego Mesa/908.22, Chollas Creek (at Mouth)		• PAHs
San Diego Mesa/908.22, Chollas Creek (at Mouth)		• Chlordane
Diego Mesa/908.22, Chollas Creek (at Mouth)		• PCBs
San Diego Mesa/ 908.2, San Diego Bay Shoreline, between Sampson and 28th Streets	• PAHs	• PAHs
San Diego Mesa/908.2, San Diego Bay Shoreline, between Sampson and 28th Streets	• Mercury	• Mercury
San Diego Mesa/908.2, San Diego Bay Shoreline, between Sampson and 28th Streets	• PCBs	• PCBs
San Diego Mesa/908.2, San Diego Bay Shoreline, between Sampson and 28th Streets	• Zinc	• Zinc
San Diego Mesa/908.2, San Diego Bay Shoreline, near Switzer Creek (at the Mouth)		• PAHs
San Diego Mesa/908.2, San Diego Bay Shoreline, near Switzer Creek (at the Mouth)		• PCBs
San Diego Mesa/908.2, San Diego Bay Shoreline, near Switzer Creek (at the Mouth)		• Chlordane
National City/908.3, Mouth of Paleta Creek/Seventh Street Channel		• PAHs
National City/908.3, Mouth of Paleta Creek/Seventh Street Channel		• PCBs
National City/908.3, Mouth of Paleta Creek/Seventh Street Channel		• Chlordane
Lower Sweetwater (909.1), Lower Sweetwater River below reservoir	• Bacteria	• Bacteria
Lower Sweetwater (909.1), Lower Sweetwater River below reservoir	• Nutrients	• Nutrients
Lower Sweetwater (909.1)	• Trash	• Trash
Middle Sweetwater (909.2)	• Bacteria	• Bacteria
Coronado/910.1, Pacific Ocean Shoreline at Carnation Ave and Camp Surf Jetty	• Bacteria	• Bacteria
Coronado/910.1, Pacific Ocean Shoreline at Tidelands Park	• Bacteria	• Bacteria
Dulzura/910.3, Lower Otay Reservoir	• Nitrogen	• Nitrogen

SOURCE: SDBRPs, 2016

3.8.3.3 Highest Priority Water Quality Conditions

The San Diego Bay WMA WQIP (SDBRPs, 2016) presents the process that assessed and identified the Highest Priority Water Quality Conditions based on the list of priority water quality conditions presented above in Table 3-22. The San Diego Bay WMA WQIP (SDBRPs, 2016) used a similar method to the San Luis Rey River WMA WQIP (LWA, 2016a) as discussed in Section 3.2.3.3. The highest priority water quality conditions are presented in Table 3-23.

TABLE 3-23
HIGHEST PRIORITY WATER QUALITY CONDITIONS IN SAN DIEGO BAY WMA

Impaired Water Body	Pollutant/Stressor	Beneficial Use Impaired
Chollas Creek	• Bacteria • Dissolved copper, lead, and zinc	Water Quality

SOURCE: SDBRPs, 2016

3.8.4 Water Resources and Systems

The San Diego Bay WMA is served by multiple water districts receiving water from SDCWA in 2015, including the City of San Diego (191,700 AF), South Bay ID (13,600 AF annually), Helix WD (31,100 AF), Otay WD (34,500 AF), and Padre Dam MWD (11,300 AF) (SDCWA, 2015) (Figure 3-48). The Viejas Reservation and Sycuan Reservation located within the Sweetwater HU both operate onsite water systems (3-48).

The Metropolitan (Metro) Sewerage System, owned by the City of San Diego and operated by the San Diego Metro Wastewater Joint Powers Authority, serves the majority of the Pueblo HU (Figure 3-48). National City has its own wastewater division that maintains the City's sanitary sewer main and lines, closed storm collection systems, and pump stations. The Metro Sewerage System is responsible for treating most of the wastewater from cities located in the Pueblo HU, along with the western portions of the Sweetwater and Otay Watersheds. Other Wastewater Agencies within the WMA include Lemon Grove and Spring Valley (Figure 3-48).

Otay Water Treatment Plant is located near Savage Dam and is the only water treatment plant in the Otay HU. The Otay Water Treatment Plant is a conventional water treatment plant with a capacity to treat up to 40 MGD, though it currently produces approximately 34 MGD (CSD, 2011). Developed cities within the Otay HU, including portions of Chula Vista, San Diego, and Imperial Beach, are connected to the sewer system. The few developments in the unincorporated areas in the north, south, and east portion of the Otay HU are all connected to septic systems.

The Pueblo HU uses imported water and water stored in reservoirs in other HUs. The Sweetwater HU has two major reservoirs, Loveland Reservoir and Sweetwater Reservoir, which are both operated by Sweetwater Authority. Both reservoirs trap rainfall and melting snow from the surrounding mountains and store natural runoff. Combined, both reservoirs can store approximately 52,200 AF of water. The Otay HU contains two major water supply reservoirs:

- Upper Otay Reservoir, owned by the City of San Diego, can store up to 2,825 AF.

- Lower Otay Reservoir, owned by the City of San Diego, can store up to 49,800 AF of surface and imported waters.

There are three groundwater basins located in the San Diego Bay WMA (Figure 3-46). No groundwater supply is currently developed within the Pueblo HU, but portions of the San Diego Formation (a deep confined groundwater aquifer) underlie portions of the watershed (Figure 3-46). Groundwater production in the Pueblo HU is limited due to lack of storage capacity in the basin, availability of groundwater recharge, and degraded water quality. Portions of the Mission Valley Groundwater Basin also underlie the Pueblo HU.

The Sweetwater Valley Groundwater Basin is a large groundwater basin that empties into the San Diego Bay underlying the Pueblo and Sweetwater HUs (Figure 3-46). Generally, the groundwater in the alluvium is of a sodium-calcium chloride character, with a TDS concentration ranging from 300 to more than 50,000 mg/L. In the San Diego Formation, the water is of a sodium chloride character and the TDS content ranges from 600 to 1,600 mg/L (USACOE 1982). Data from 9 public supply wells shows TDS concentration ranging from 1,249 to 3,320 mg/L, with an average of approximately 2,114 mg/L. TDS, chloride and sodium content of the groundwater generally exceed the recommended limits for drinking (DWR, 2004o). Groundwater in the Sweetwater HU is pumped by Sweetwater Authority.

The Otay Valley Groundwater Basin has unknown storage capacity(DWR, 2004e). Groundwater in the coastal plain part of this basin has a sodium chloride character and ranges in TDS content from about 500 to more than 2,000 mg/L (DWR, 2004e). Groundwater in the eastern portion of the basin ranges from sodium-calcium bicarbonate-chloride to sodium-calcium chloride-bicarbonate in character (DWR, 1967). Concentration of TDS in water from the San Diego Formation ranges from 342 to about 12,000 mg/L throughout the region (DWR, 2004e). Groundwater is rated marginal to inferior for domestic use in the coastal plain because of high TDS content and suitable in the eastern part of the basin (DWR, 1967). Water is rated marginal to inferior for irrigation use for most of the basin because of high chloride concentrations (DWR, 1967). Groundwater production in the Otay HU is mostly from private wells for domestic use and irrigation in the unincorporated eastern portions of the HU. Recharge in the basin is derived from percolation of precipitation, stream-flow originating in the valley highlands, return of applied water, and from the rare releases from the Lower Otay Reservoir during flood conditions.

3.8.5 Natural Resources

Figure 3-49 shows the parks and open space within the San Diego Bay WMA, including Balboa Park, Cuyamaca Mountain State Park, Cuyamaca Rancho State Park, Lawrence and Barbara Daley Preserve, Otay Valley Regional Park, Pilcha Community Park, Stoneridge Preserve, and Sweetwater Regional Park. Approximately 36 square miles of the Otay HU is part of the MSCP (Figure 3-49).

The San Diego Bay WMA provides critical habitat for nine species, including Least Bell’s vireo, Otay tarplant, San Diego fairy shrimp, Spreading navarretia, Quino checkerspot butterfly, Arroyo Southwestern Toad, Riverside Fairy shrimp, Southwestern willow flycatcher, and Western snowy plover (Figure 3-49).

3.8.6 Watershed Processes

Major issues in the San Diego Bay WMA consist of surface water quality degradation, habitat degradation, and sediment toxicity in San Diego Bay due to urbanization. Due to damming, the Sweetwater River is now nearly dry most of the year except during the winter, when releases are made from the Loveland Reservoir. These releases have had an impact on the arroyo toad, a federally listed endangered species and a state species of special concern. Similarly, the Otay River flows are significantly controlled via dams and reservoirs which has significantly altered the River flow regimes. The altered flow regime impacts habitat, the chemical and physical characteristics of the River, and the sediment distribution downstream (RWMG, 2013).

3.9 Tijuana

3.9.1 Tijuana Watershed Management Area Description

The Tijuana River Watershed is the largest of the San Diego watersheds. It encompasses over 1.1 million acres, 299,263 of which are in San Diego County. The Tijuana River WMA makes up 27 percent of the full Tijuana watershed and is under the jurisdiction of three separate entities, including the County of San Diego, City of San Diego, and City of Imperial Beach. The remaining area of the watershed (73 percent) is within the jurisdiction of Mexico (Figure 3-50).The Tijuana River is formed by two drainage networks that merge in the City of Tijuana, flow across the U.S. border into the Tijuana River Estuary, and ultimately drain to the Pacific Ocean.

The portion of the WMA located in San Diego County is comprised of the following eight HAs: Tijuana Valley (911.10), Potrero (911.20), Barrett Lake (911.30), Monument (911.40), Morena (911.50), Cottonwood (911.60), Cameron (911.70), and Campo (911.80). There are 18 HSAs in the Tijuana River WMA. The HUs and HAs for the Tijuana River WMA are shown in a map provided in Figure 3-51.

Major water bodies in the WMA include the Tijuana River, Cottonwood Creek, Barrett Lake, Lake Morena, Pine Valley Creek, Campo Creek, and Tijuana River Estuary (Figure 3-52). On the Mexican side of the border, major water bodies include Tecate Creek, Rio Alamar, and Rodriguez Reservoir.

This SWRP covers only the portion of the Tijuana Watershed located within San Diego County and not the portions that extend into Mexico.

3.9.2 Land Use

Dominant land uses in the U.S. portion of the watershed are vacant and undeveloped land (59 percent) and open space/parks and recreation (25 percent). Other land uses include residential (9 percent), agriculture (3 percent), and transportation (2 percent). Commercial, commercial recreation, industrial, military, public facility, construction, and water land uses account for the remaining 2 percent of the land area in the U.S. portion of the watershed (SANDAG, 2009). The land use in the Mexican portion of the WMA is predominately vacant and undeveloped land

(81.8 percent). Much of Mexico's lands classified as undeveloped are used for low-intensity cattle and goat grazing (Weston, 2012).

Land use categories within the Tijuana River WMA are shown on Figure 3-53, including military facilities at Naval Outlying Field Imperial Beach and U.S. Navy LA Posta Microwave Station. Tribal lands associated with four separate tribal reservations are located within the U.S. portion of the upper Tijuana Watershed. Those tribal reservations include the Cuyapaipe Reservation, Manzanita Reservation, La Posta Reservation, and Campo Reservation. These tribal lands account for approximately 8 percent of the total area of the Tijuana Watershed that is located within the U.S. Portions of the WMA are managed as the Cleveland National Forest and the USFWS Wildlife Refuge. Other parts of the WMA are managed by the BLM, including BLM Lands, BLM Wilderness Areas, and BLM National conservation areas.

3.9.3 Water Quality

3.9.3.1 Applicable TMDLs and Special Biological Habitats

Tijuana River WMA TMDLs

No TMDLs have been adopted for the Tijuana River WMA, but a bacteria TMDL is in progress for the Tijuana River and Estuary (Table 3-24).

TABLE3-24
TMDLS AND WATER QUALITY LIMITED SEGMENTS IN THE TIJUANA RIVER WMA

Sub Watershed	Water Body Name	Pollutant	Adoption Date
Tijuana Valley (911.10)	Tijuana River and Estuary	• Bacteria	In progress

Special Biological Habitats

Biological habitats of special significance within the Tijuana River WMA include the following portions of the Tijuana River Estuary (SDRWQCB, 2012c):

- Tijuana Estuary Natural Preserve, designated as a Natural Preserve by the State Park and Recreation Commission;
- Tijuana River National Estuarine Research Reserve, designated a National Estuarine Research Reserve by the National Oceanic and Atmospheric Administration, including Border Field State Park; and
- Tijuana Slough NWR, managed by the USFWS as part of the NWR System.

3.9.3.2 Priority Water Quality Conditions

The Tijuana River WMA WQIP (URS, 2016) provides a detailed description of the process for determining the Priority Water Quality Conditions for this WMA. The WQIP identified receiving water conditions and impacts from MS4 discharges to assess and develop a list of priority water quality conditions. Priority water quality conditions are defined as receiving water conditions for which there is evidence that MS4 discharges may cause or contribute to the condition. An initial list of priority water quality conditions was developed and then compared with the public input that was provided during the January 28, 2013 workshop and the public data call. The priorities identified in previous planning documents were also considered. Many of the same concerns were provided during the workshop and were evident in the third-party data. Finally, the overall potential for improvement of MS4 discharges to affect conditions within the overall WMA was considered. The list of priority water quality conditions was then finalized on the basis of these factors. The final list of priority water quality conditions is presented in Table 3-25.

TABLE 3-25
PRIORITY WATER QUALITY CONDITIONS IN THE TIJUANA RIVER WMA

Water Body	Dry Weather	Wet Weather
Tijuana River	• Impairment of WARM because of Sedimentation/Siltation/Solids/TSS • Elevated turbidity • Impairment of REC-1 because of indicator bacteria • Impairment of WARM because of low DO • Impairment of WARM because of nutrients • Impairment of REC-1 because of surfactants (MBAS) • Impairment of REC-2 because of trash • Impairment of WARM because of pesticides • Impairment of MUN because of synthetic organics • Impairment of WARM because of toxicity	• Impairment of WARM because of Sedimentation/Siltation/Solids/TSS • Elevated turbidity • Impairment of REC-1 because of indicator bacteria • Impairment of WARM because of low DO • Impairment of WARM because of nutrients • Impairment of REC-1 because of surfactants (MBAS) • Impairment of REC-2 because of trash
Tijuana River Estuary	• Impairment of MAR because of turbidity • Impairment of REC-1 because of indicator bacteria • Impairment of MAR because of low DO • Impairment of REC-2 because of trash	• Impairment of MAR because of turbidity • Impairment of REC-1 because of indicator bacteria • Impairment of MAR because of low DO • Impairment of REC-2 because of trash
Pacific Ocean Shoreline	• Impairment of REC-1 because of indicator bacteria	• Impairment of REC-1 because of indicator bacteria
Campo Creek	• Elevated indicator bacteria (dry weather) • Elevated nutrients (dry weather) • Elevated TDS (dry weather)	
Barrett Lake	• Impairment of WARM because of nutrients	• Impairment of WARM because of nutrients
Morena Reservoir		• Impairment of WARM because of nutrients

SOURCE: URS, 2016

3.9.3.3 Highest Priority Water Quality Conditions

The Tijuana River WMA WQIP (URS, 2016) provides the details of the process that assessed and identified the Highest Priority Water Quality Conditions based on the list of priority water quality conditions presented above in Table 3-24. The Tijuana River WMA WQIP (URS, 2016) used a similar method to the San Luis Rey River WMA WQIP (LWA, 2016a) as discussed in Section 3.2.3.3. The highest priority water quality conditions are presented in Table 3-26.

TABLE 3-26
HIGHEST PRIORITY WATER QUALITY CONDITIONS IN THE TIJUANA RIVER WMA

Highest Priority Condition	Dry Weather	Wet Weather
Tijuana River		• Sedimentation/Siltation
Tijuana River		• Turbidity
Tijuana Estuary		• Turbidity

SOURCE: URS, 2016

3.9.4 Water Resources and Systems

Two water agencies serve the Tijuana River WMA, the City of San Diego and Otay WD, which both purchase water from SDCWA. In 2015 SDCWA provided 191,700 AF to the City of San Diego and 34,500 AF to the Otay WD. The Tijuana River WMA has two water supply reservoirs where purchased water can be stored:

- Morena Reservoir, owned by City of San Diego, can store up to 50,700 AF of surface water (CSD, 2012d).
- Barrett Reservoir, owned by City of San Diego, can store up to 34,800 AF of surface water (CSD, 2012c).

The Tijuana River WMA has four underlying groundwater basins: Tijuana, Cottonwood Valley, Campo Valley, and Potrero Valley (Fig 3-52). The Tijuana groundwater basin (estimated storage capacity 50,000 to 80,000 AF (DWR, 1975)) underlies the portion of the coastal Tijuana River Valley that lies in California. In the Tijuana groundwater basin, the alluvium contains water of sodium chloride character. TDS content for this water typically ranges from 1,120 to 3,620 mg/L, although, less than 1,000 mg/L is found beneath some side canyons (Izbicki, 1985). Groundwater in the San Diego Formation is sodium chloride in character and TDS content ranges from 380 to 2,360 mg/L (Izbicki, 1985). Chloride and sulfate concentrations have exceeded the maximum contaminant level (MCL) in some wells in the basin (Izbicki, 1985). The MCL for aluminum, barium, lead, selenium, and silver concentrations are exceeded individually in some wells in the basin (DWR, 2006). Cottonwood Valley groundwater basin (storage capacity unknown) underlies portions of Cottonwood, Cameron, and La Posta Valley in eastern San Diego County. Groundwater in this basin is predominantly calcium bicarbonate in character with TDS content ranging from about 130 to 645 mg/L (DWR, 1967). Campo Valley groundwater basin (estimated storage capacity estimated 63,450 AF (Erickson and Kingery, 1983)) underlies the Campo Valley. The alluvium contains water of calcium bicarbonate character. Electrical conductivity readings are around 800 µmho (Erickson and Kingery, 1983). In the 1960s, TDS concentrations ranged from 219 to 480 mg/L (DWR 1967) and in the 1970s were less than 800 mg/L (DWR, 2003). The groundwater in this basin was generally rated suitable for domestic and irrigation uses (DWR, 1967). Potrero Valley groundwater basin (storage capacity unknown) underlies a small valley 30 miles inland from San Diego and about two miles from the Mexican border. In this basin, water character is variable, with calcium and sodium as the dominant cations and bicarbonate and chloride as the dominant anions (DWR 1967). TDS content ranges from 283 to 305 mg/L, and groundwater is designated as suitable for domestic and irrigation use (DWR, 1967). Recharge for the groundwater basins in the Tijuana River WMA is primarily from percolation from ephemeral stream flow or reservoir releases. Some recharge also occurs from irrigation and discharge from septic tanks.

The Metro Sewerage System, owned by the City of San Diego and operated by the San Diego Metro Wastewater Joint Powers Authority, serves the lower portion of the WMA (Figure 3-54). The South Bay International Wastewater Treatment Plant, located in San Diego County just two miles west of the San Ysidro Port of Entry treats sewage originating in Tijuana, Mexico and discharges it to the Pacific Ocean. The South Bay Water Reclamation Plant is a water reclamation plant owned and operated by the City of San Diego, and located in the Tijuana River Valley (RWMG, 2013).

3.9.5 Natural Resources

Figure 3-55 shows the parks and open space within Tijuana River WMA, including Border Field State Park, Lake Morena Park, Cuyamaca Rancho State Park, Otay Mitigation Site, and Potrero Park. Areas of the Tijuana River WMA designated under the MSCP are also shown in Figure 3-55.

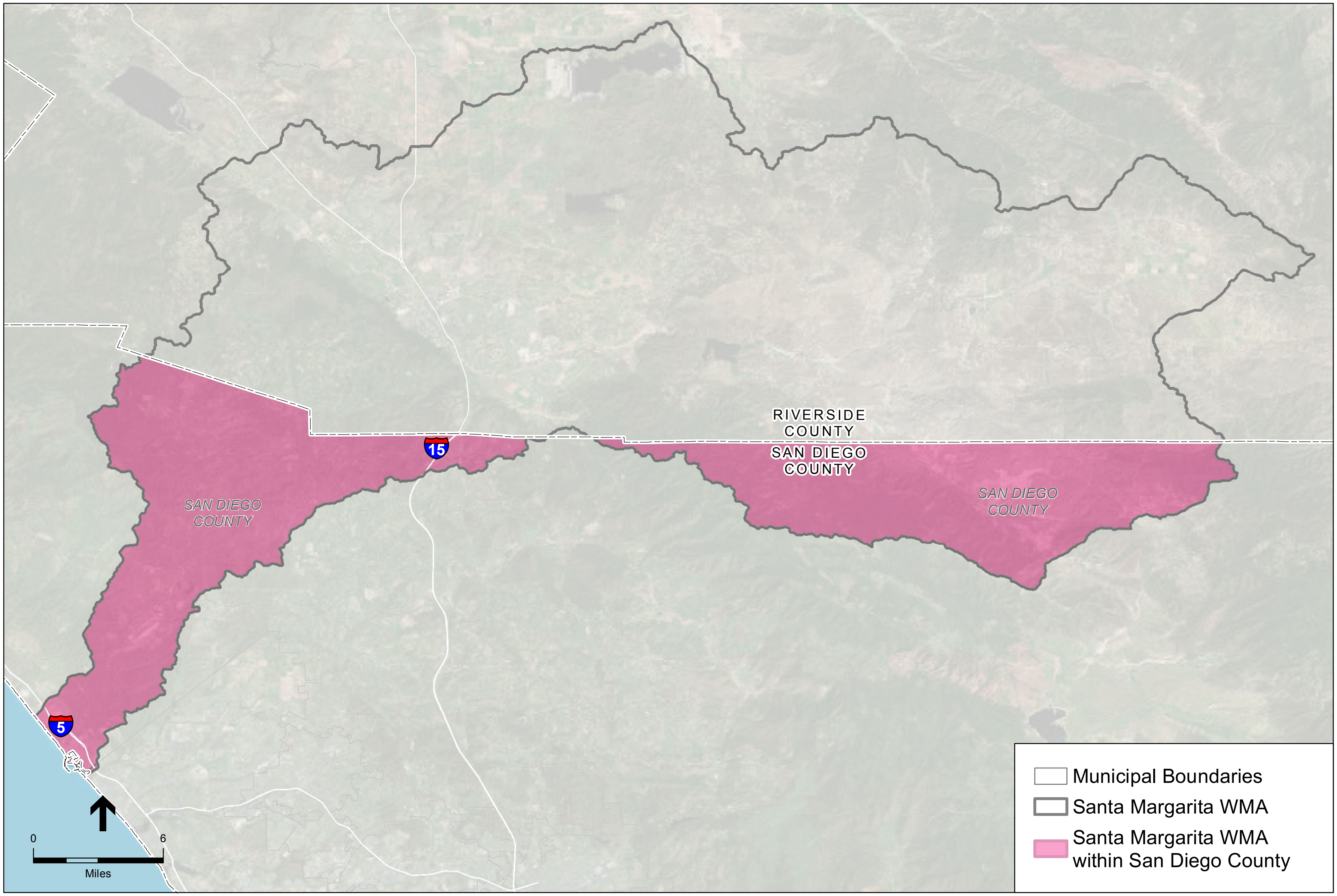
The Tijuana River WMA provides critical habitat for nine species, including Least Bell's vireo, Otay tarplant, San Diego fairy shrimp, Spreading navarretia, Quino checkerspot butterfly, Arroyo Southwestern Toad, Laguna Mountains Skipper, Riverside Fairy shrimp, and Western snowy plover. These critical habitats are shown in Figure 3-55.

3.9.6 Watershed Processes

The Tijuana Watershed has various environmental problems impacting both sides of the international border. Pollution impacts public health, the environment, and the economy of San Diego-Tijuana border communities.

Unplanned development, industry, and population growth in Tijuana has led to an increase in water quality issues, especially since many new developments in Mexico near the Tijuana River have no sewer infrastructure. Additionally, Mexico does not have a federal program like the USEPA's NPDES program to minimize the threat of pollutants entering waterways.

The Department of Homeland Security has allowed for construction projects under the U.S. Border Fence program to be exempt from environmental regulations which could degrade habitat and water quality in the Tijuana Watershed. The border fence itself is also considered a significant hydromodification that impacts hydrology and natural hydrologic flows.

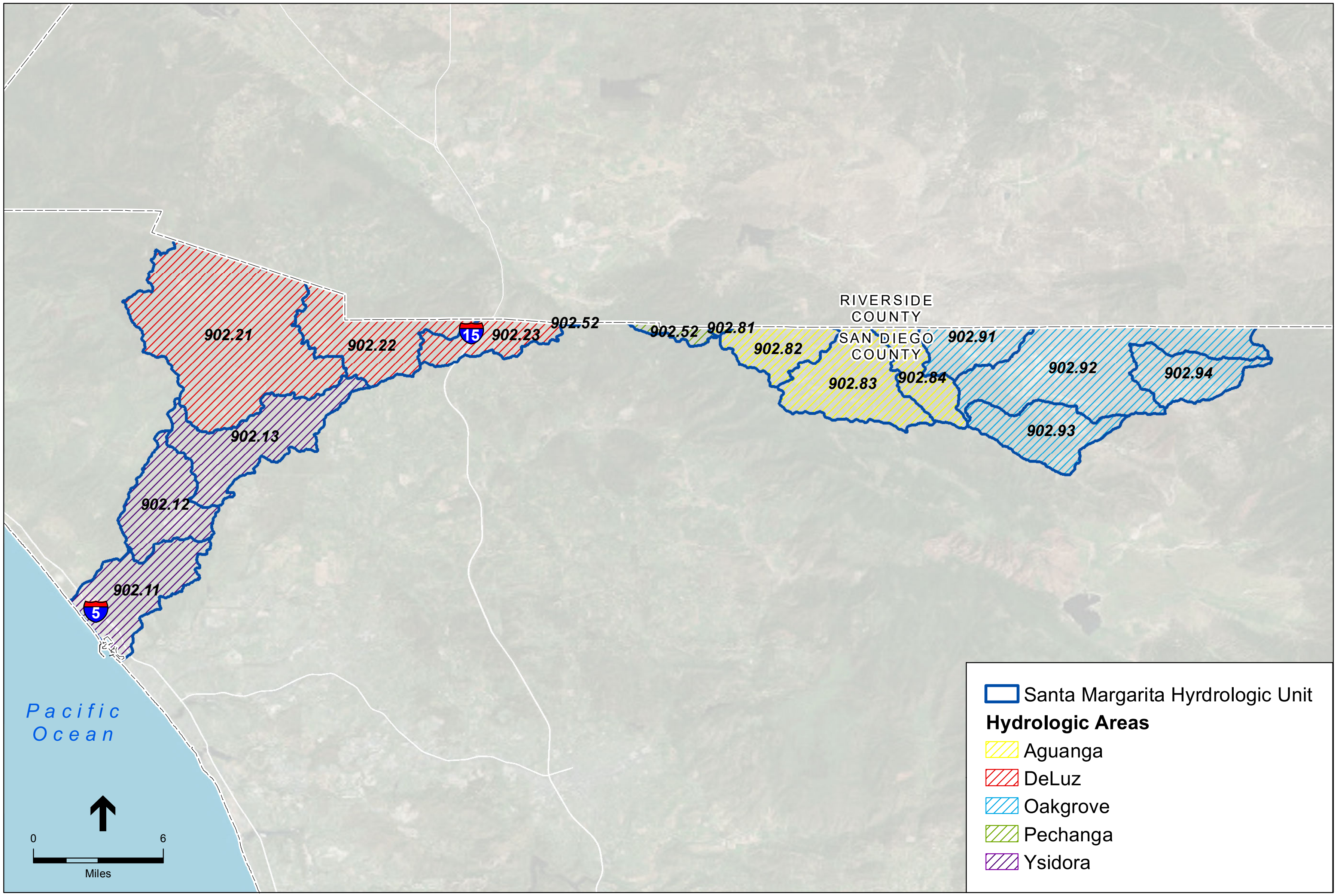


SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

Figure 3-2

City Boundaries within the Santa Margarita Water Management Area

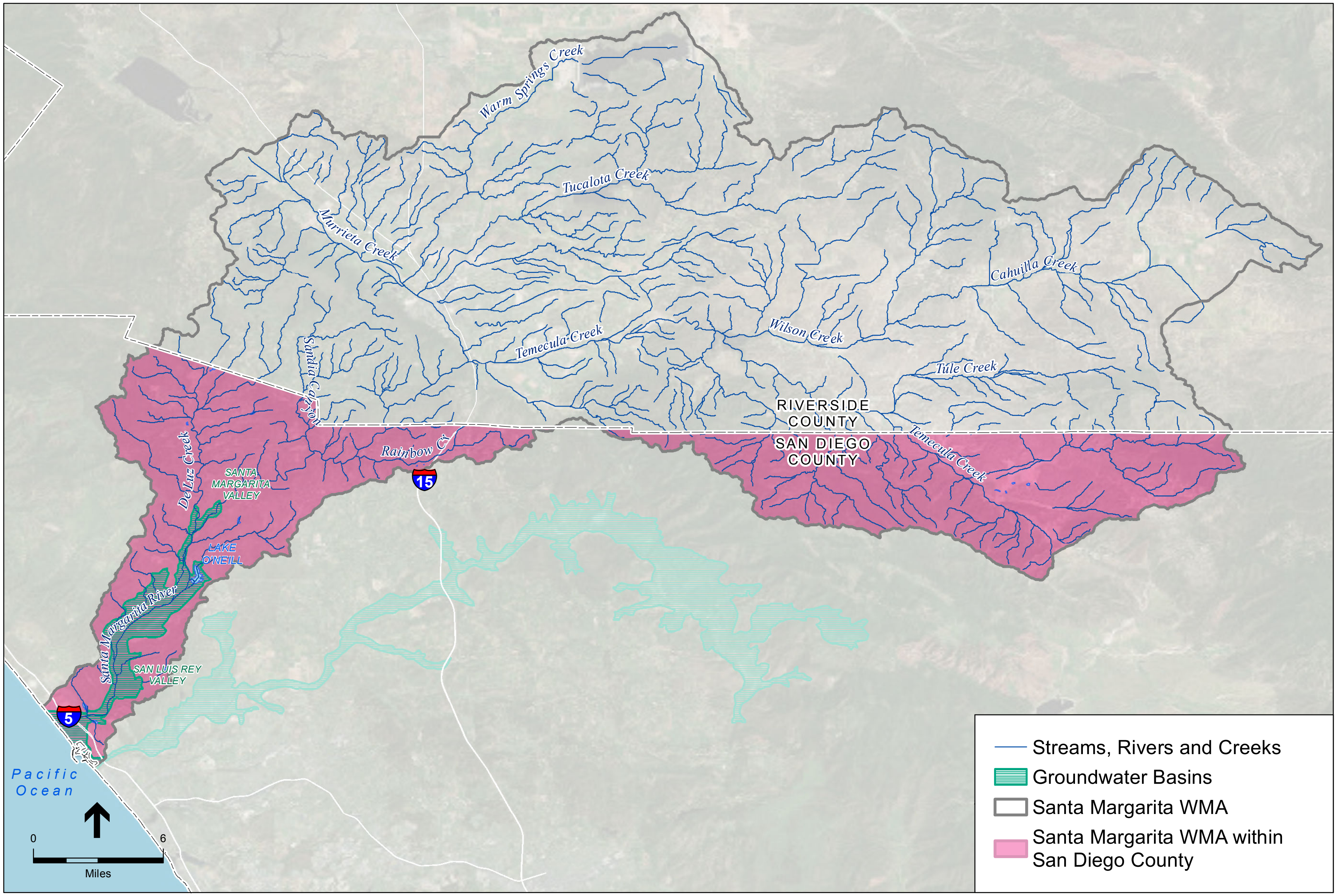


SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

Figure 3-3

Hydrologic Units and Areas within the Santa Margarita Water Management Area

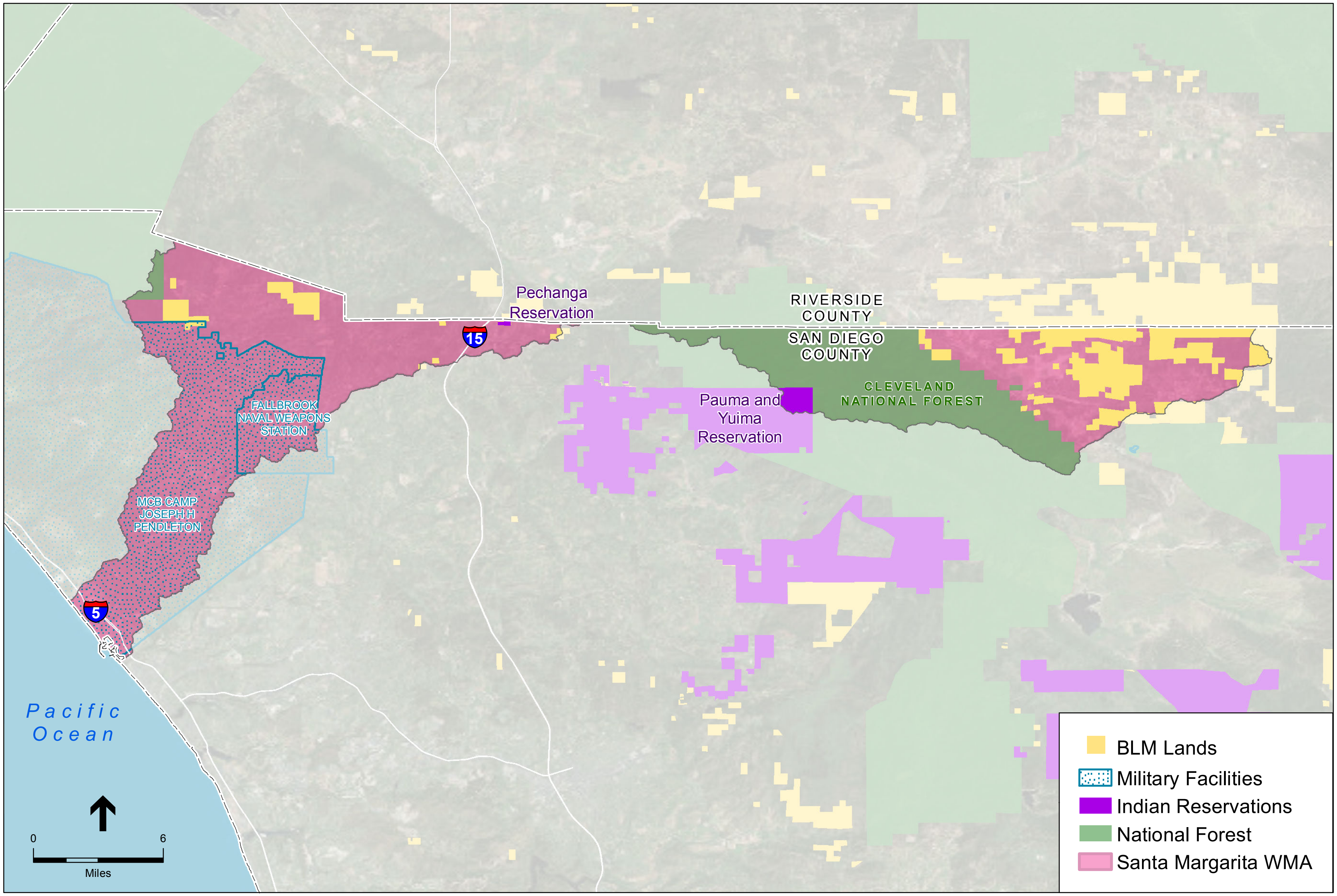


SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

Figure 3-4

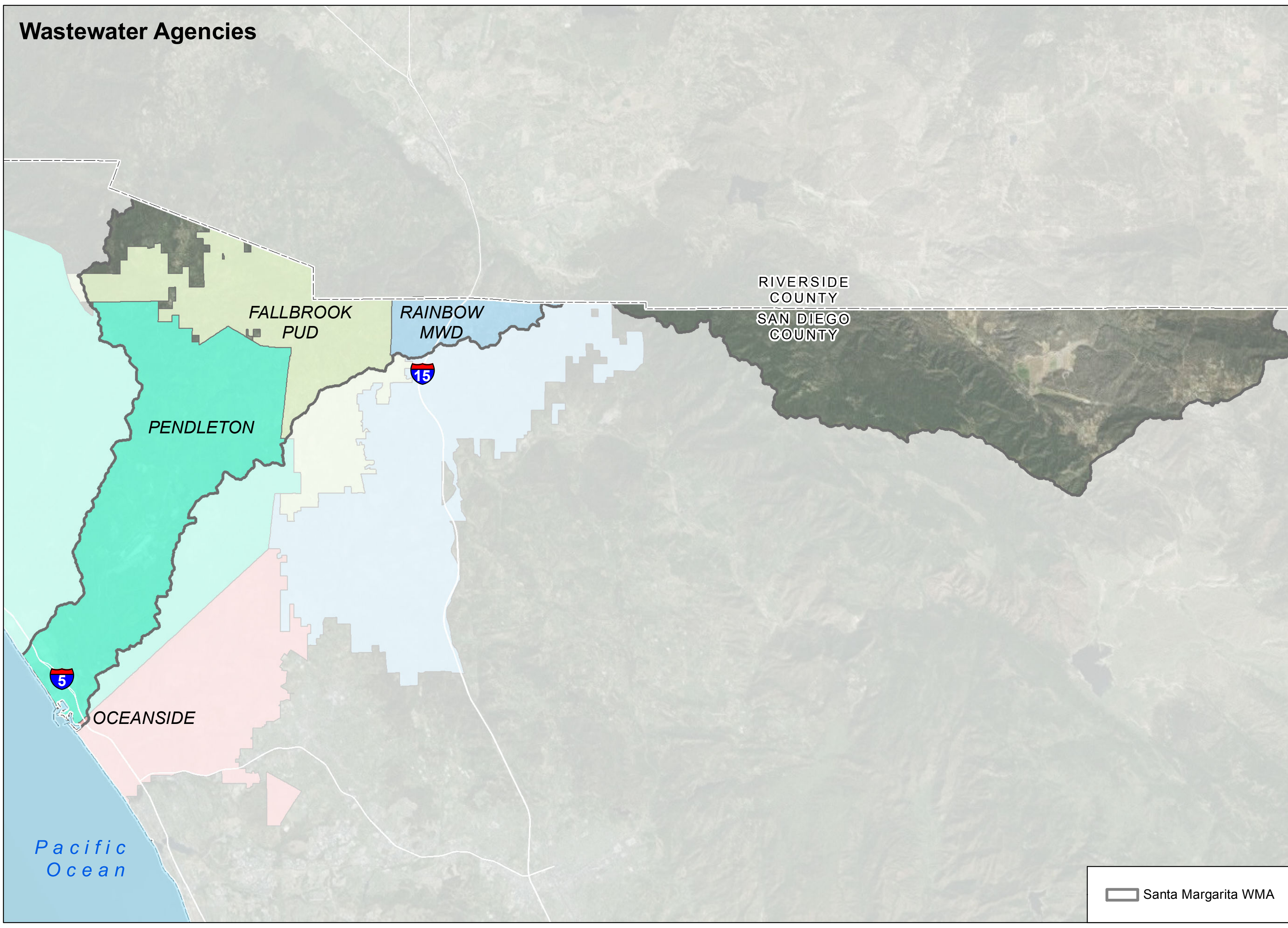
Water Features within the Santa Margarita Water Management Area

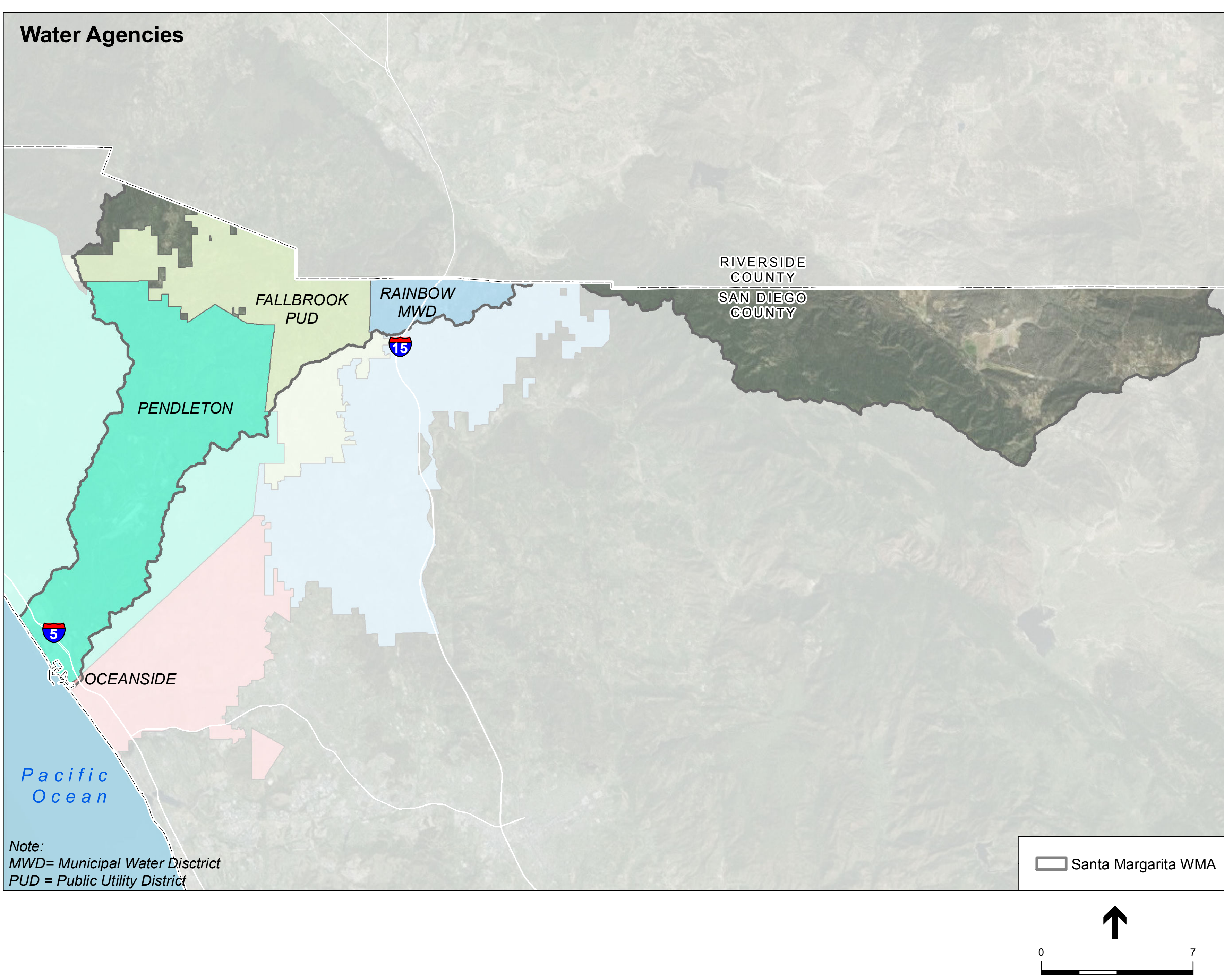


SOURCE: ESRI, 2016; SanGIS, 2016; Bureau of Land Management

SWRP . 160618

Figure 3-5
Land Use Agencies within the Santa Margarita Water Management Area

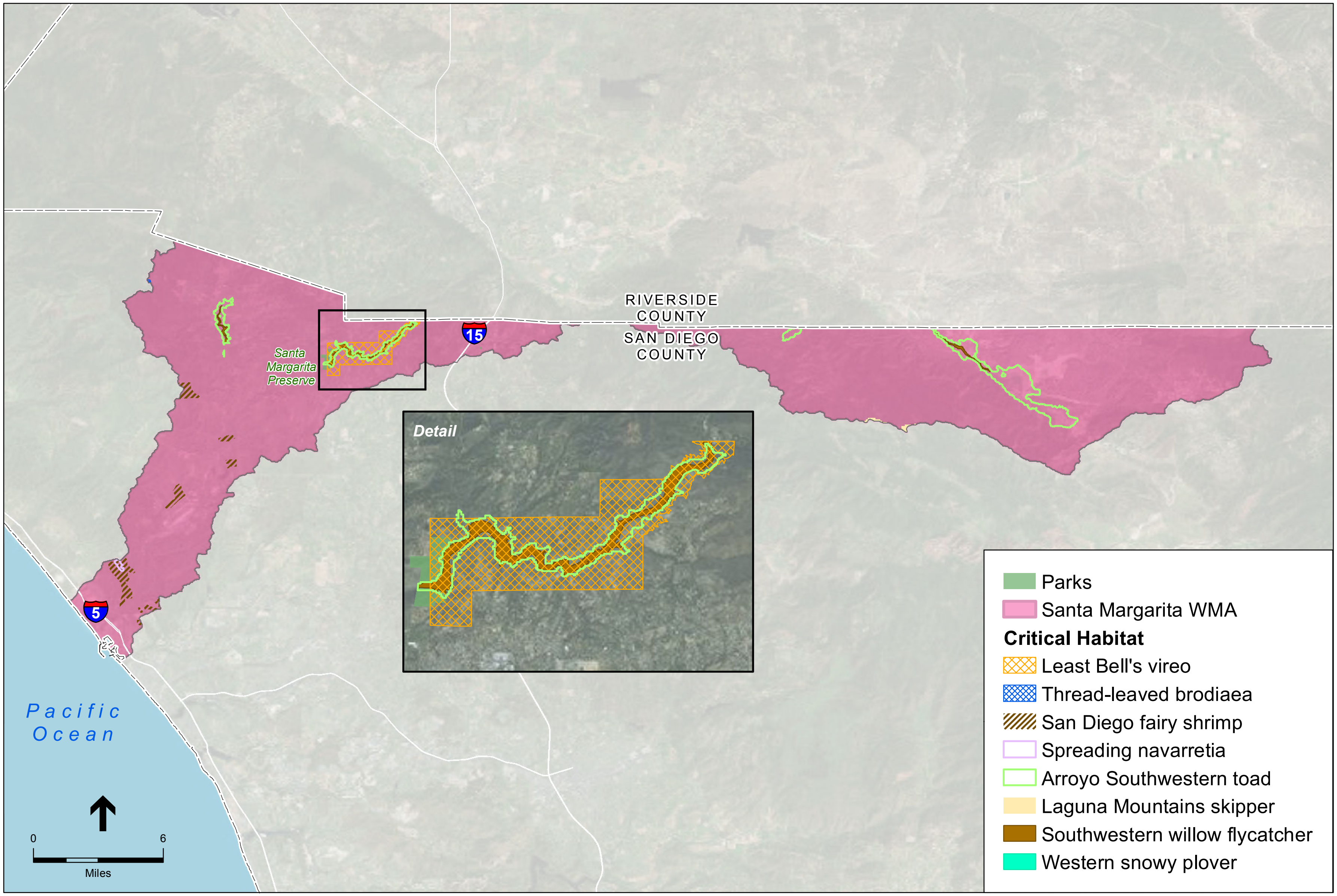




SOURCE: ESRI, 2016; SanGIS, 2016; IRWM, 2016

SWRP . 160618

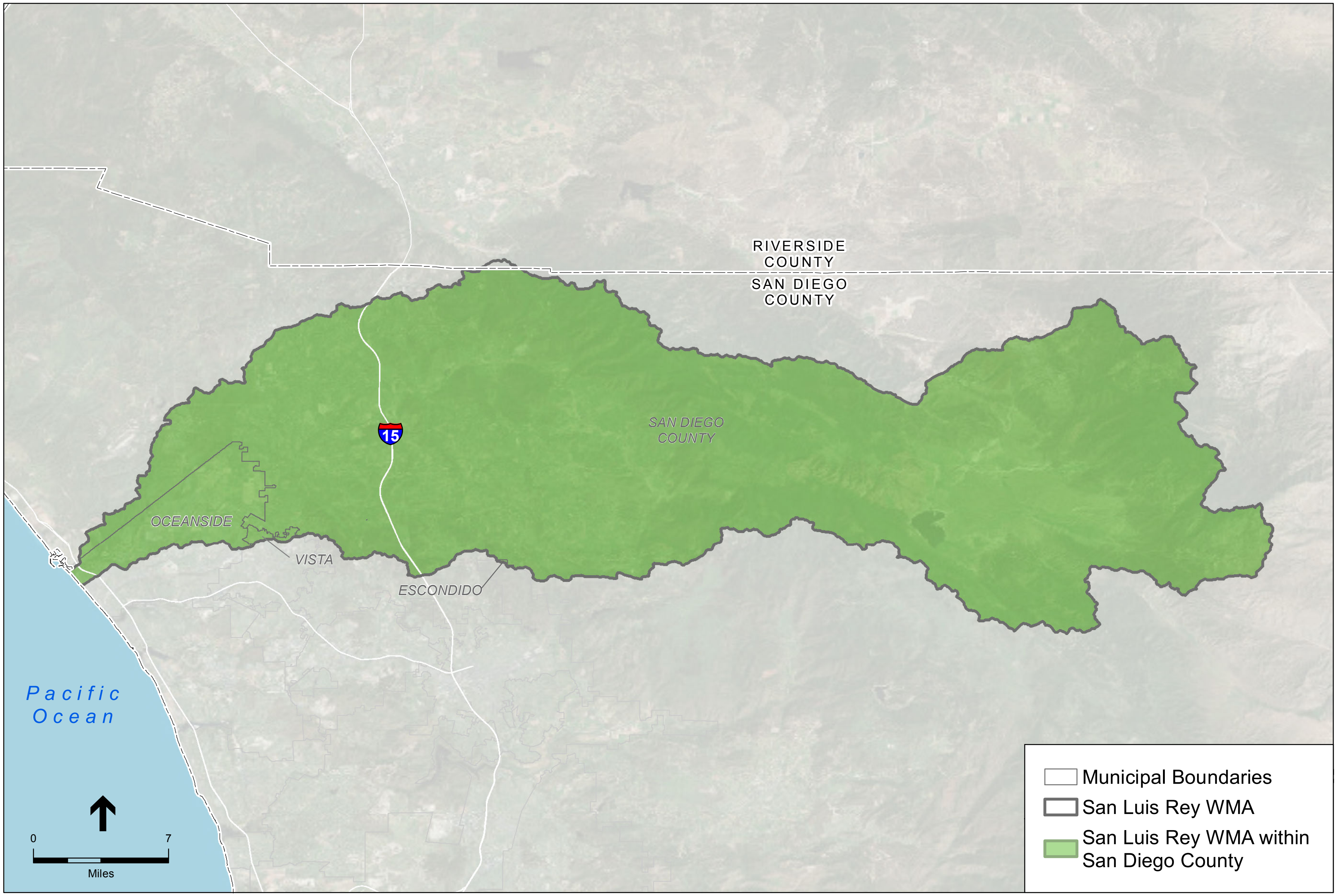
Figure 3-6
Water Agencies and Wastewater Agencies
within the Santa Margarita Water Management Area



SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

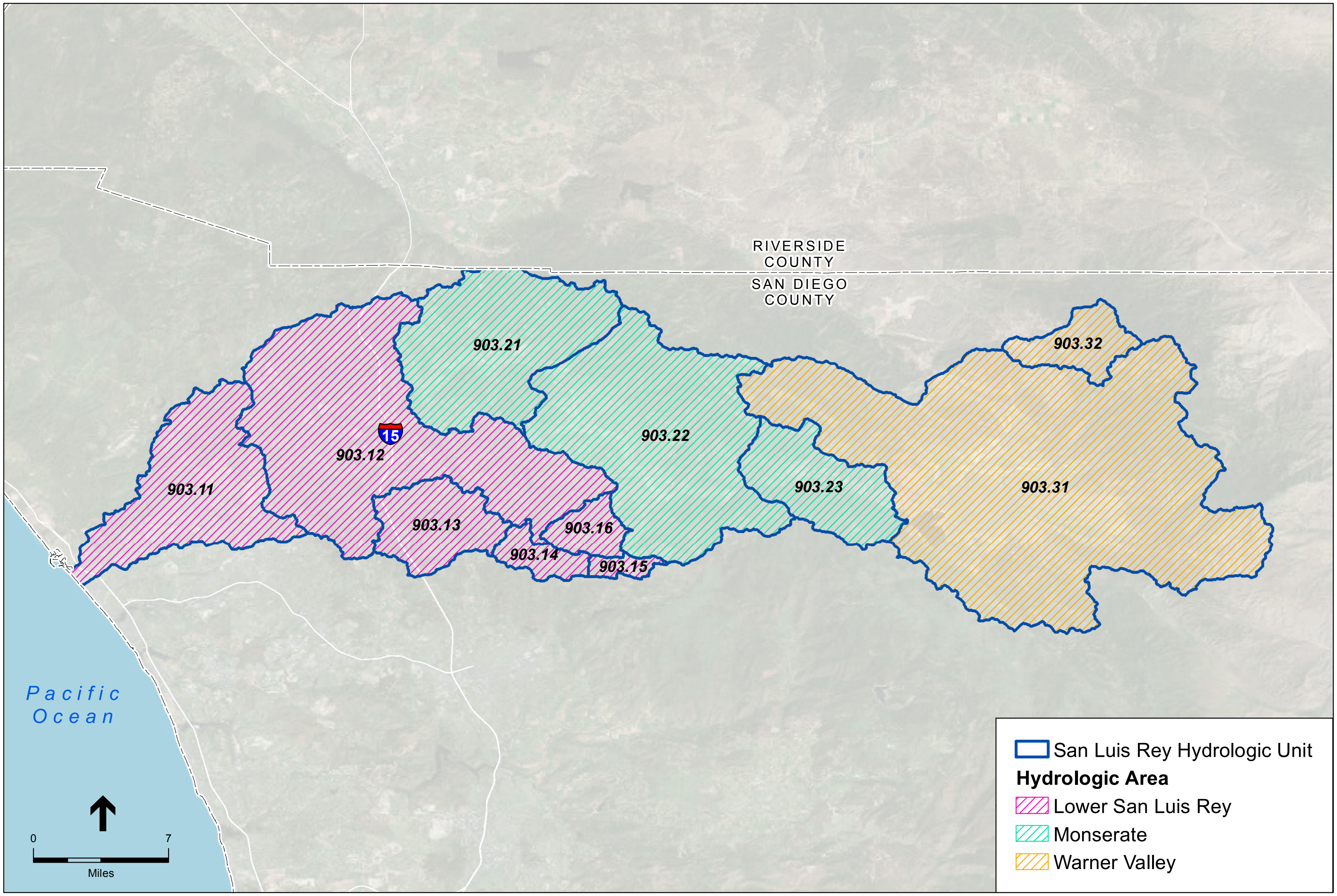
Figure 3-7
Critical Habitat within the Santa Margarita Water Management Area



SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

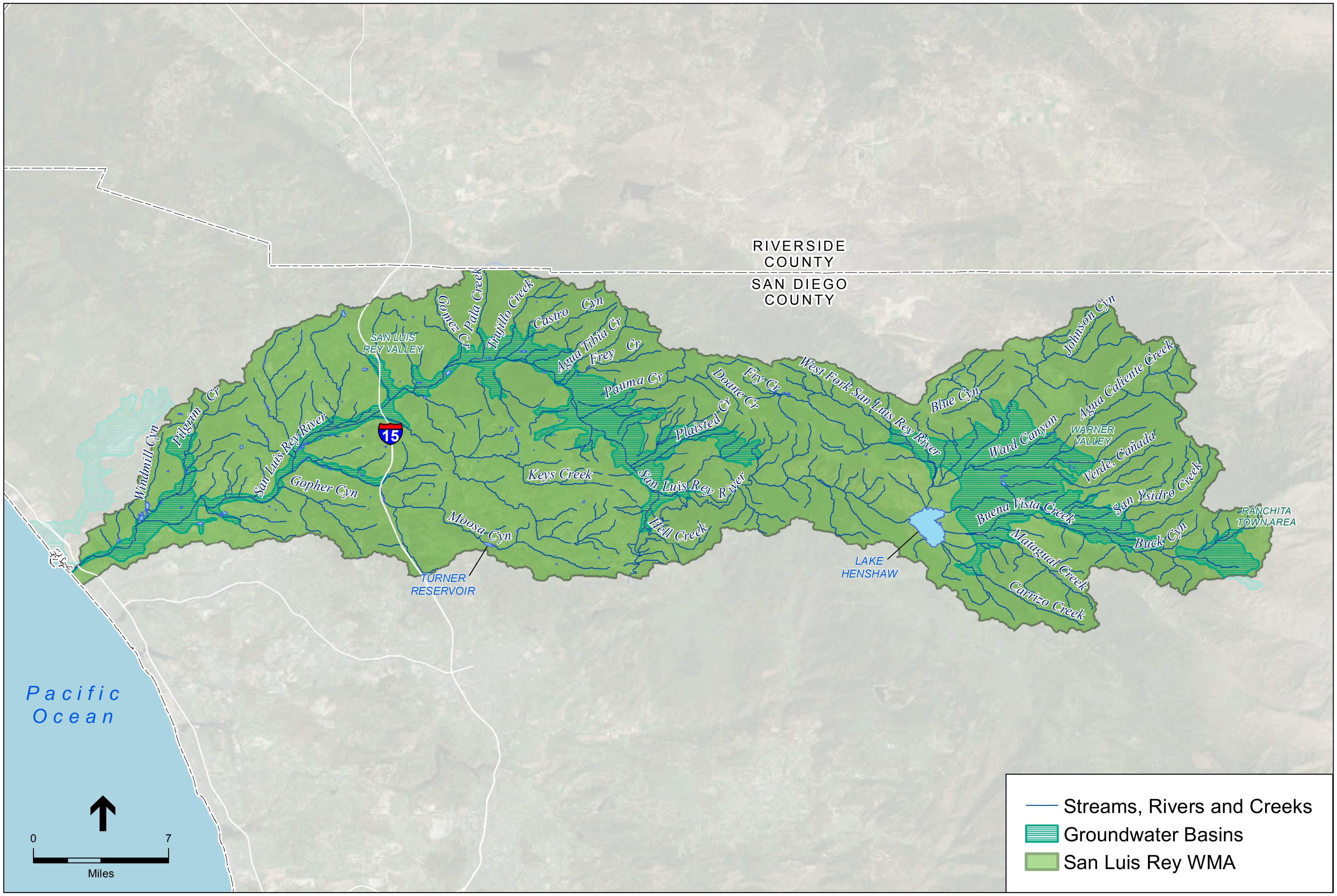
Figure 3-8
City Boundaries within the San Luis Rey
Water Management Area



SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

Figure 3-9
Hydrologic Units and Areas within the San Luis Rey Water Management Area



SOURCE: ESRI, 2016; SanGIS, 2016

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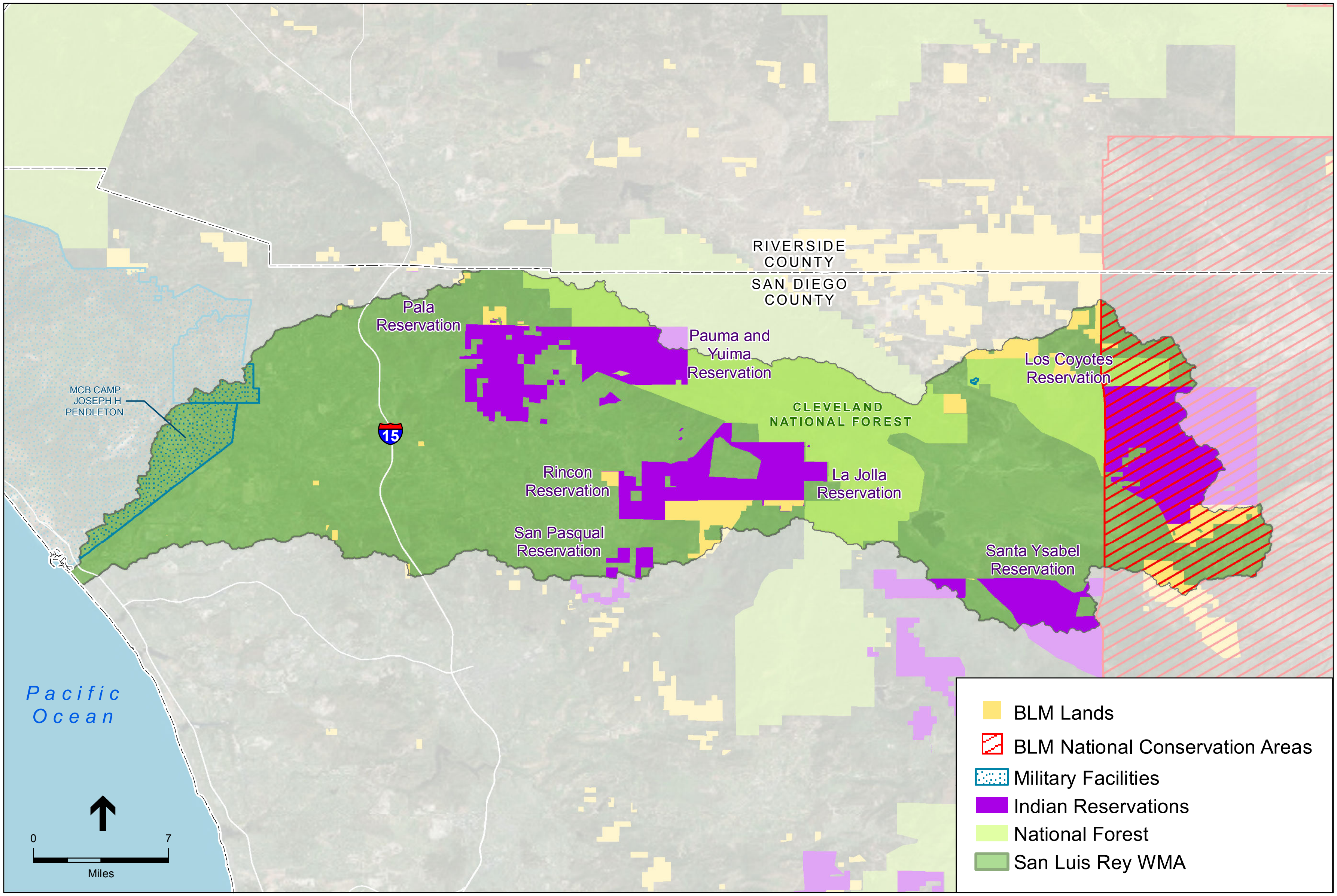
Figure 3-10

Water Features within the San Luis Rey Water Management Area



SOURCE: ESRI, 2016; SanGIS, 2016

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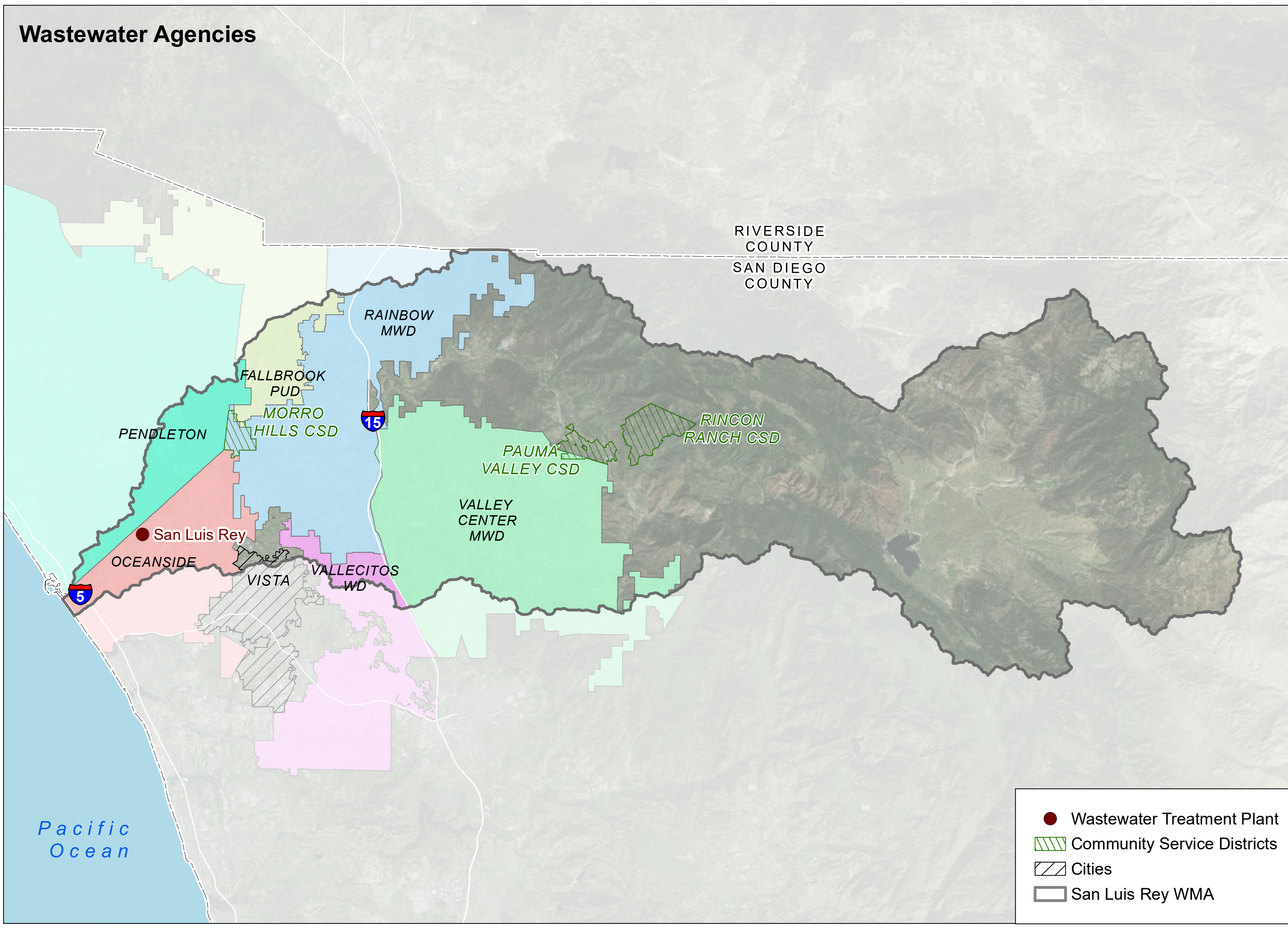
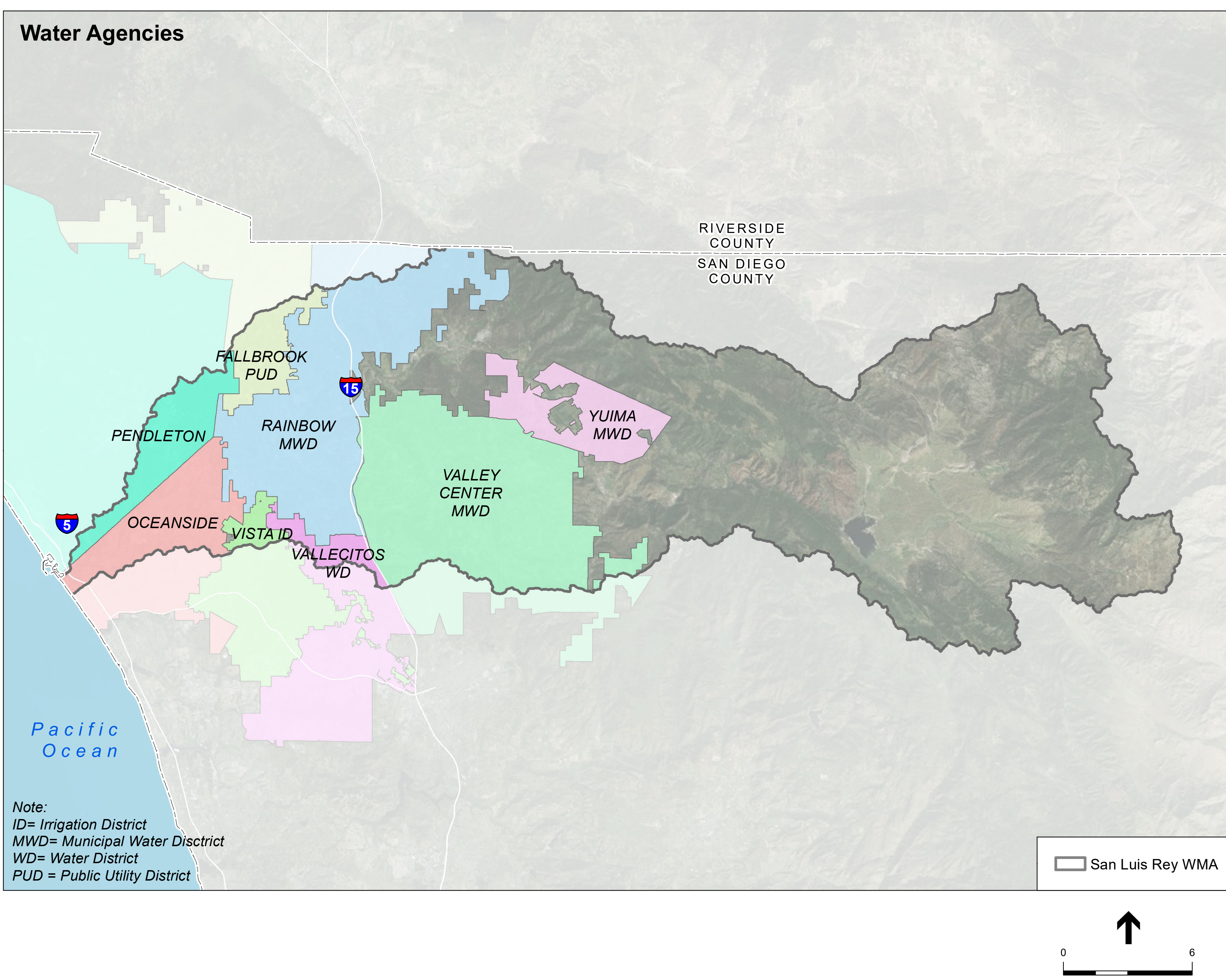
Figure 3-11
Land Use Agencies within the San Luis Rey Water Management Area





SOURCE: ESRI, 2016; SanGIS, 2016; IRWM, 2016

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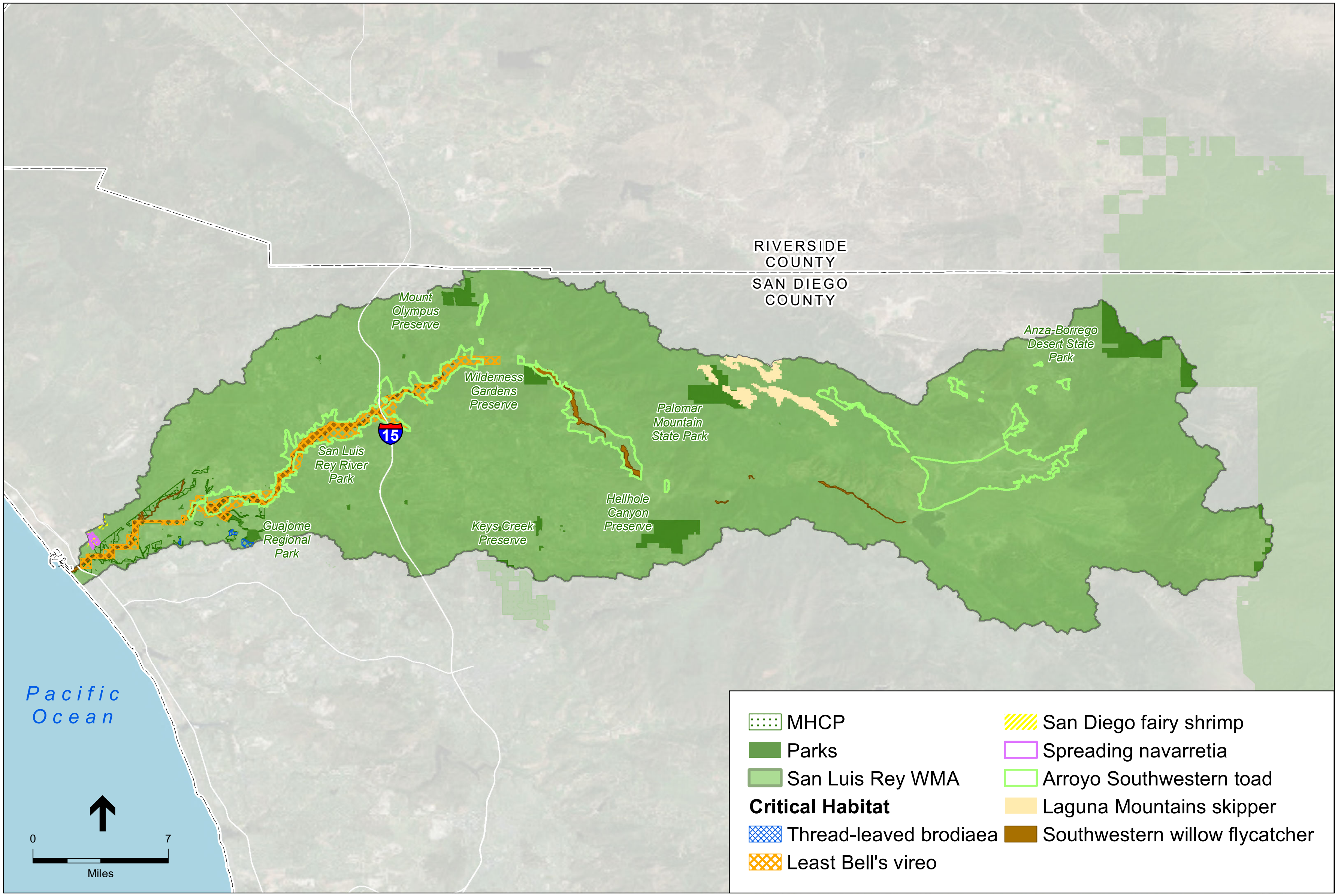
Figure 3-12
Water Agencies and Wastewater Agencies within the San Luis Rey Water Management Area



SOURCE: ESRI, 2016; SanGIS, 2016

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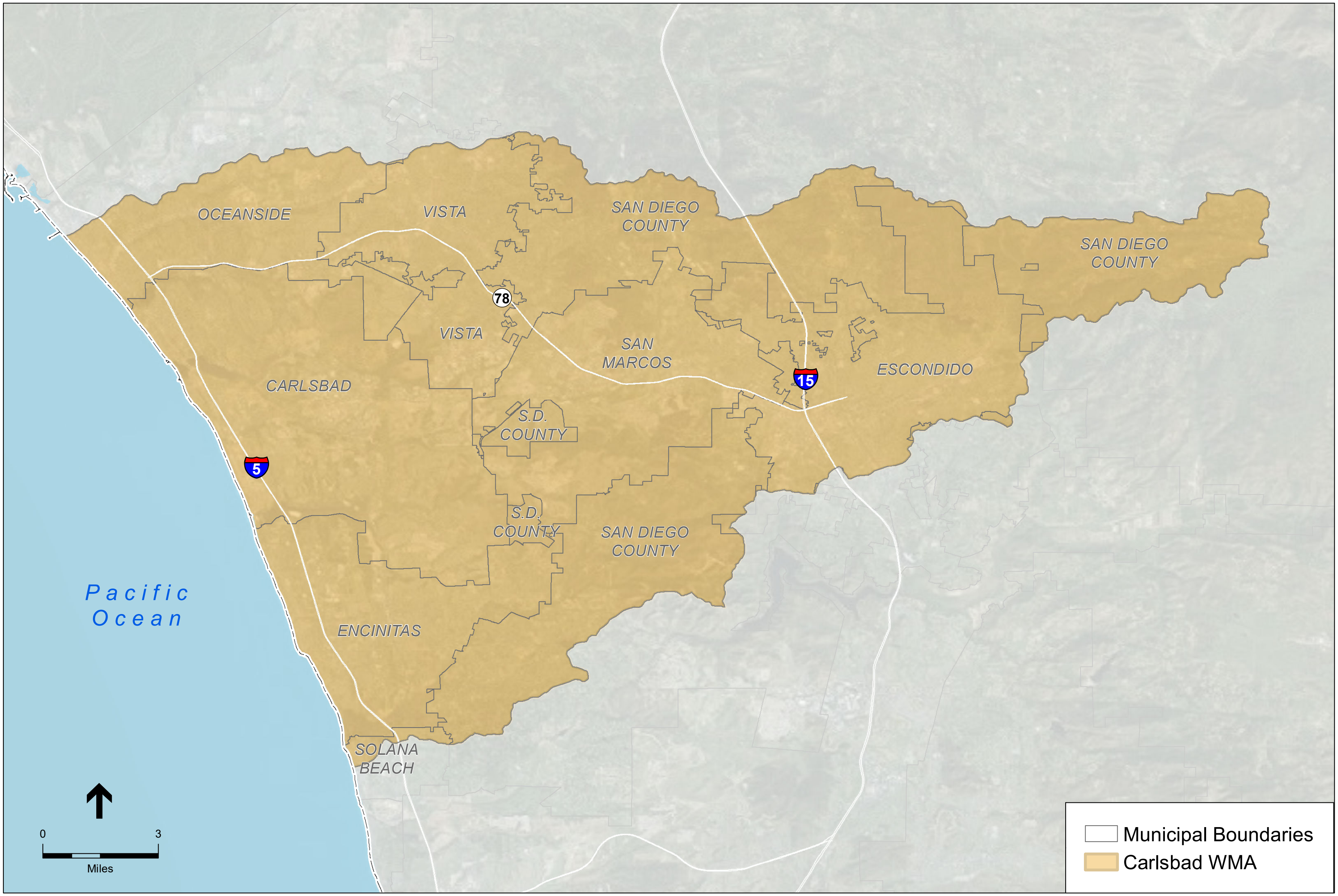
Figure 3-13
Critical Habitat within the San Luis Rey Water Management Area



SOURCE: ESRI, 2016; SanGIS, 2016

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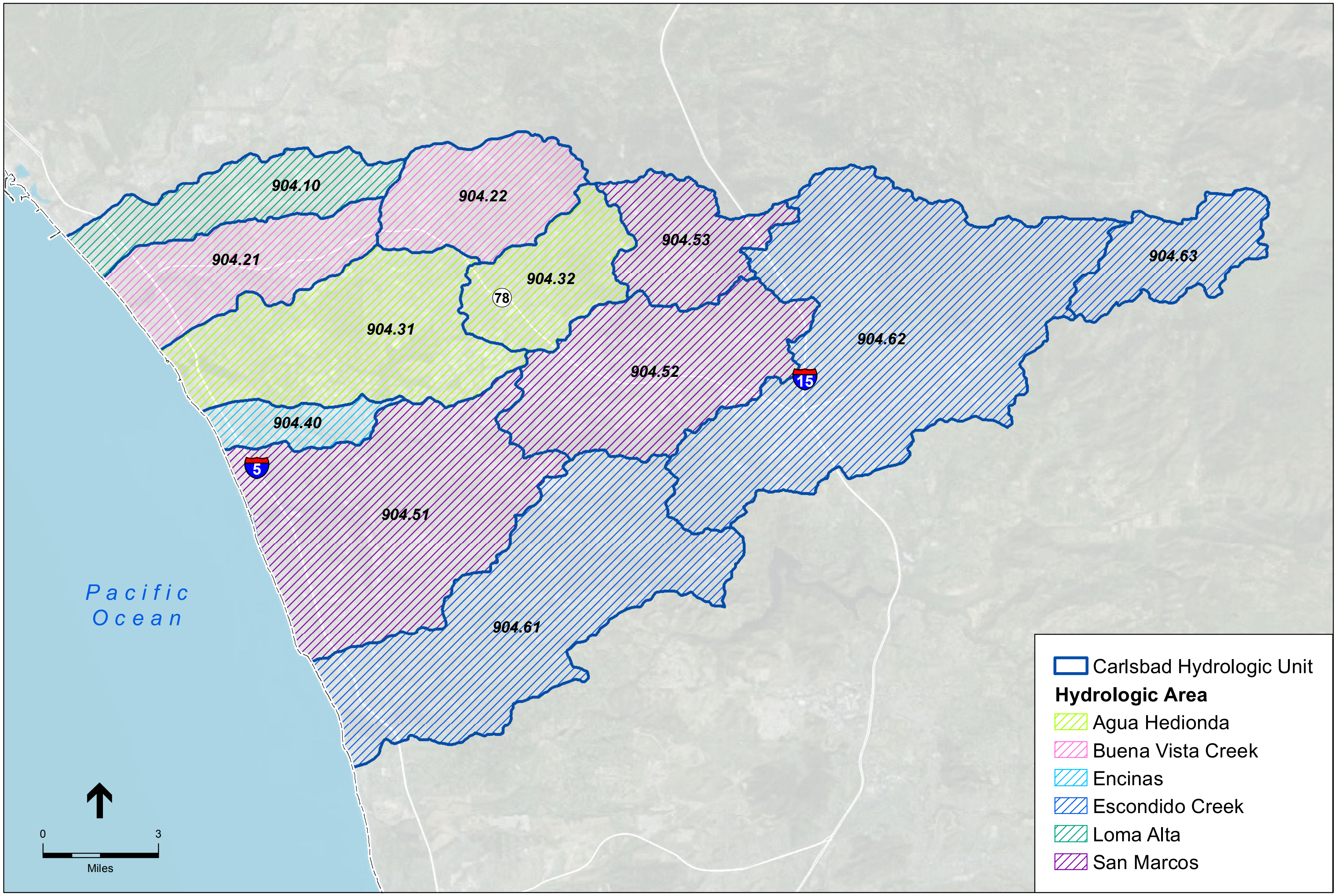
Figure 3-14
City Boundaries within the Carlsbad Water Management Area

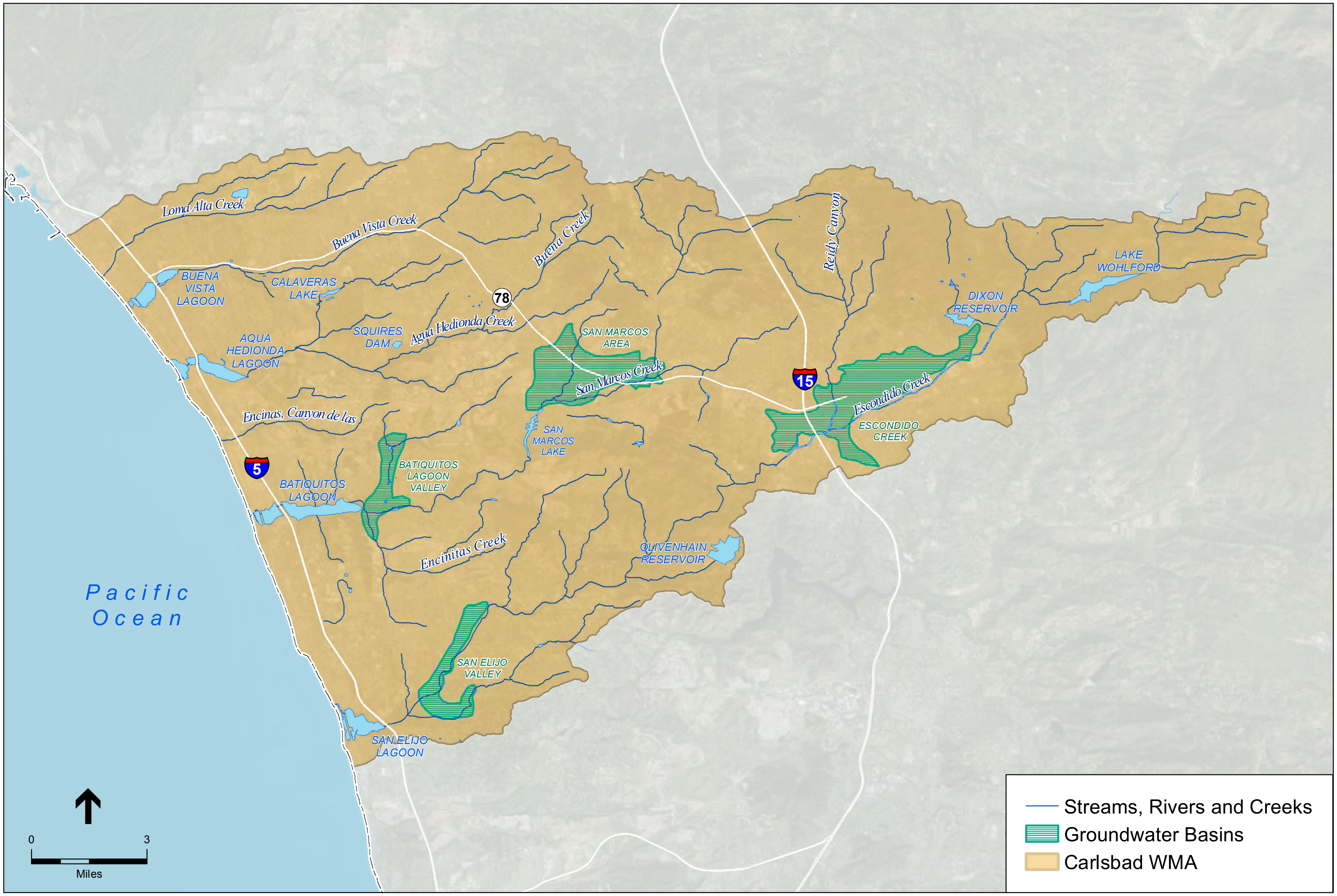


SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

Figure 3-15

Hydrologic Units and Area within the Carlsbad Water Management Area



SOURCE: ESRI, 2016; SanGIS, 2016

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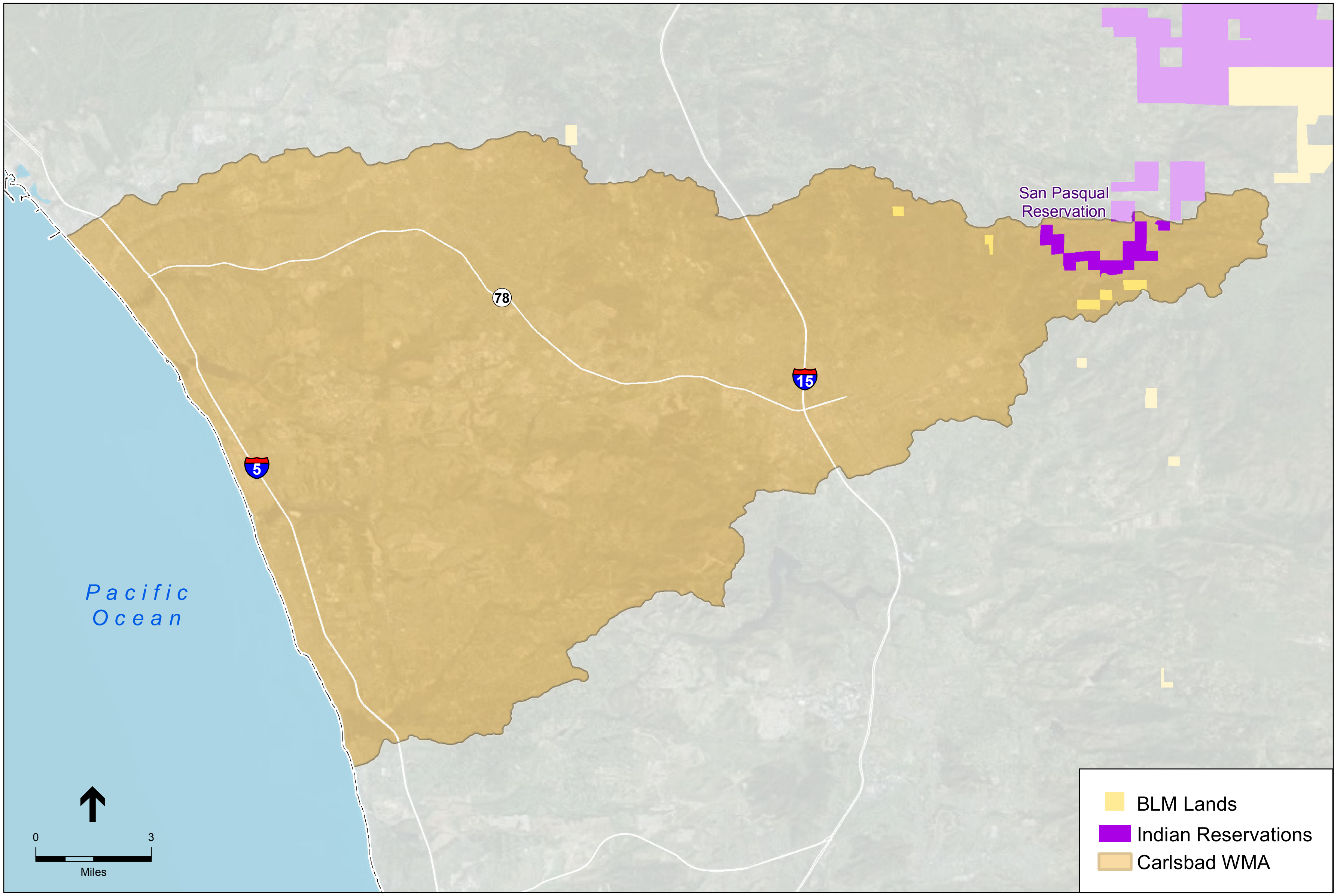
Figure 3-16
Water Features within the Carlsbad Water Management Area



SOURCE: ESRI, 2016; SanGIS, 2016; Bureau of Land Management

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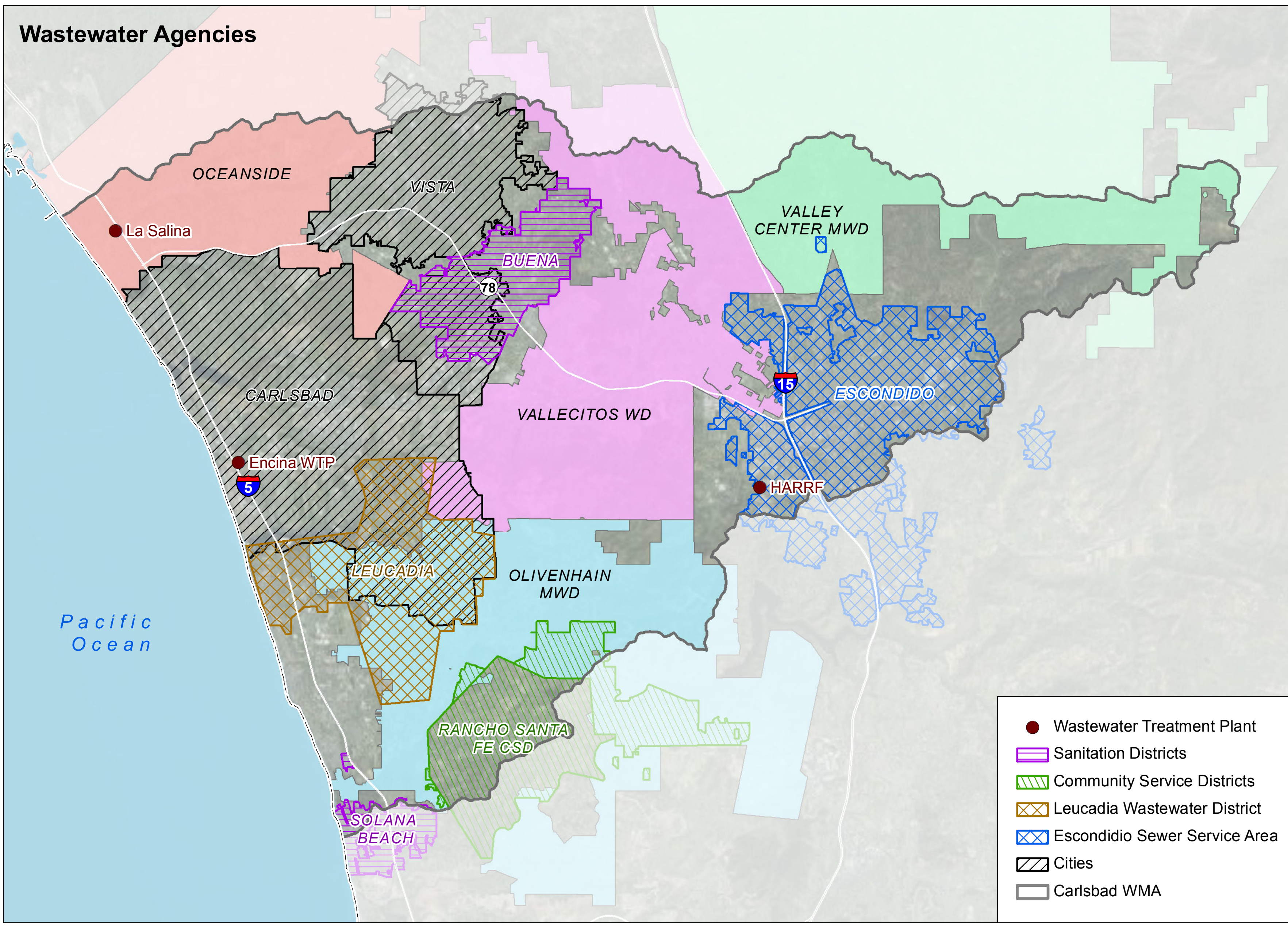
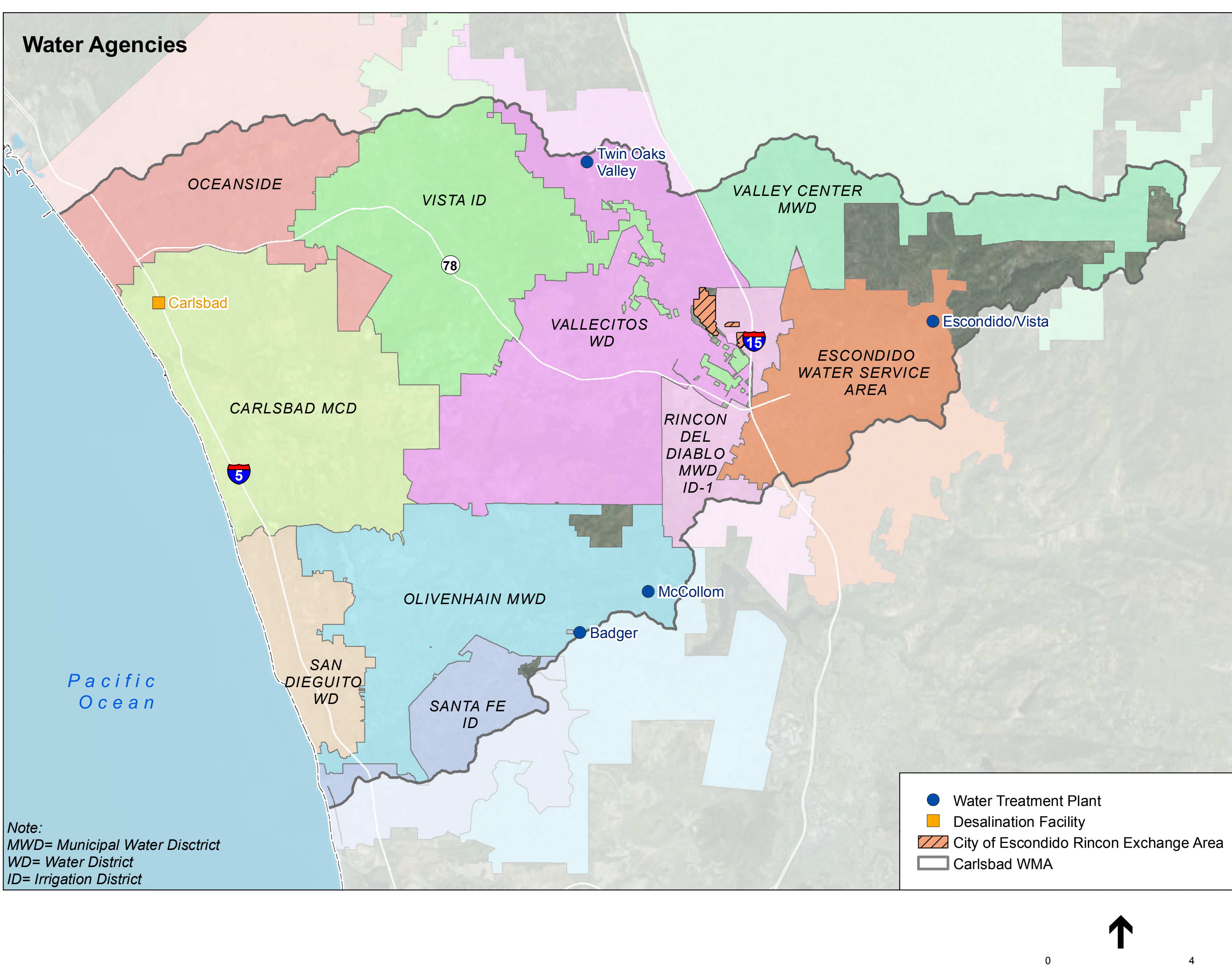
Figure 3-17
Land Use Agencies within the
Carlsbad Water Management Area

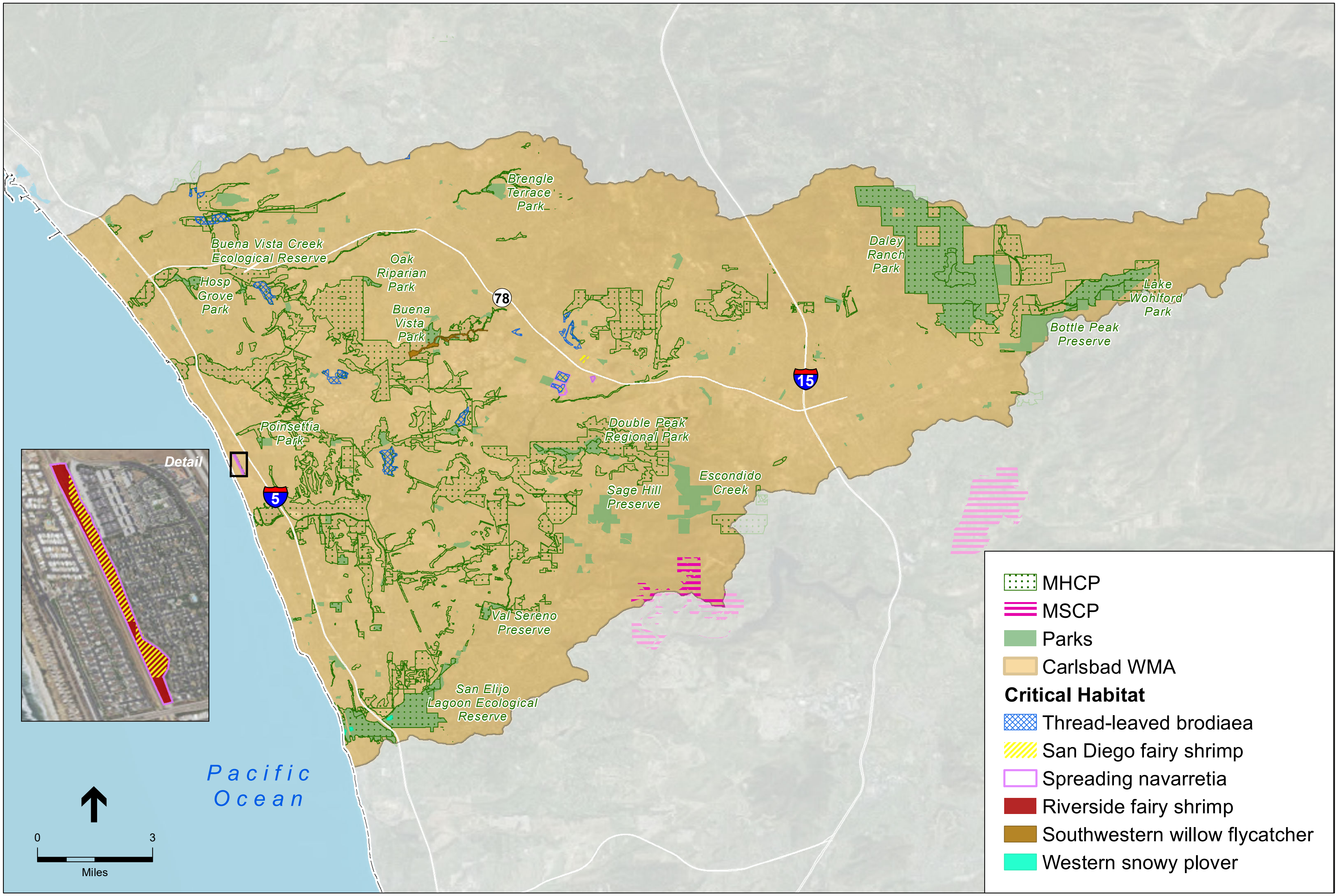




SOURCE: ESRI, 2016; SanGIS, 2016; IRWM, 2016

SWRP . 160618

Figure 3-18
Water Agencies and Wastewater Agencies within the Carlsbad Water Management Area



SOURCE: ESRI, 2016; SanGIS, 2016; USFWS

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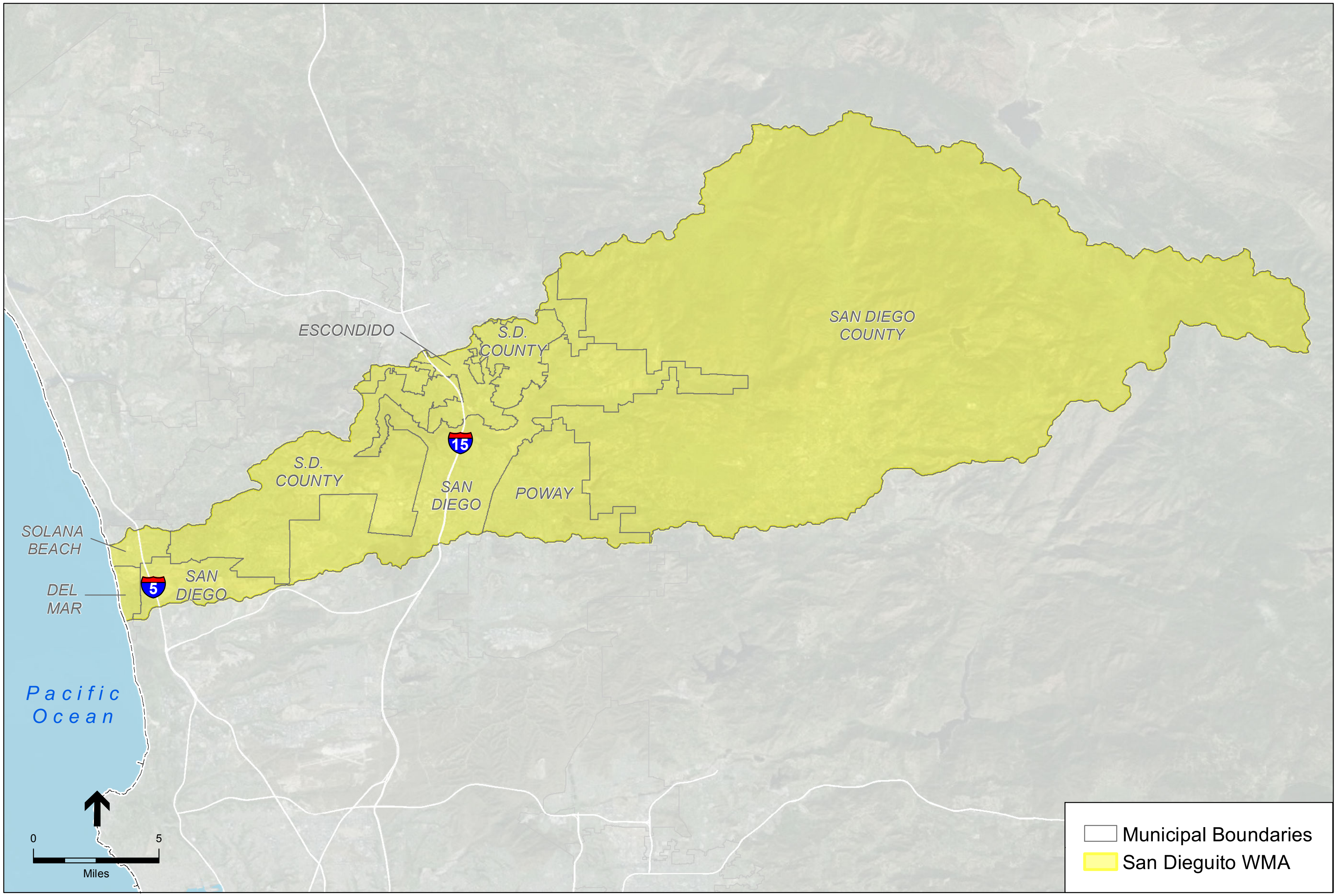
Figure 3-19

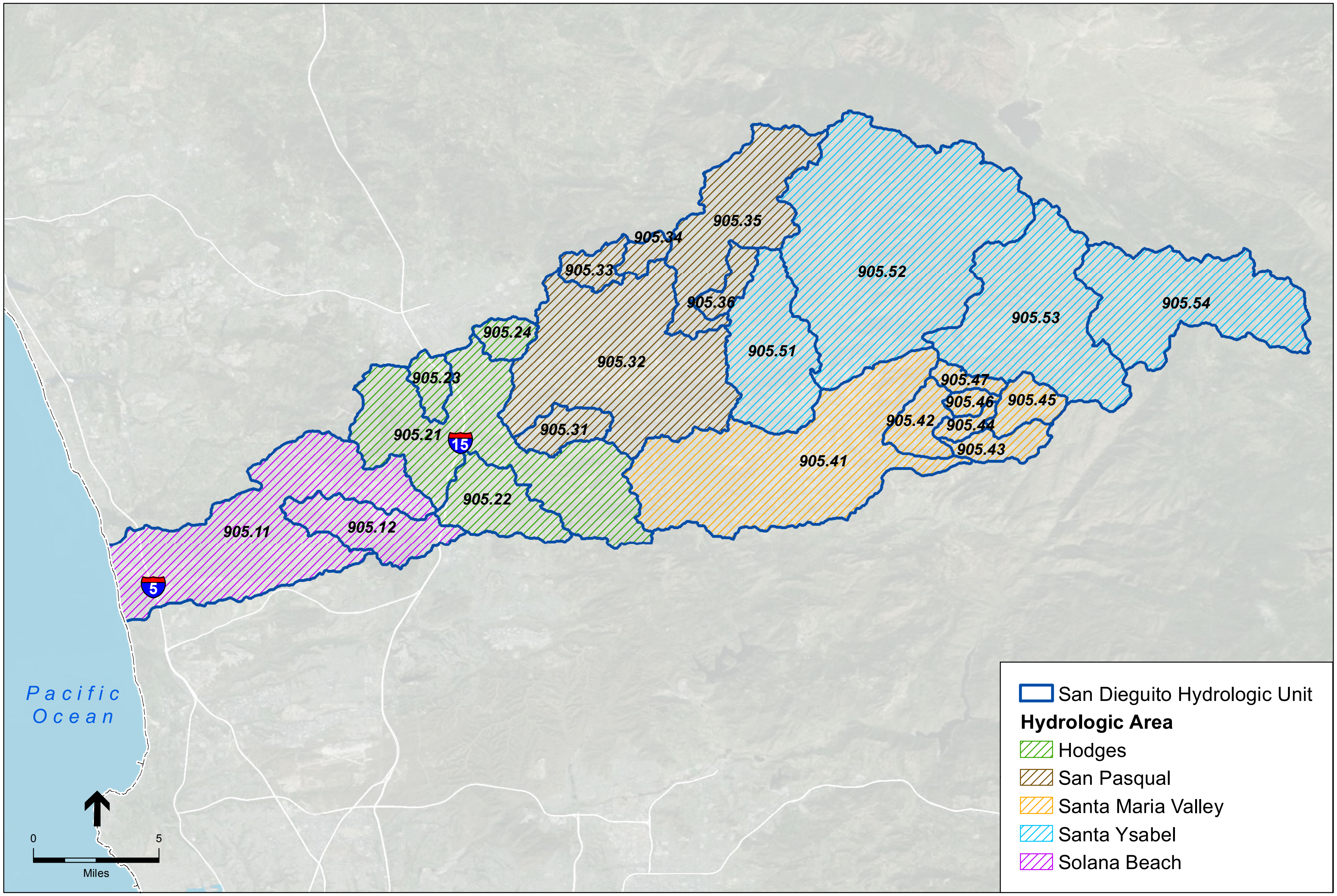
Critical Habitat within the Carlsbad Water Management Area



SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

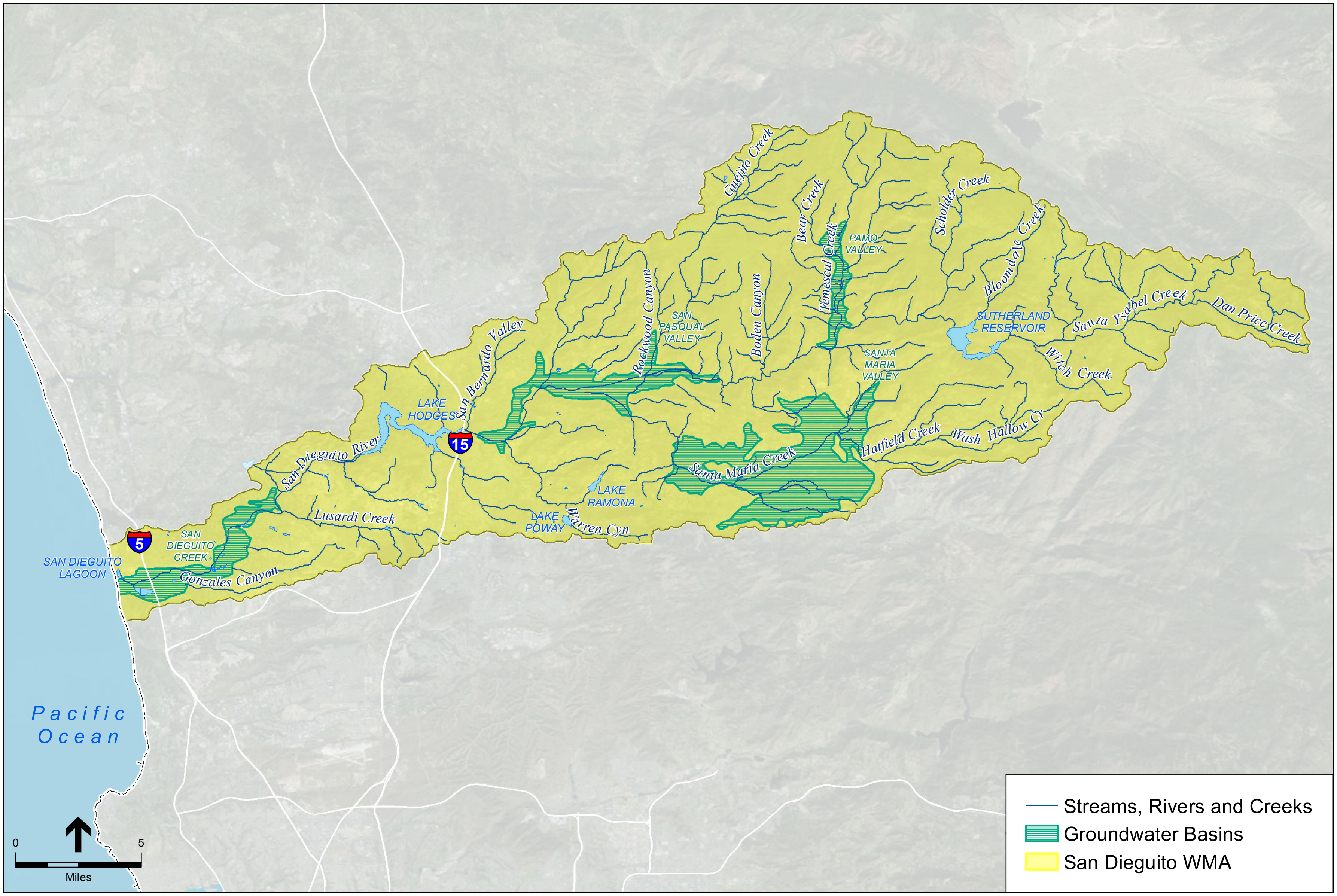
Figure 3-20
City Boundaries within the San Dieguito Water Management Area



SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

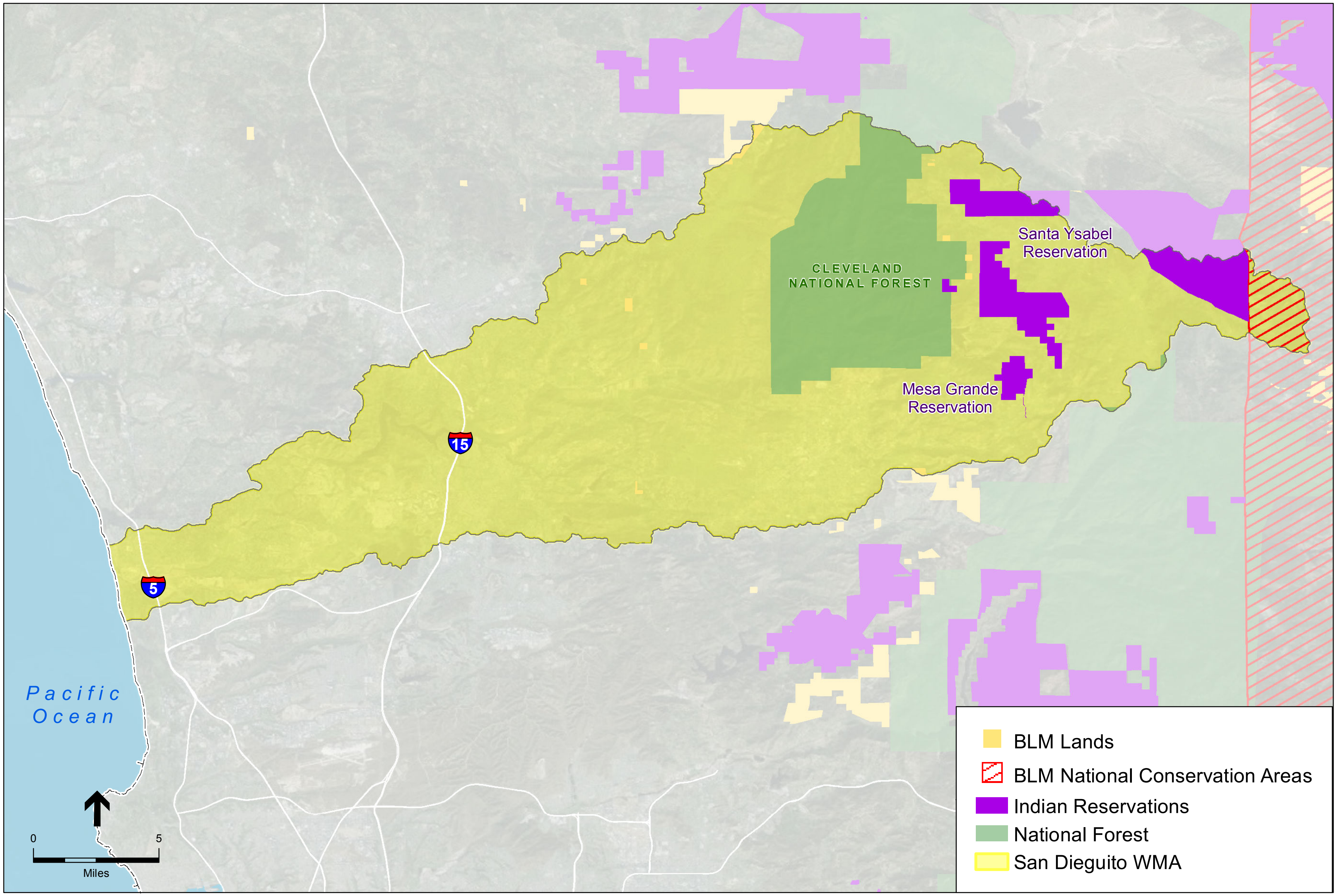
Figure 3-21
Hydrologic Units and Areas within the San Dieguito Water Management Area



SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

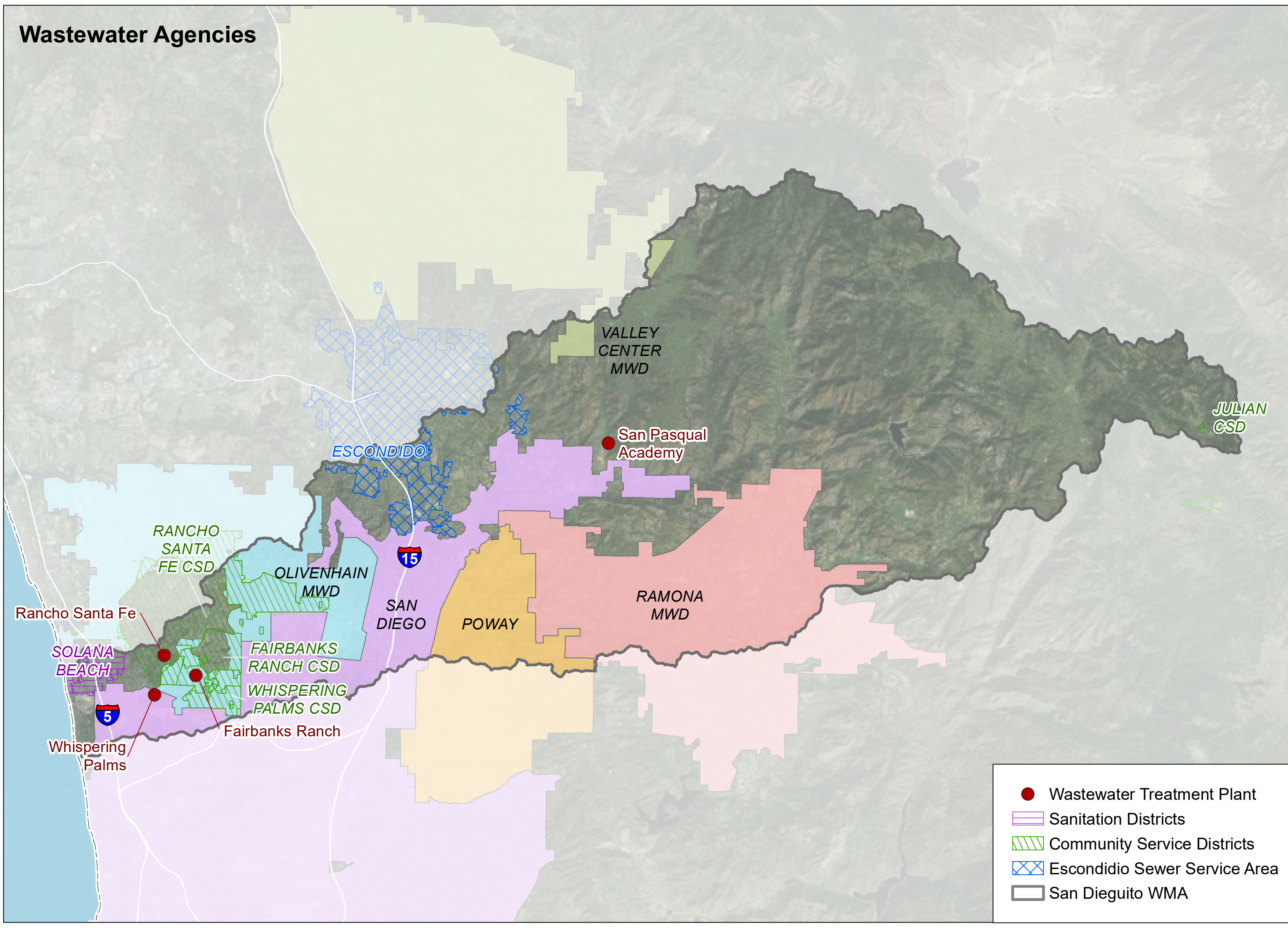
Figure 3-22
Water Features within the San Dieguito Water Management Area

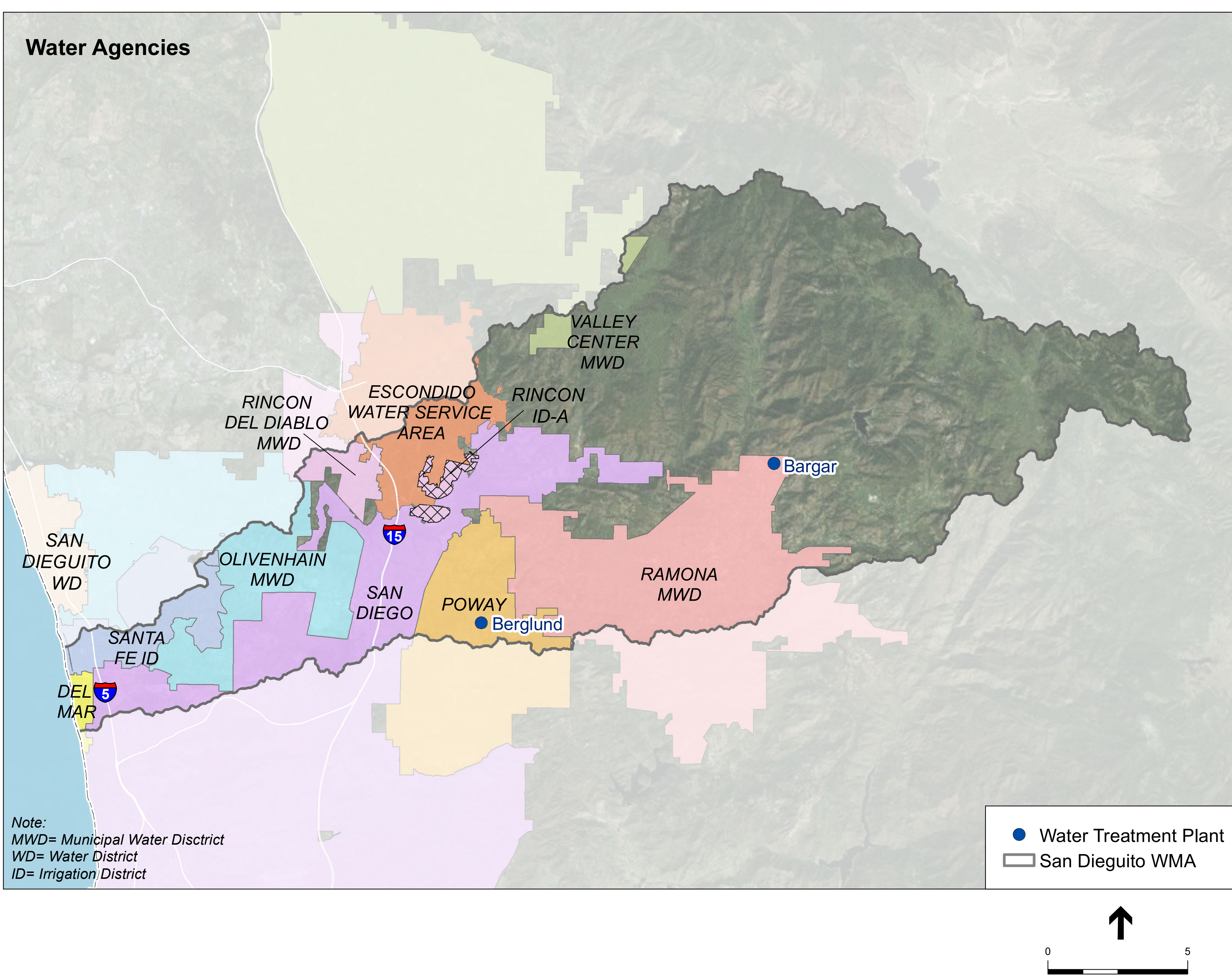


SOURCE: ESRI, 2016; SanGIS, 2016; Bureau of Land Management

SWRP . 160618

Figure 3-23
Land Use Agencies within the San Dieguito Water Management Area

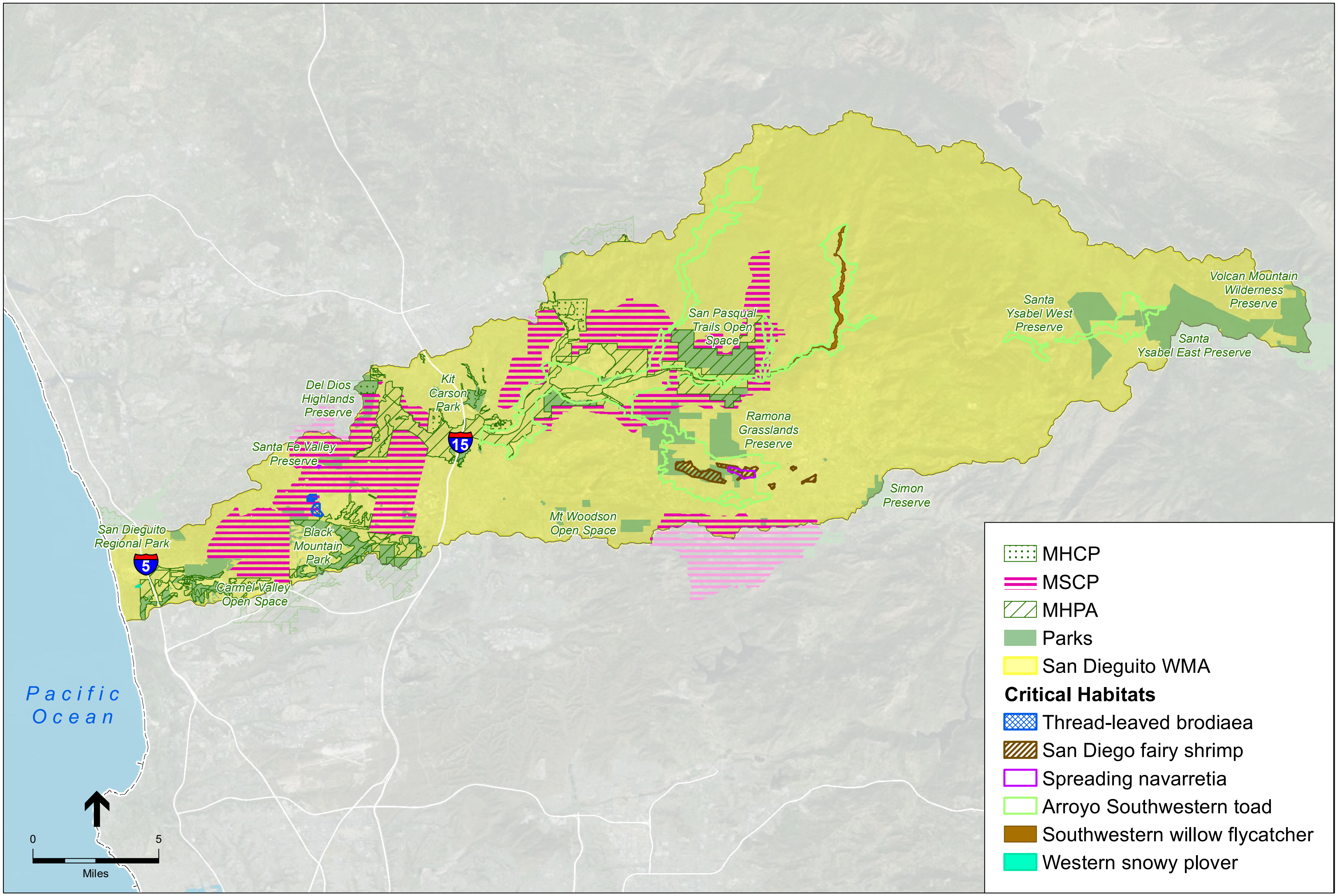




SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

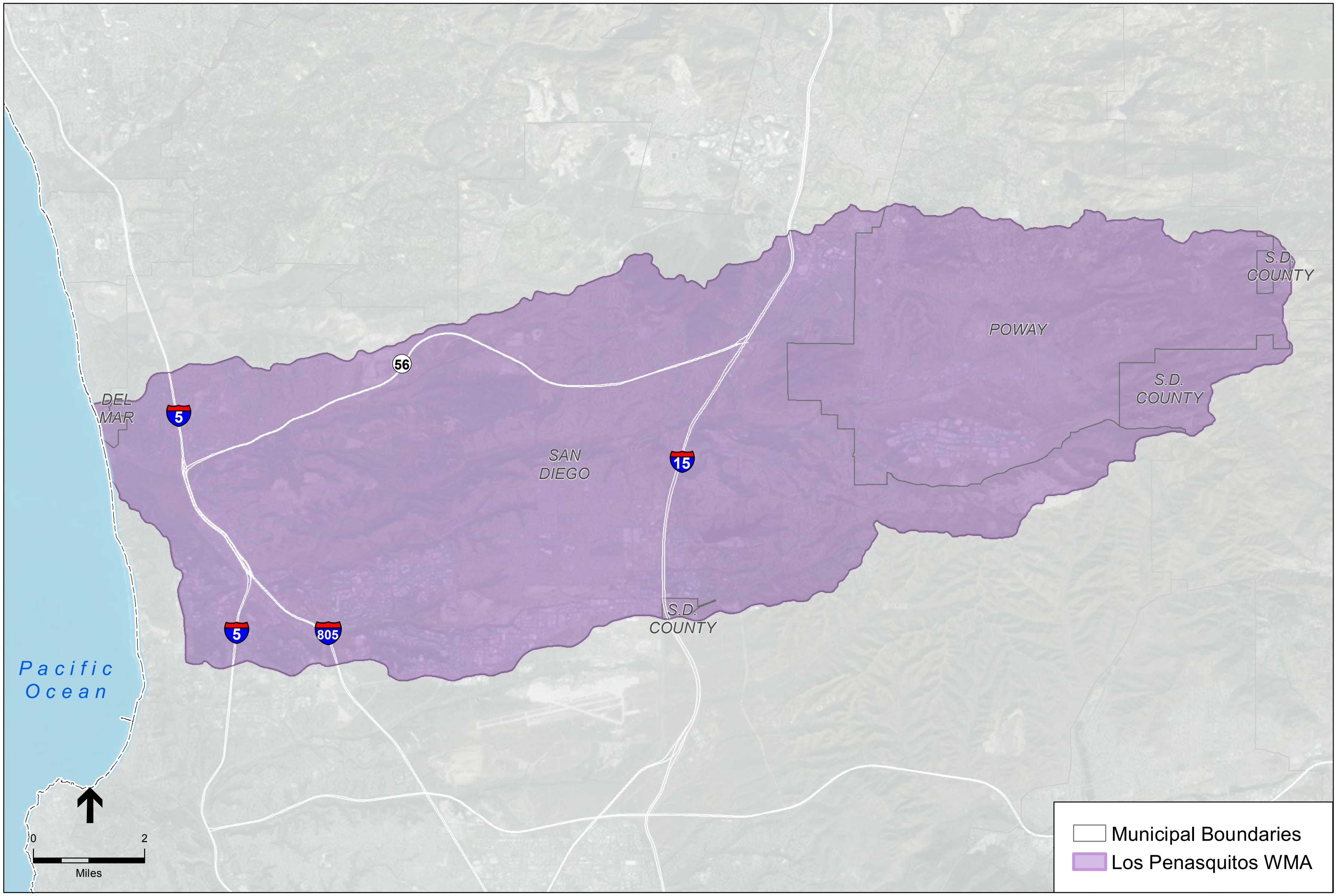
Figure 3-24
Water Agencies and Wastewater Agencies within the San Dieguito Water Management Area



SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

Figure 3-25
Critical Habitat within the San Dieguito Water Management Area

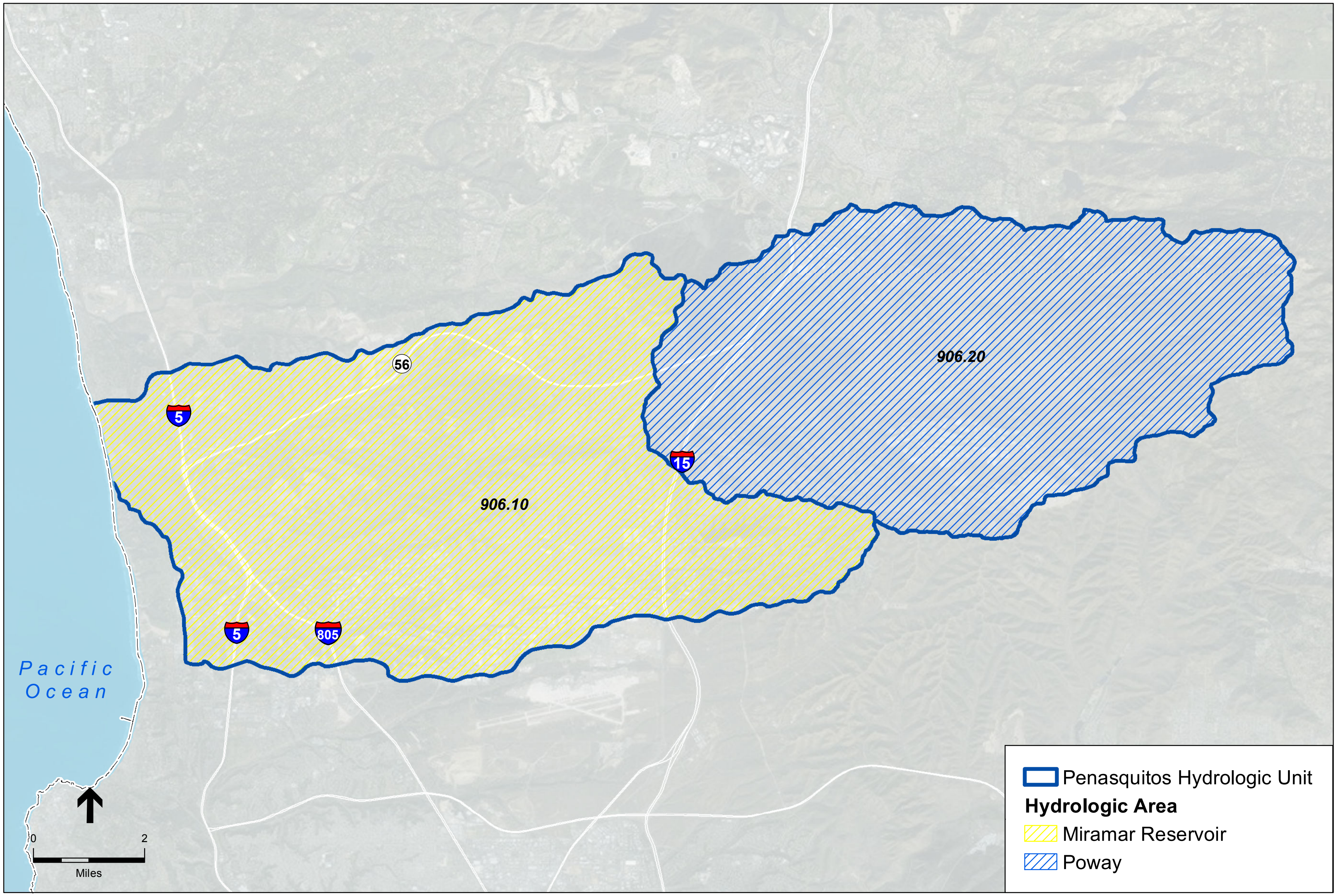


SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

Figure 3-26

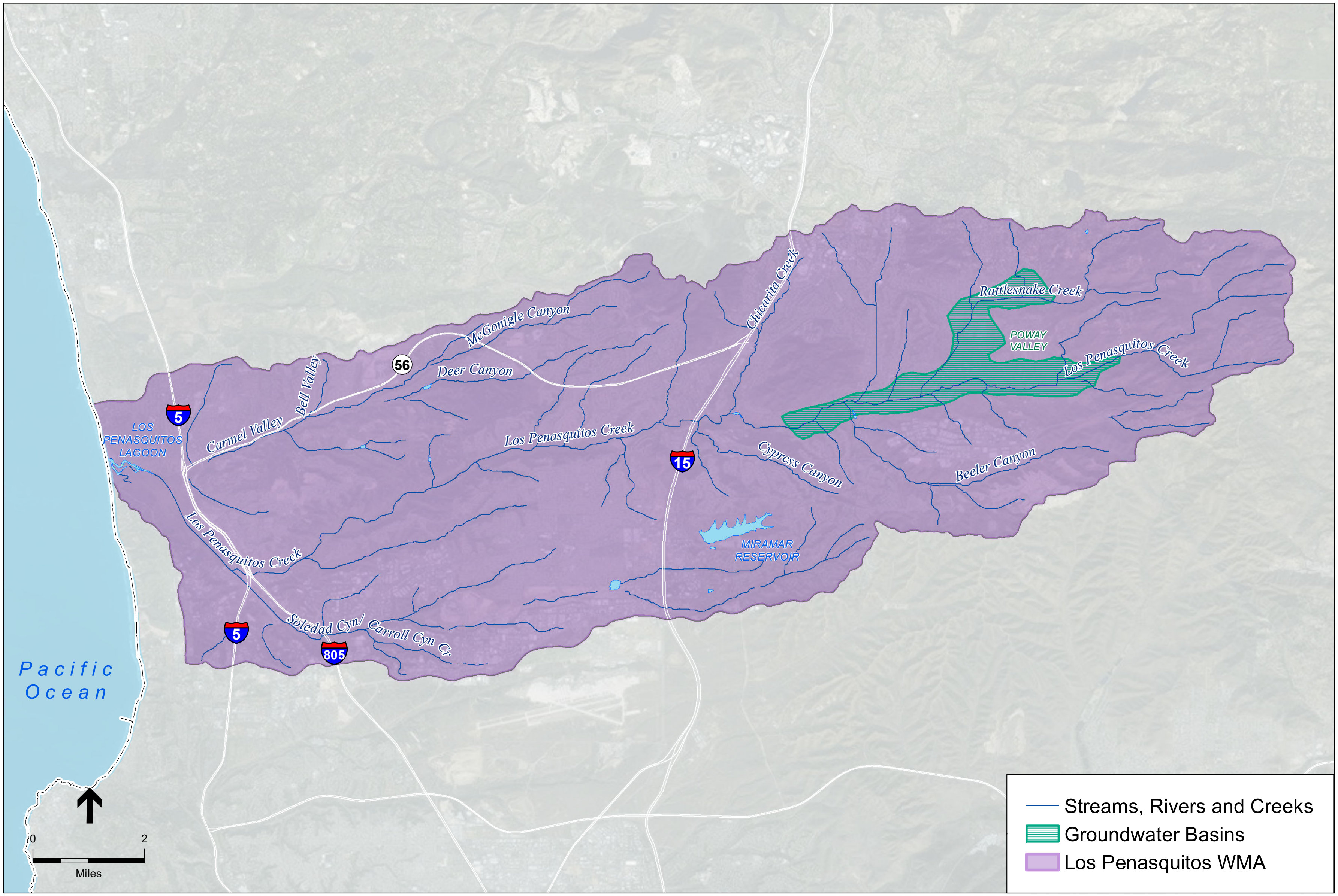
City Boundaries within the Los Penasquitos Water Management Area



SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

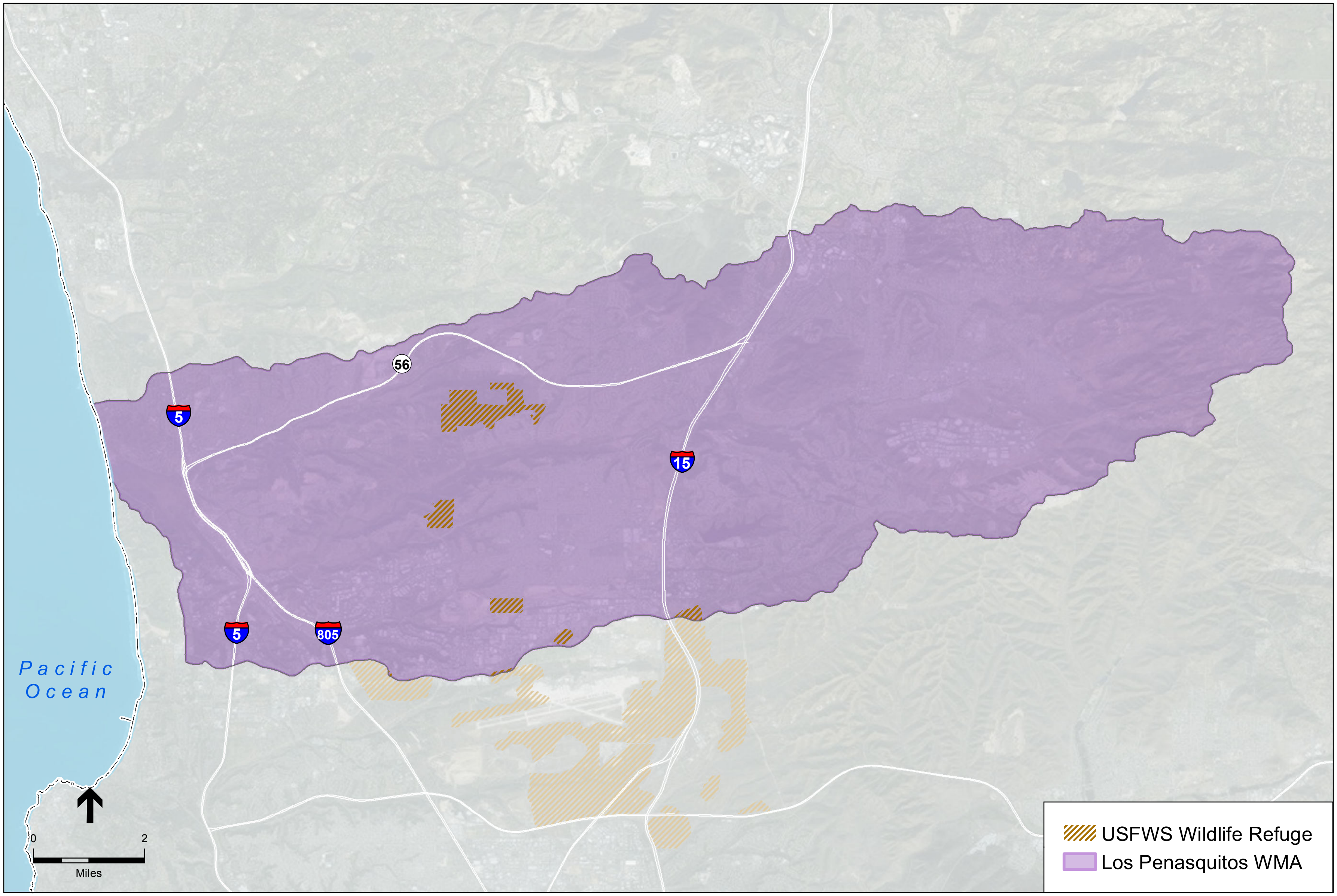
Figure 3-27
Hydrologic Units and Areas within the Los Penasquitos Water Management Area



SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

Figure 3-28
Water Features within the Los Penasquitos Water Management Area



SOURCE: ESRI, 2016; SanGIS, 2016; USFWS, 2016

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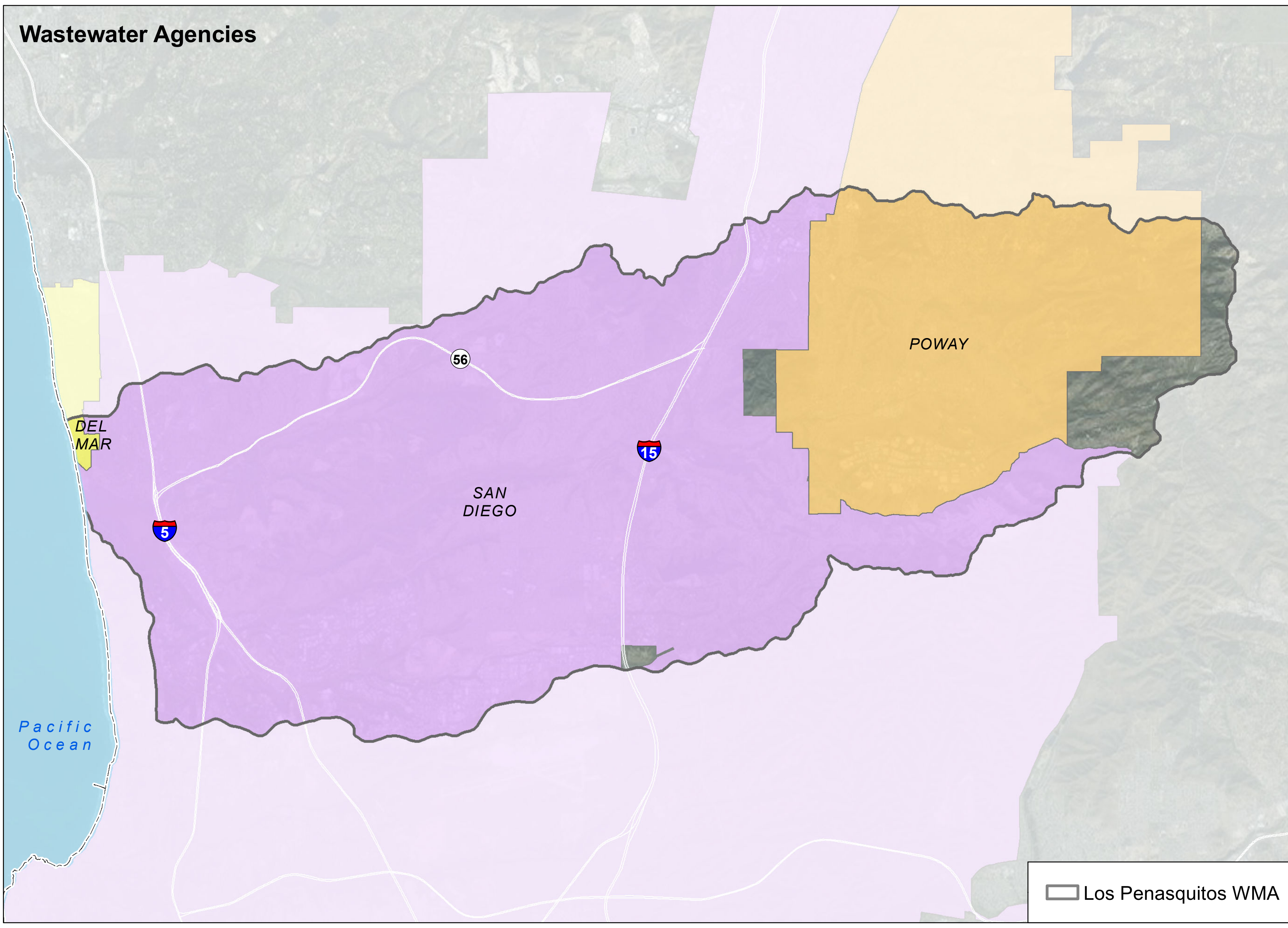
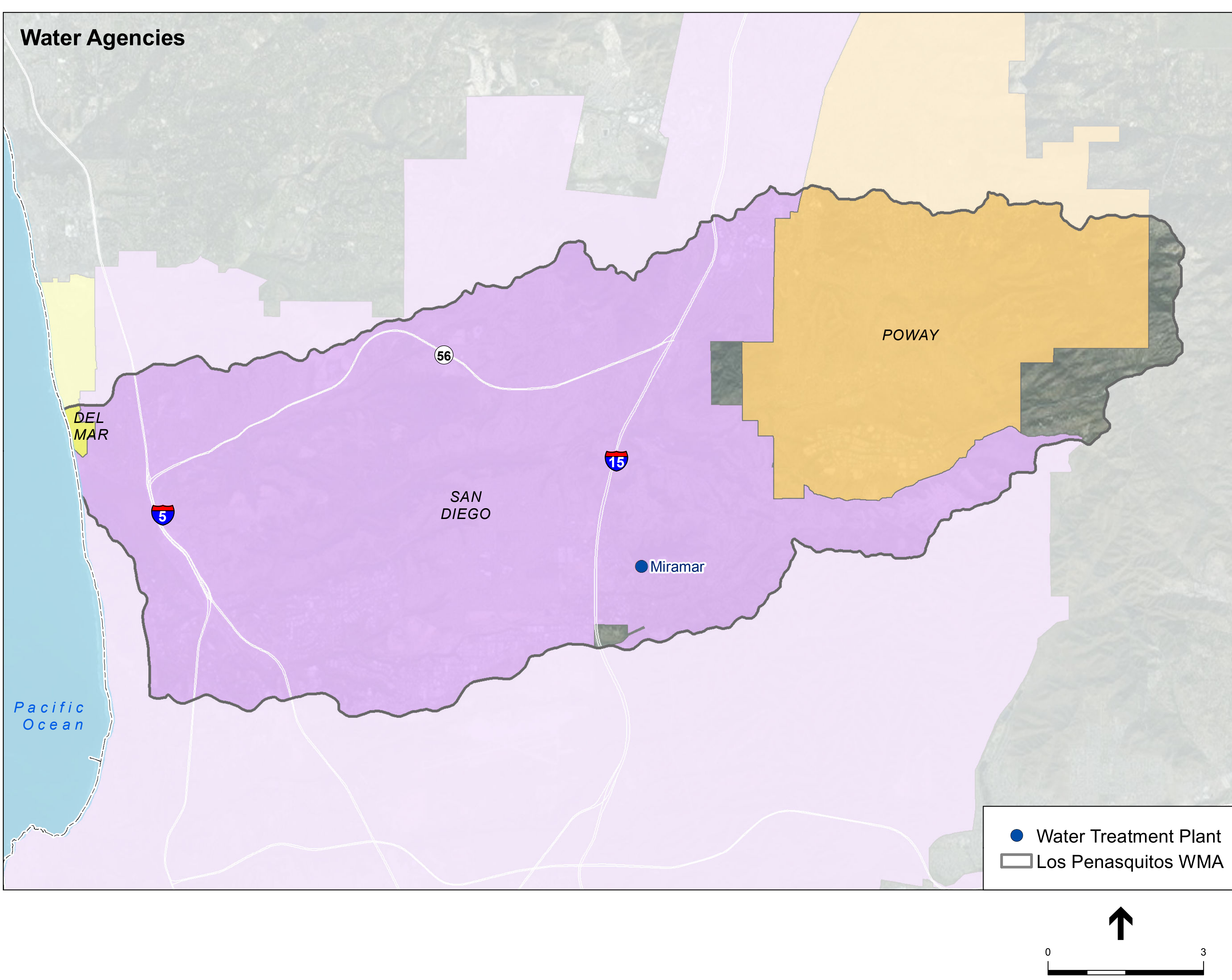
Figure 3-29

Land Use Agencies within the Los Penasquitos Water Management Area



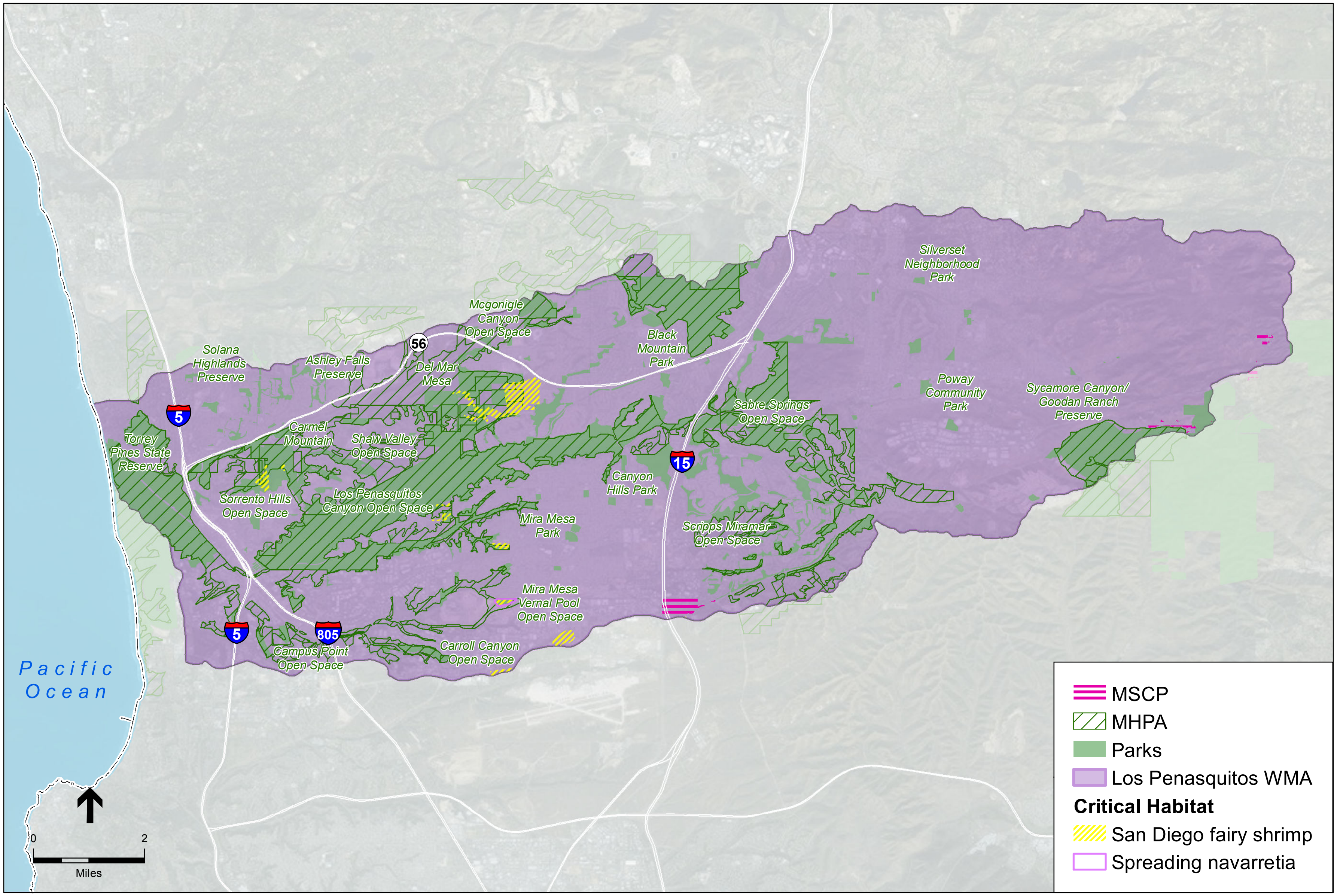


SOURCE: ESRI, 2016; SanGIS, 2016; IRWM, 2016

SWRP . 160618

Figure 3-30

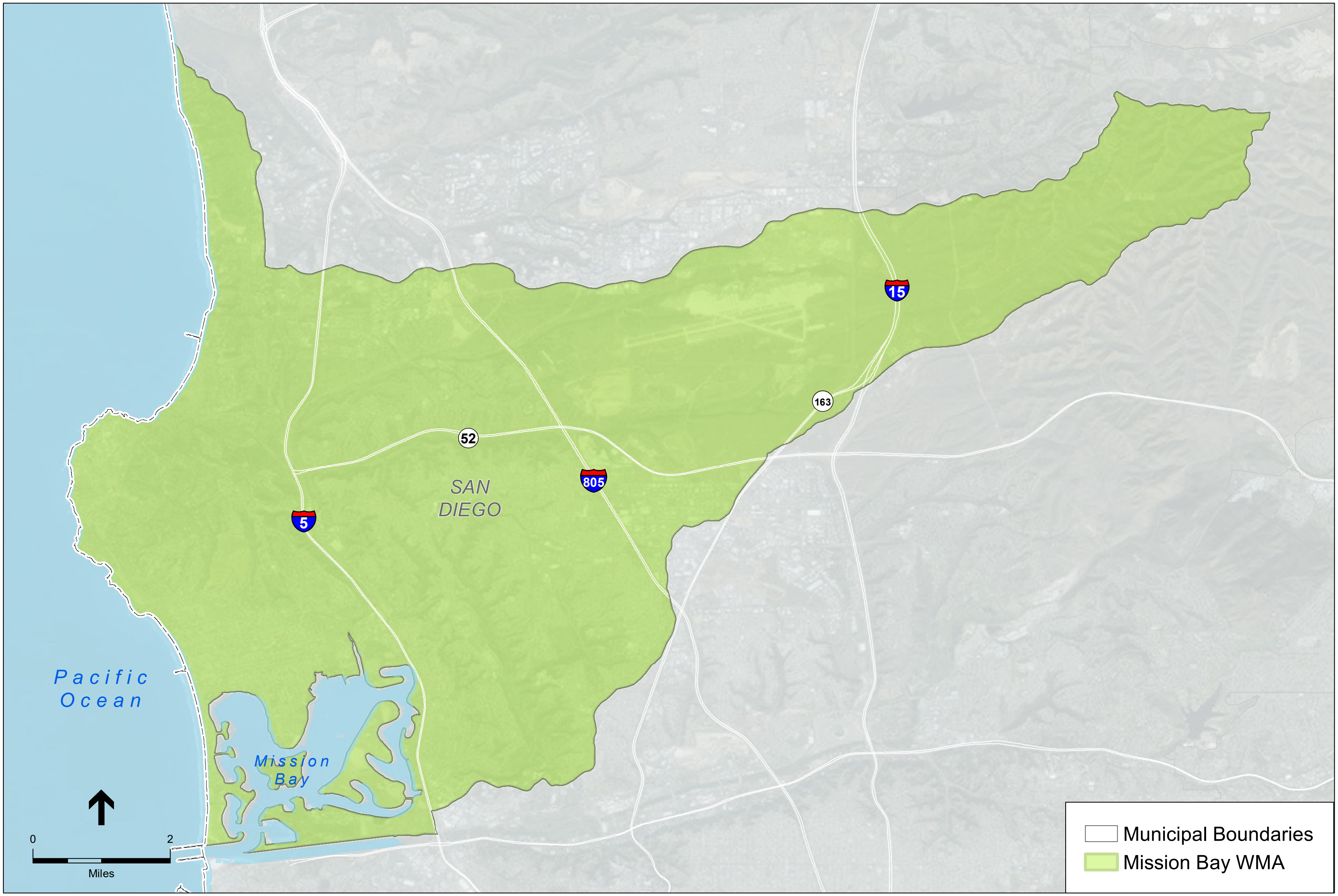
Water Agencies and Wastewater Agencies within the Los Penasquitos Water Management Area



SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

Figure 3-31
Critical Habitat within the Los Penasquitos Water Management Area

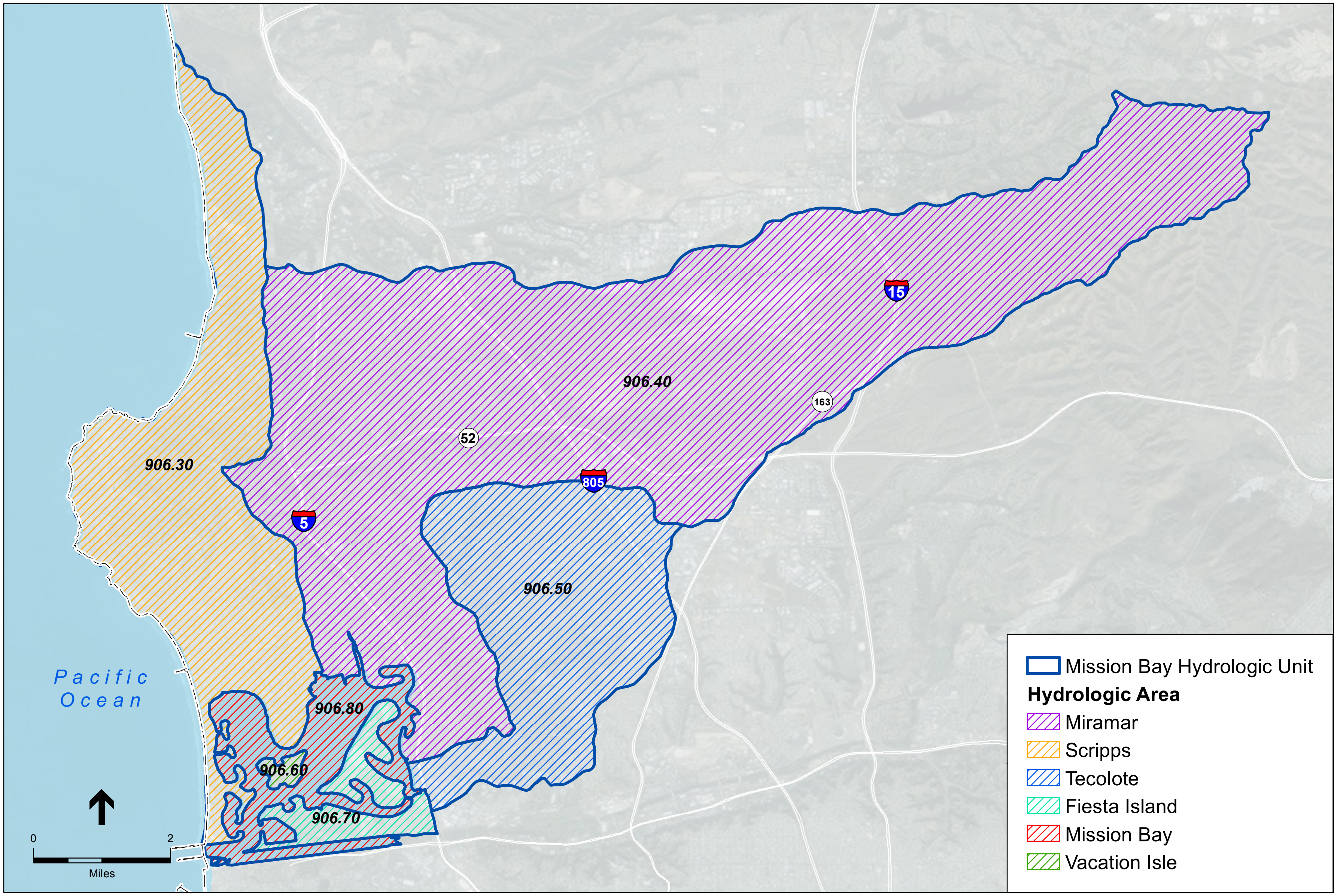


SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

Figure 3-32

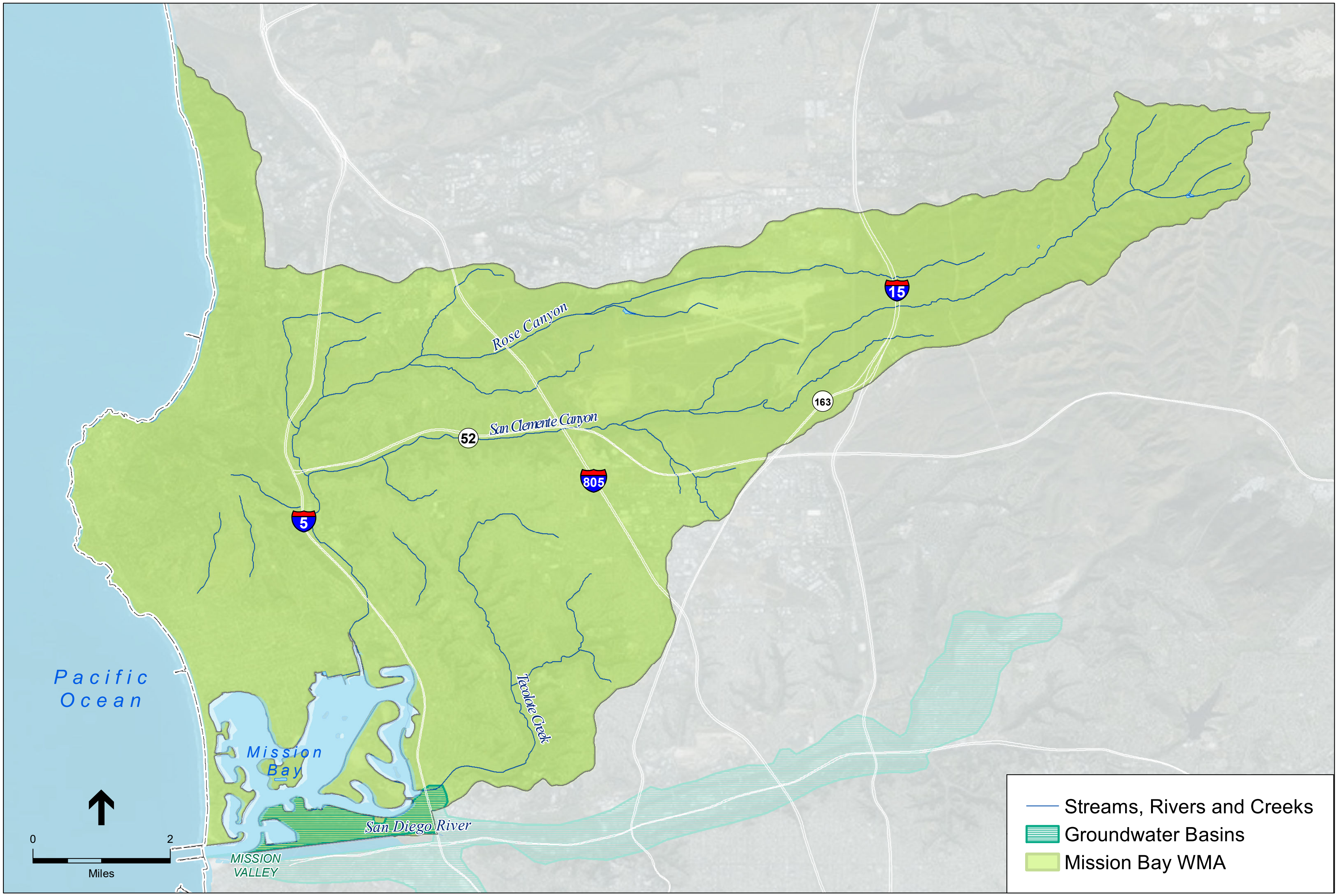
City Boundaries within the Mission Bay Water Management Area



SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

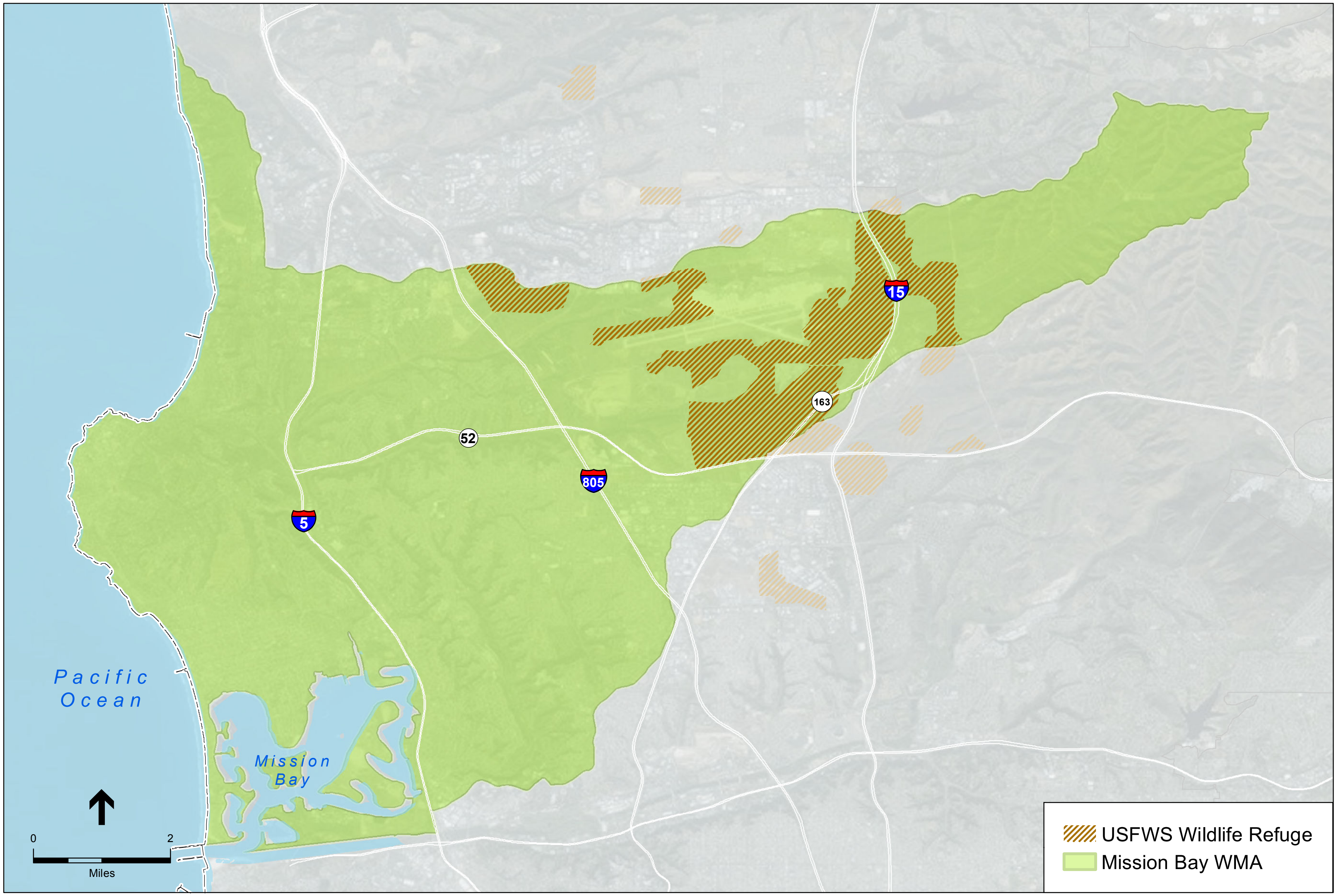
Figure 3-33
Hydrologic Units and Areas within the Mission Bay Water Management Area



SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

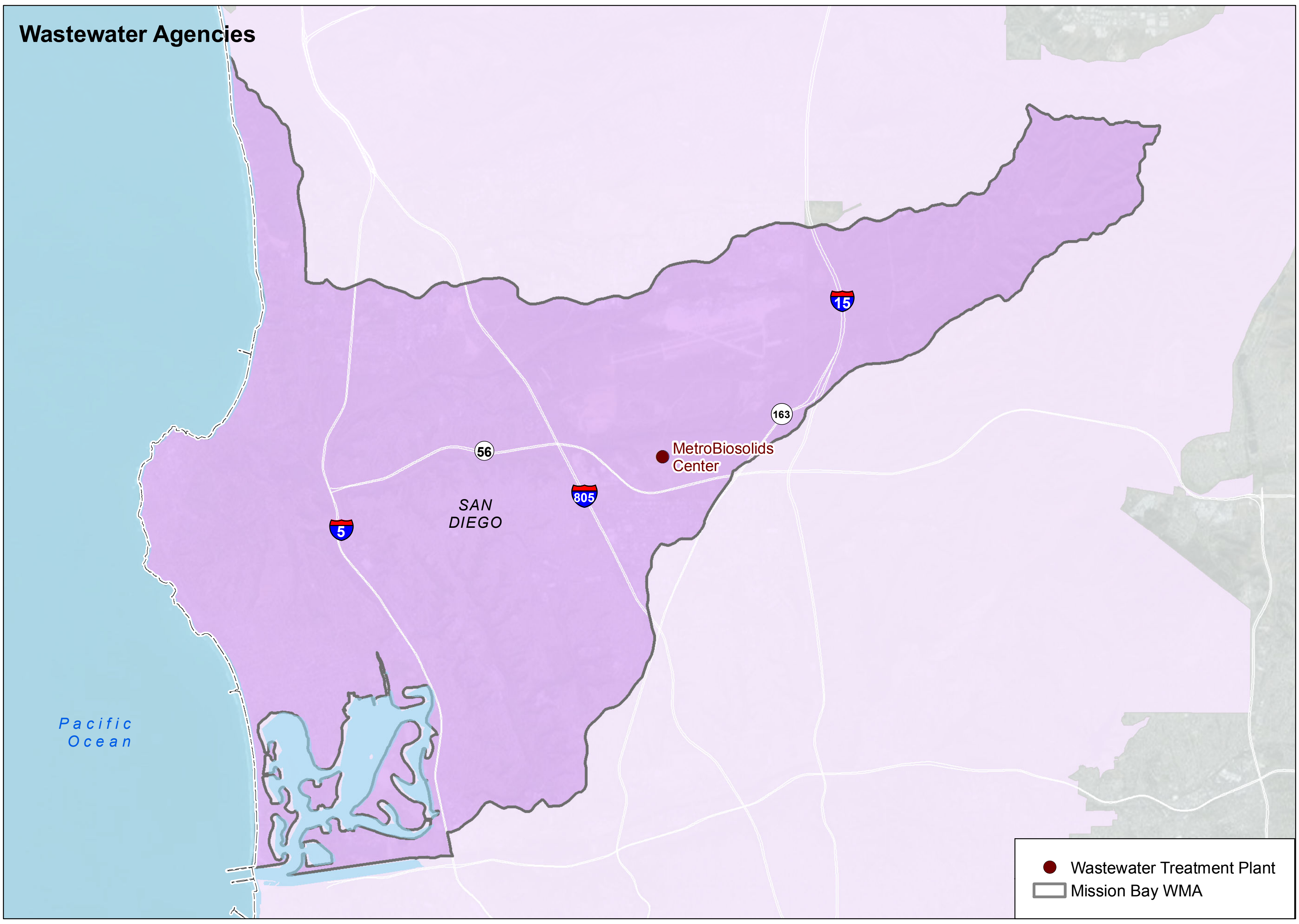
Figure 3-34
Water Features within the Mission Bay Water Management Area

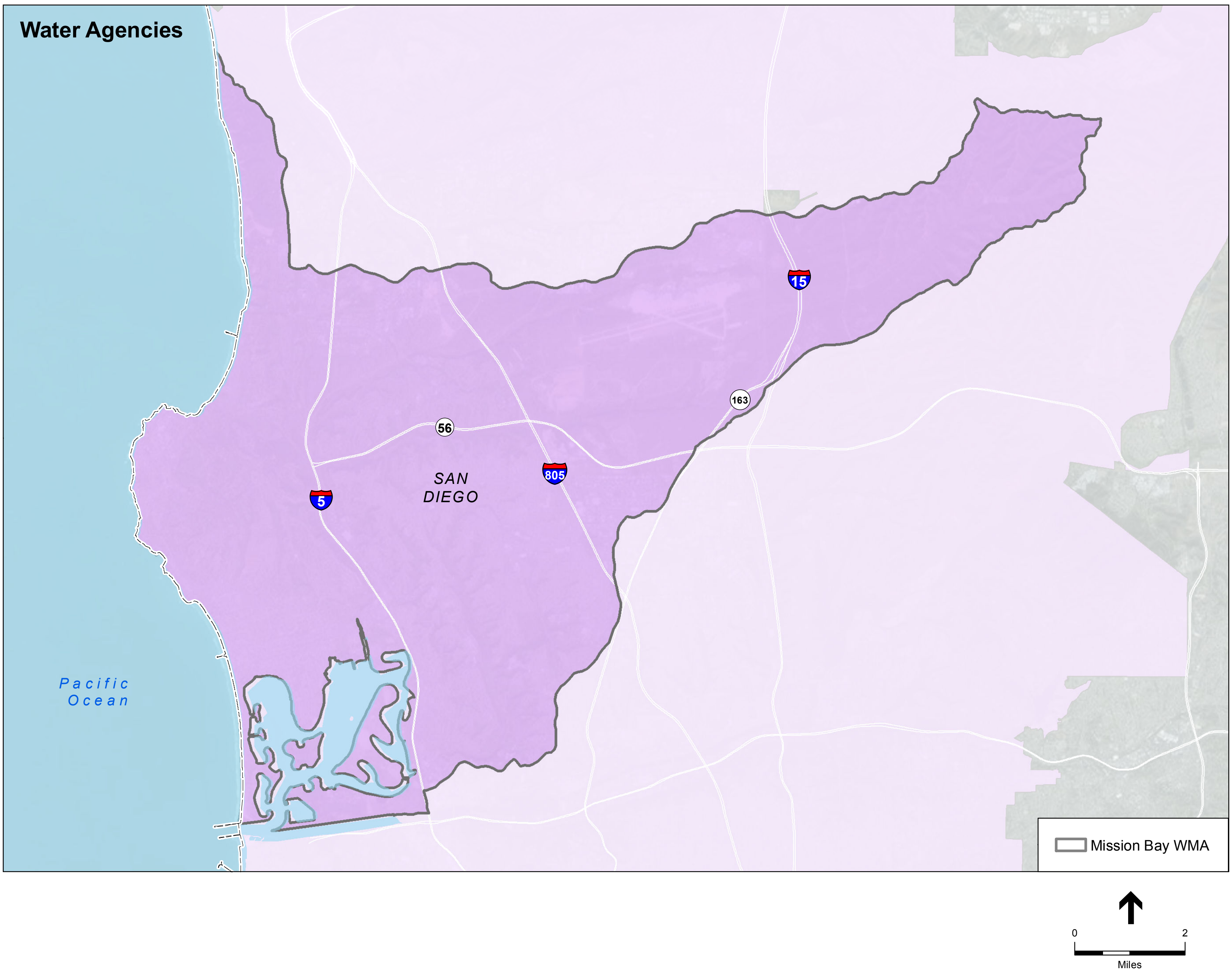


SOURCE: ESRI, 2016; SanGIS, 2016; USFWS, 2016

SWRP . 160618

Figure 3-35
Land Use Agencies within the Mission Bay Water Management Area

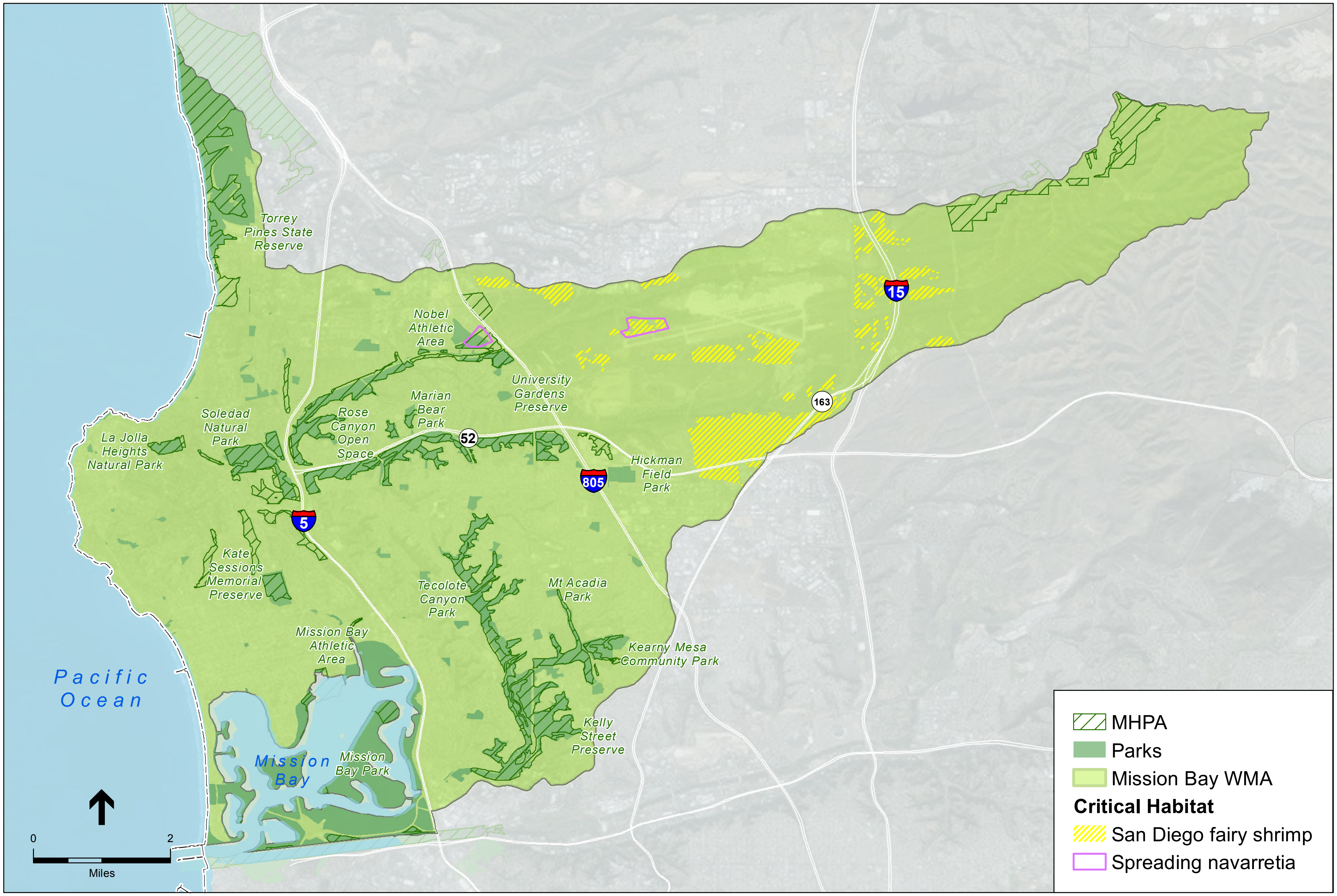




SOURCE: ESRI, 2016; SanGIS, 2016; IRWM, 2016

SWRP . 160618

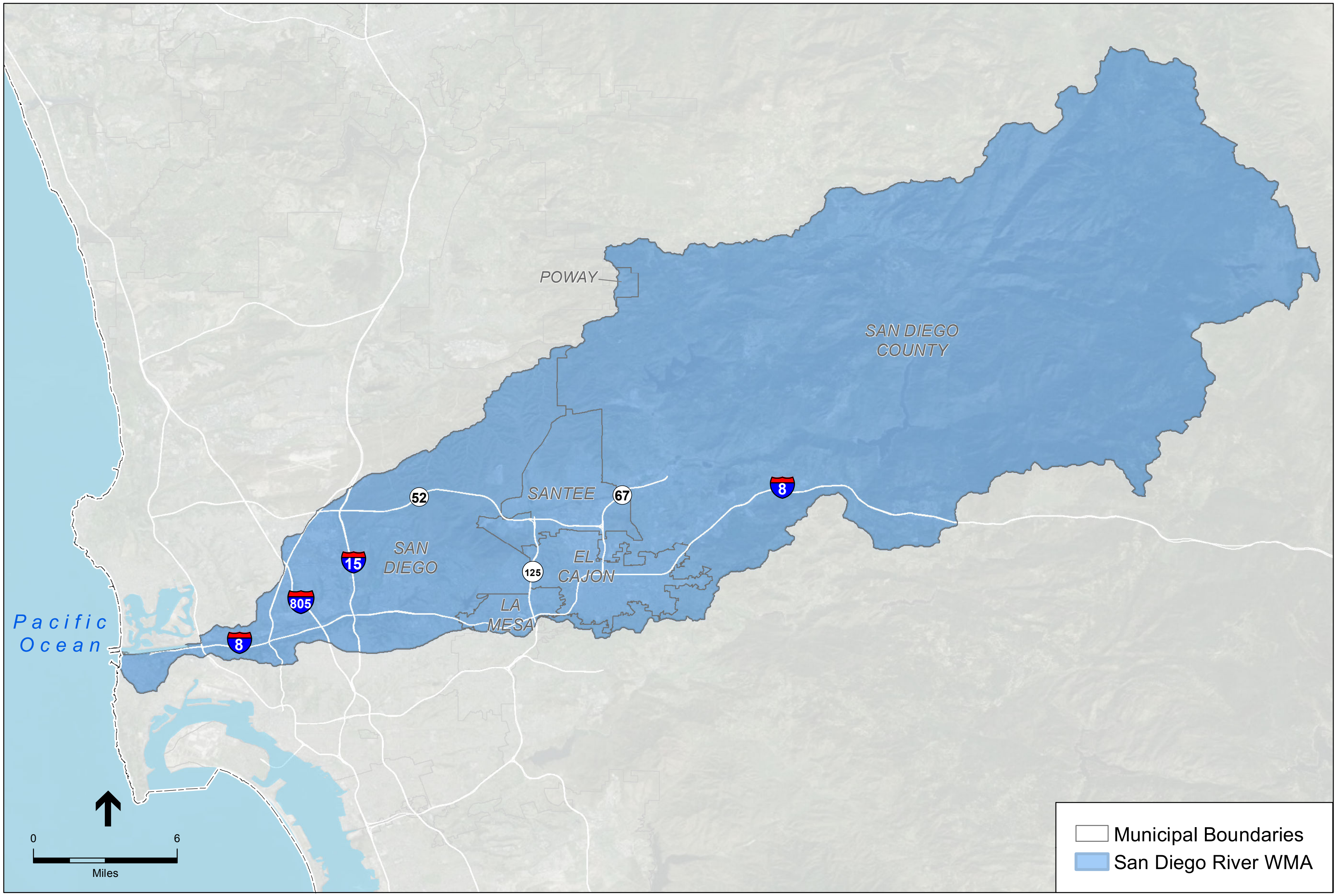
Figure 3-36
Water Agencies and Wastewater Agencies
within the Mission Bay Water Management Area



SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

Figure 3-37
Critical Habitat within the Mission Bay Water Management Area

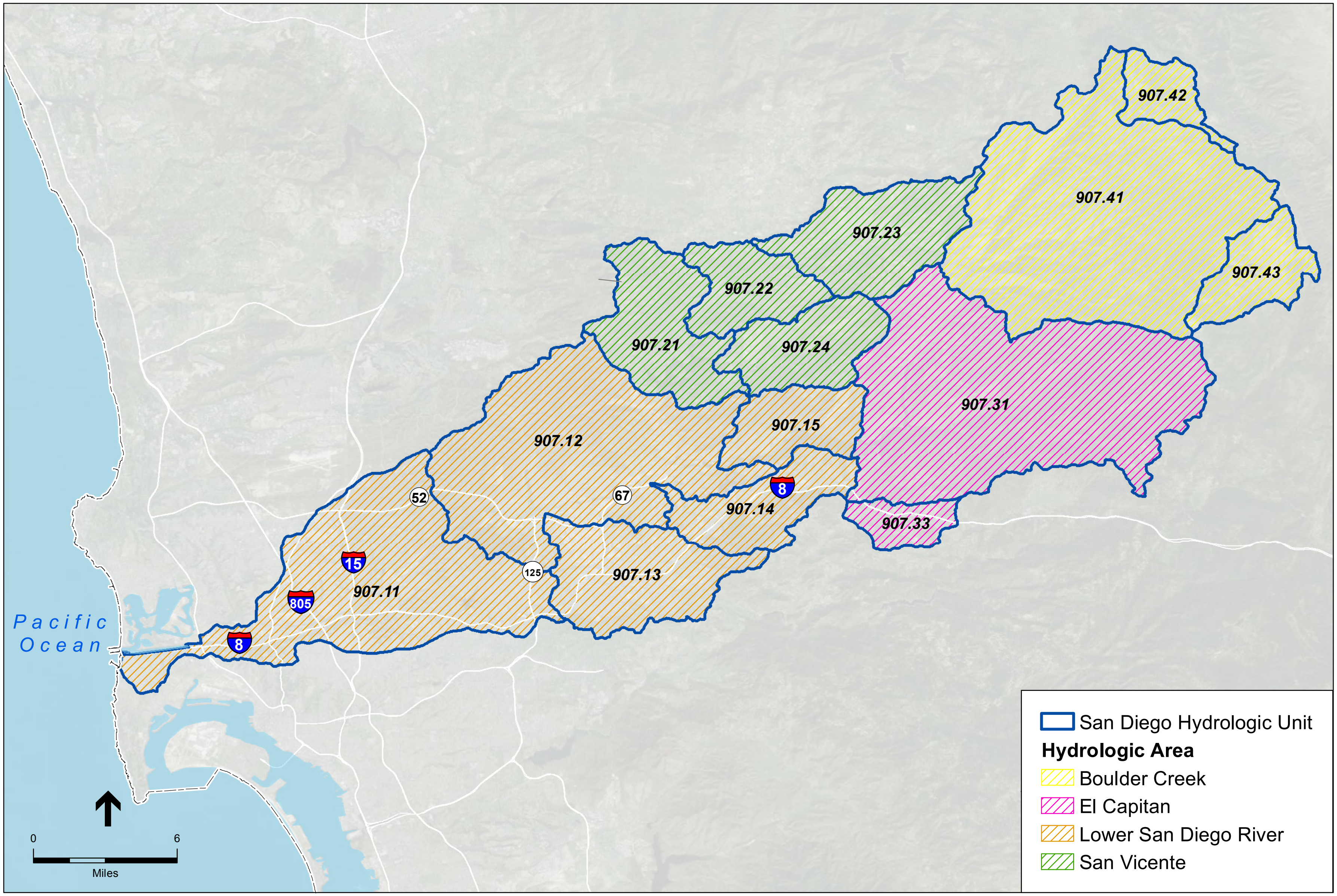


SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

Figure 3-38

City Boundaries within the San Diego River Water Management Area

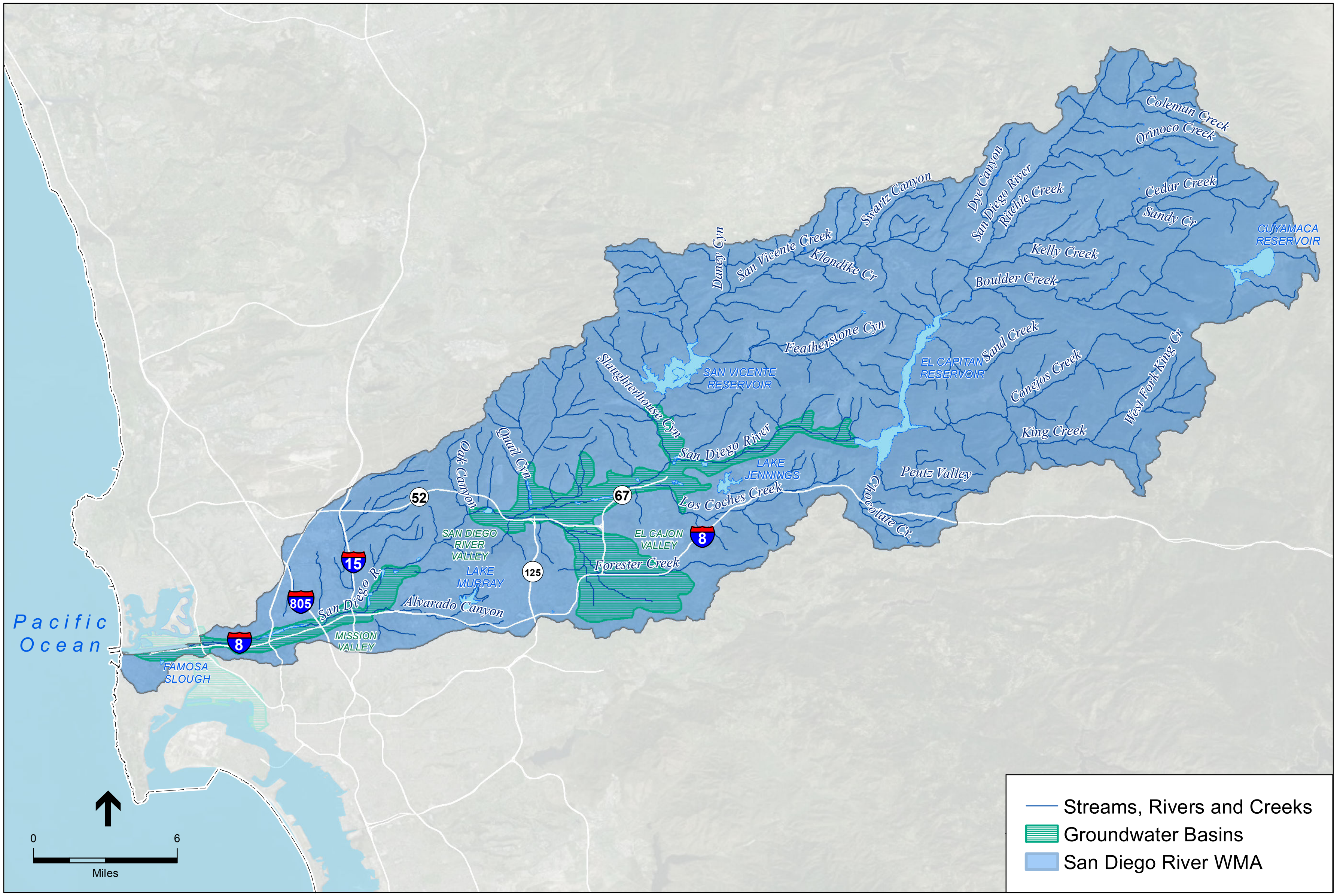


SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

Figure 3-39

Hydrologic Units and Areas within the San Diego River Water Management Area

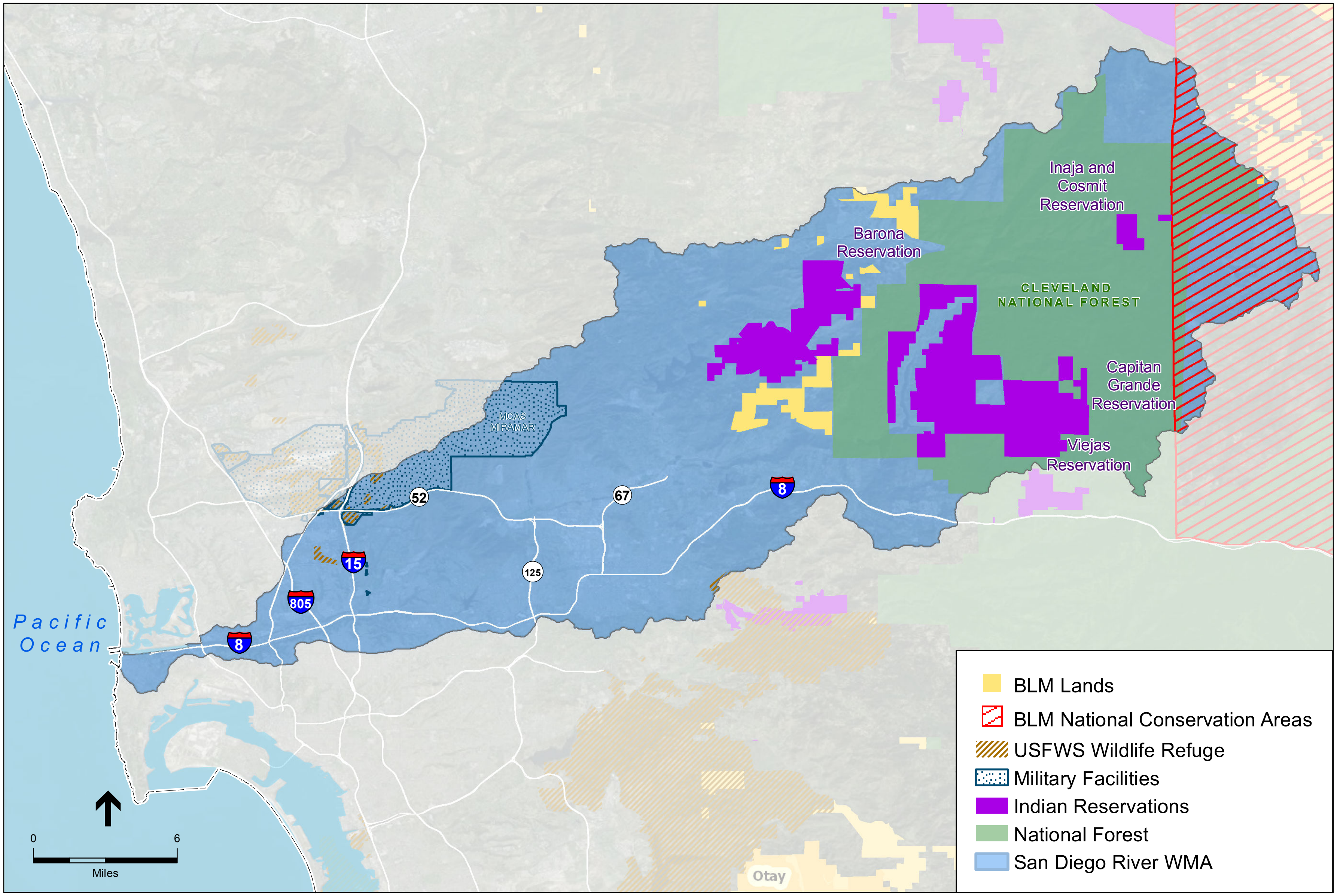


SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

Figure 3-40

Water Features within the San Diego River Water Management Area

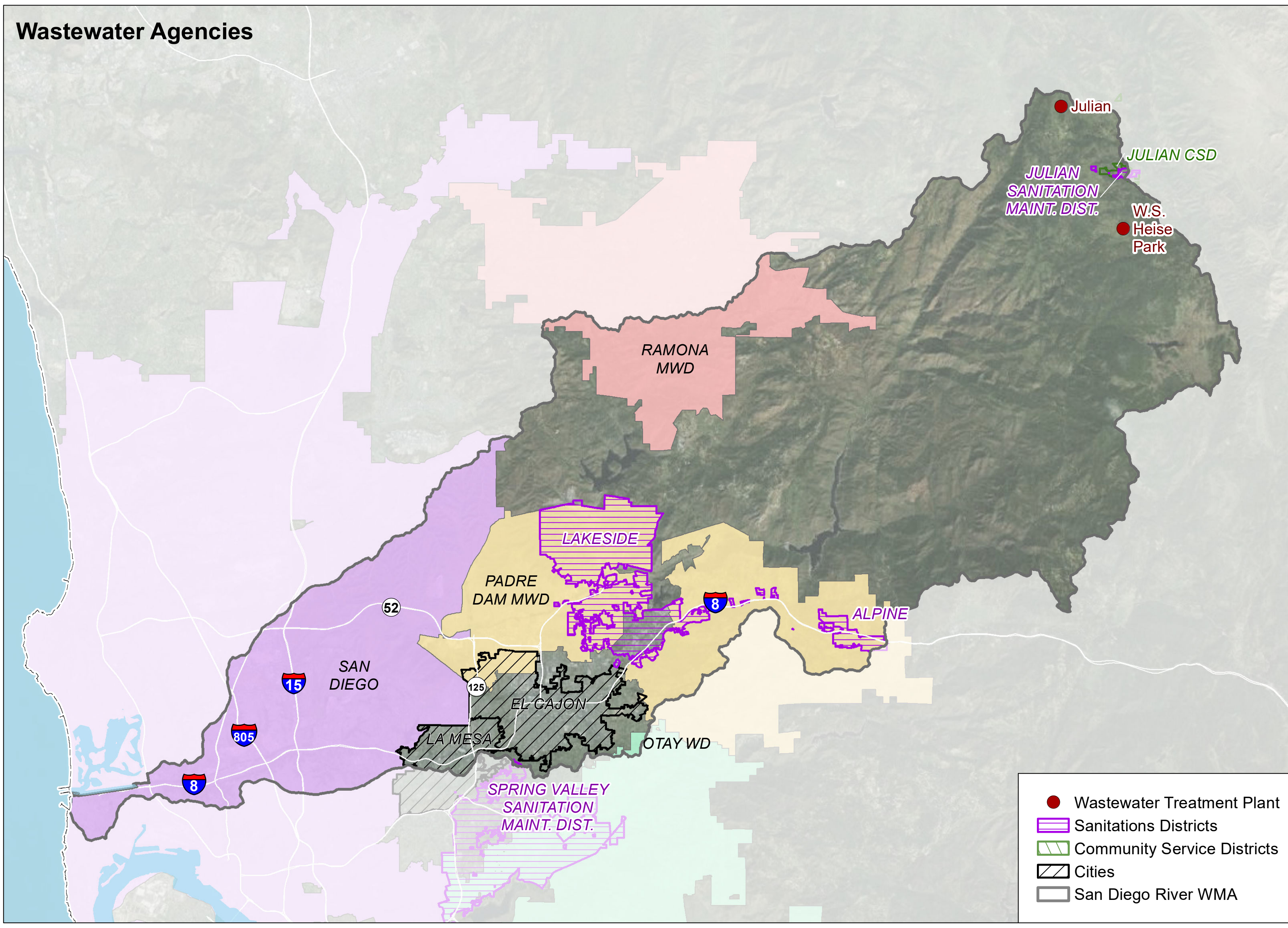


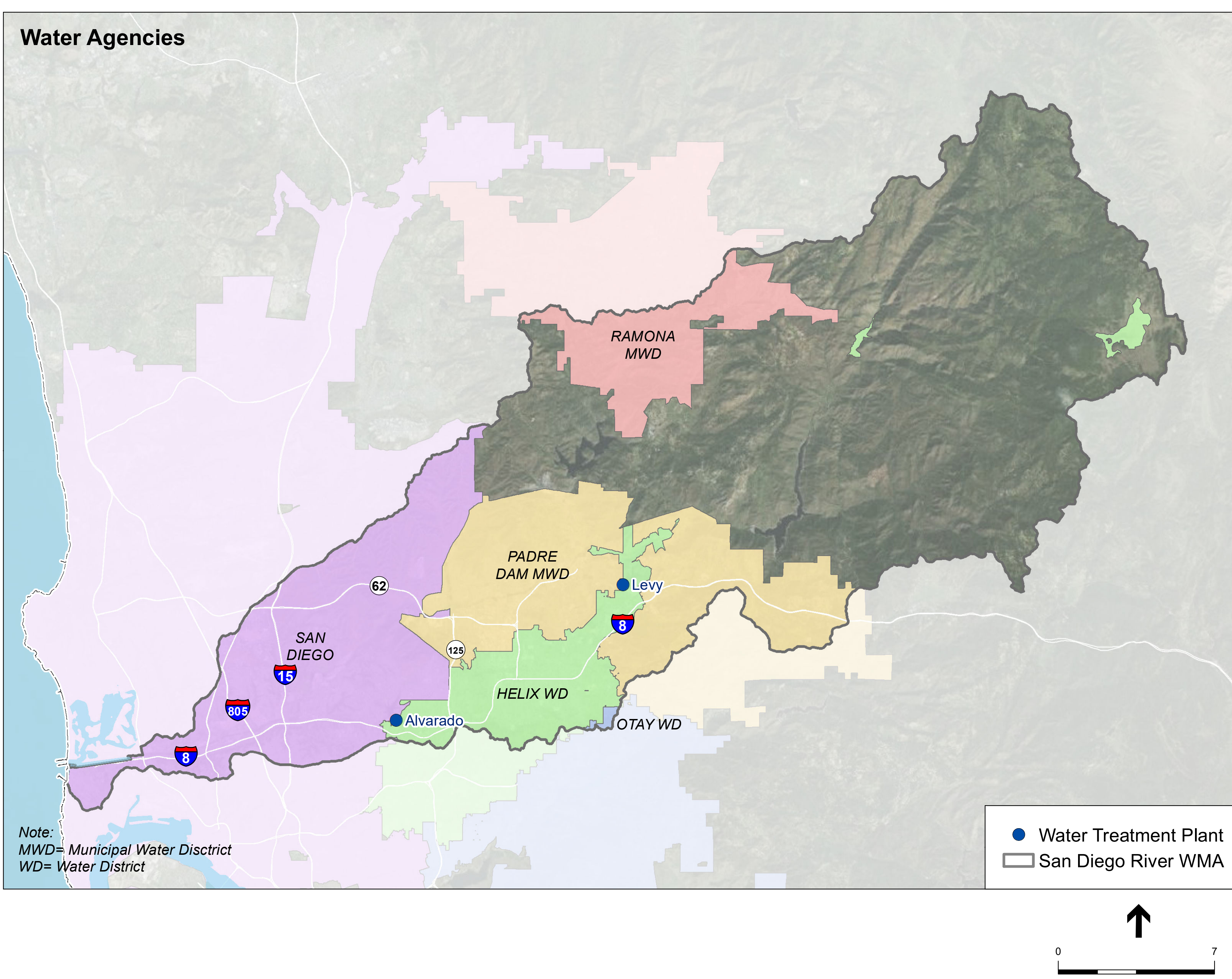
SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

Figure 3-41

Land Use Agencies within the San Diego River Water Management Area

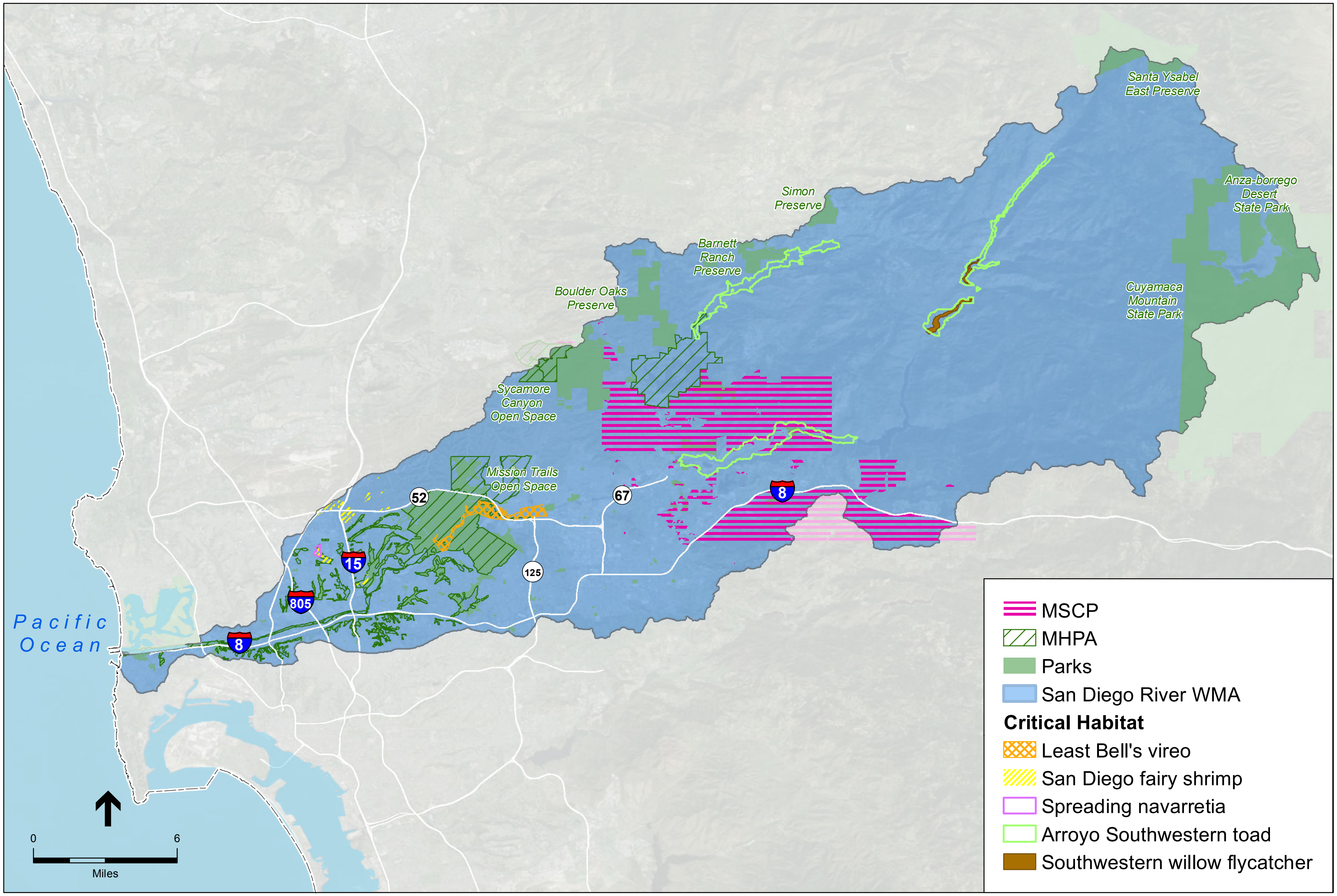




SOURCE: ESRI, 2016; SanGIS, 2016; IRWM, 2016

SWRP . 160618

Figure 3-42
Water Agencies and Wastewater Agencies within the San Diego River Water Management Area



SOURCE: ESRI, 2016; SanGIS, 2016

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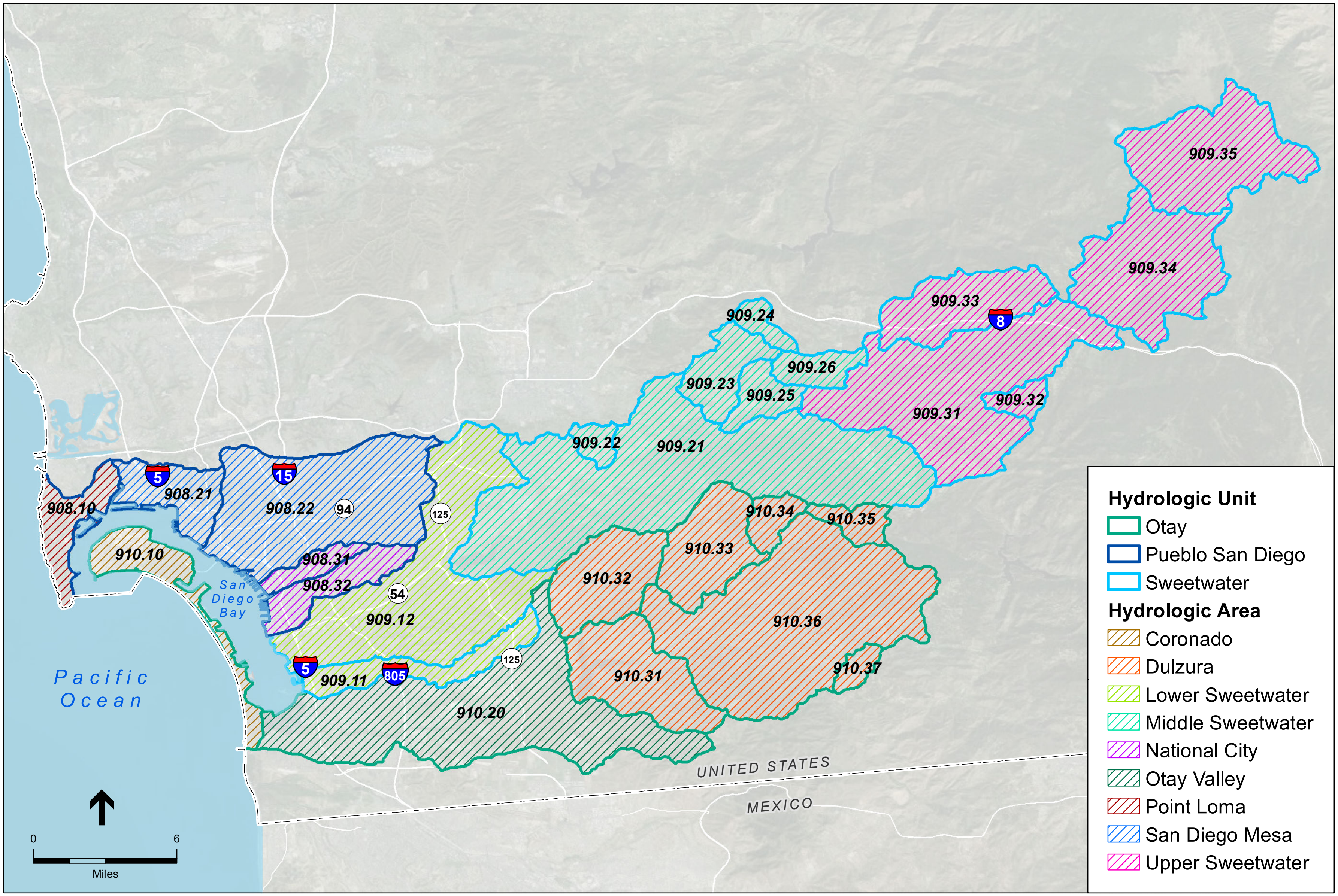
Figure 3-43

Critical Habitat within the San Diego River Water Management Area

SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

Figure 3-44
City Boundaries within the San Diego Bay Water Management Area

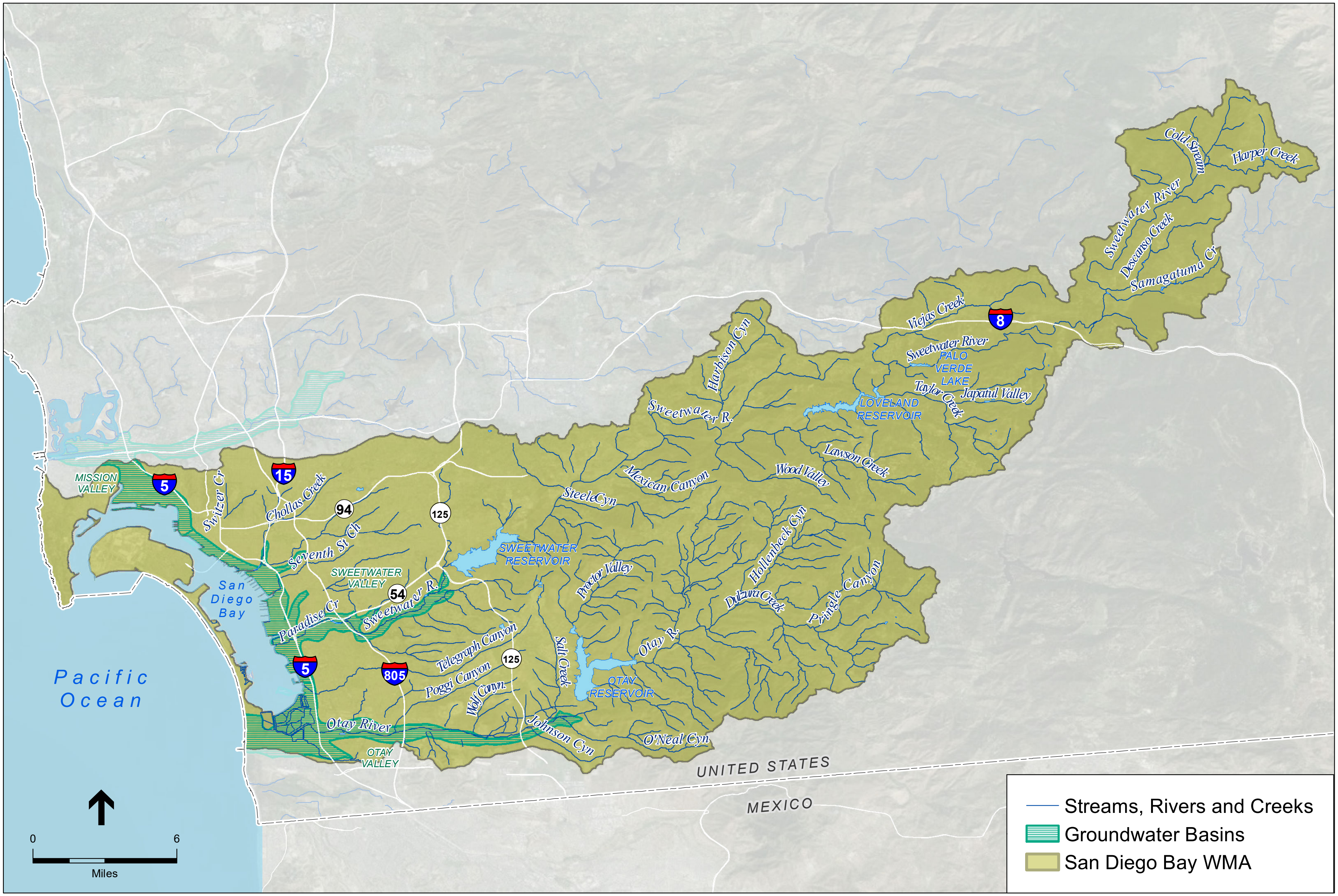


SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

Figure 3-45

Hydrologic Units and Areas within the San Diego Bay Water Management Area

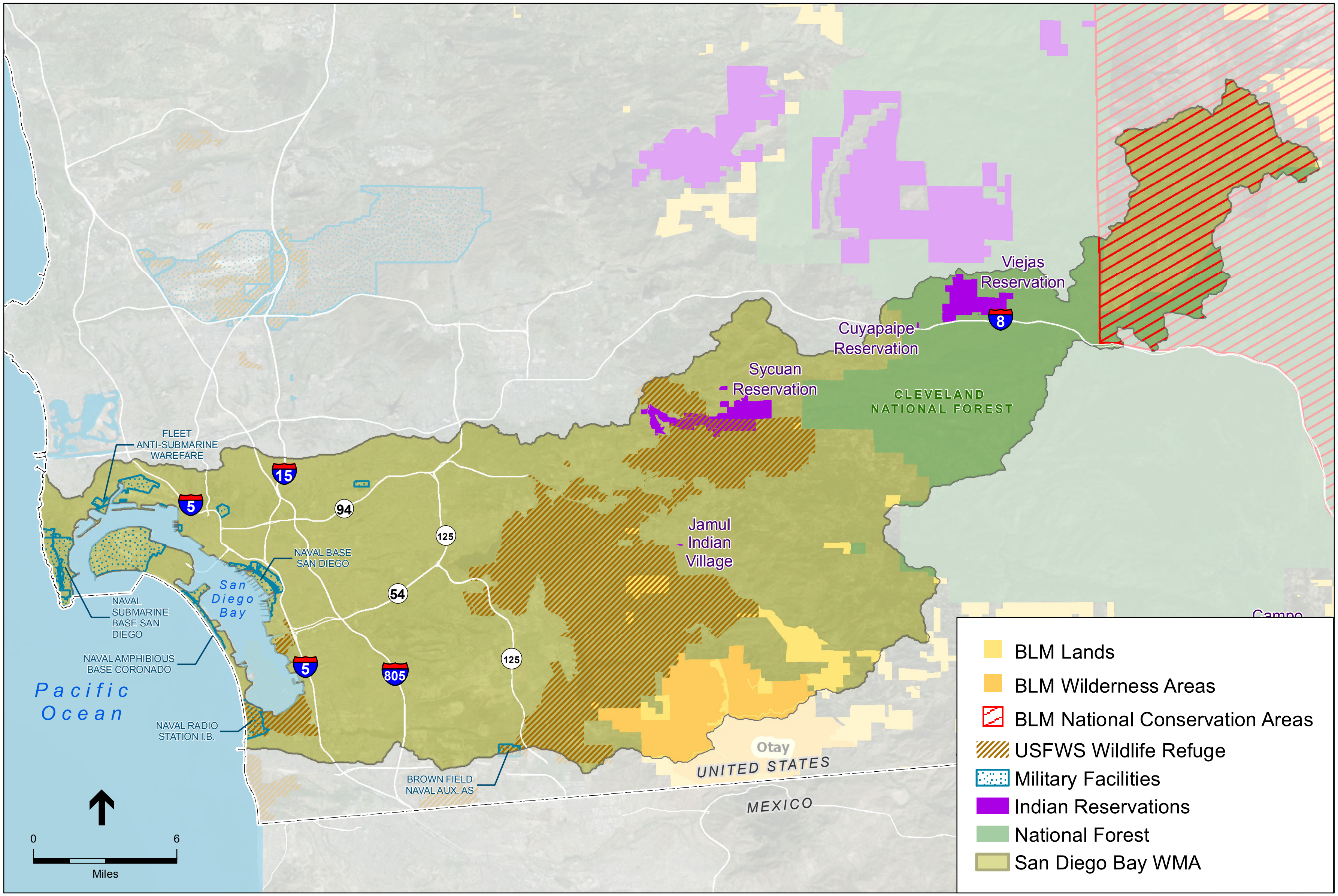


SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

Figure 3-46

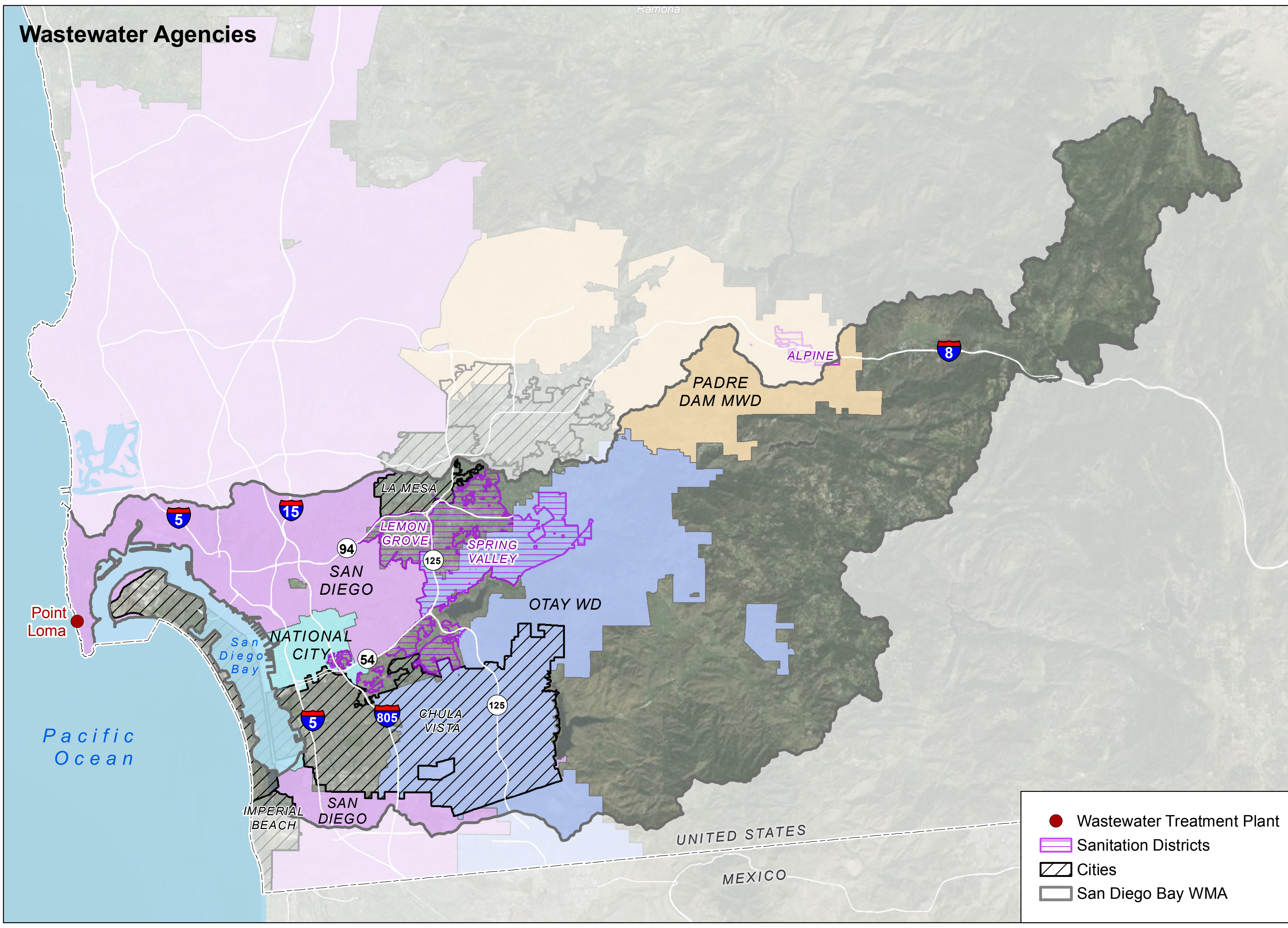
Water Features within the San Diego Bay Water Management Area

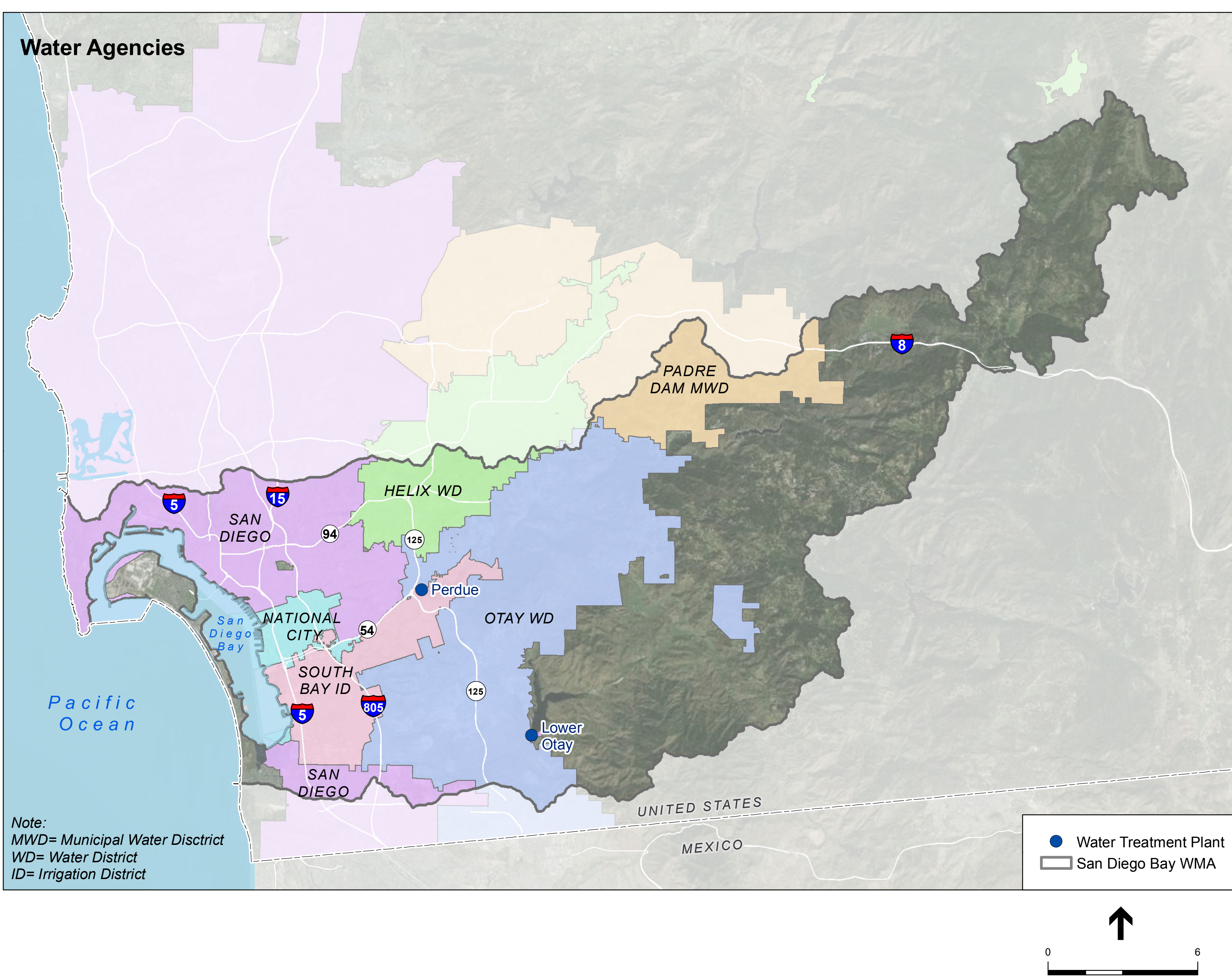


SOURCE: ESRI, 2016; SanGIS, 2016; Bureau of Land Management

SWRP . 160618

Figure 3-47
Land Use Agencies within the San Diego Bay Water Management Area



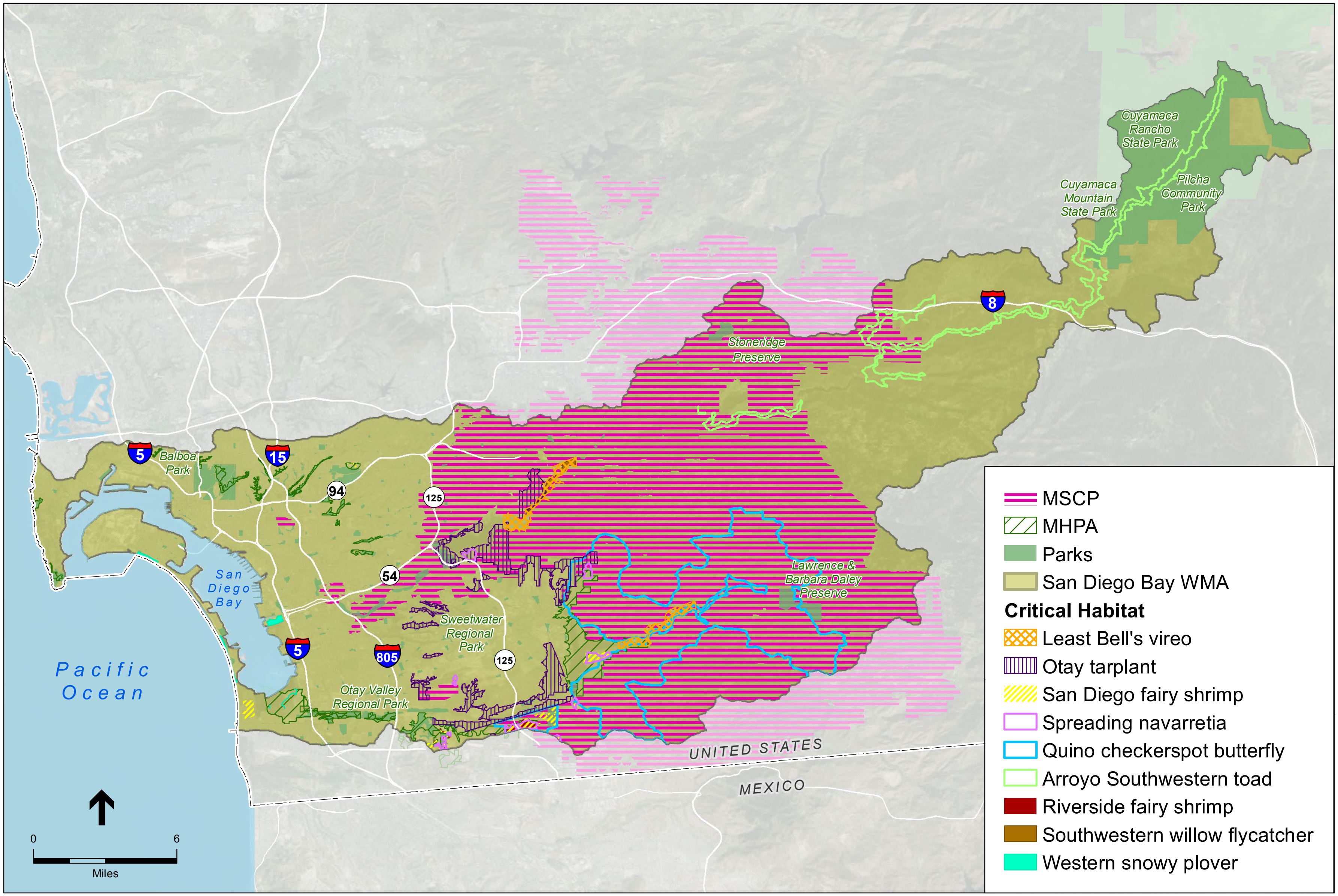


SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

Figure 3-48

Water Agencies and Wastewater Agencies
within the San Diego Bay Water Management Area

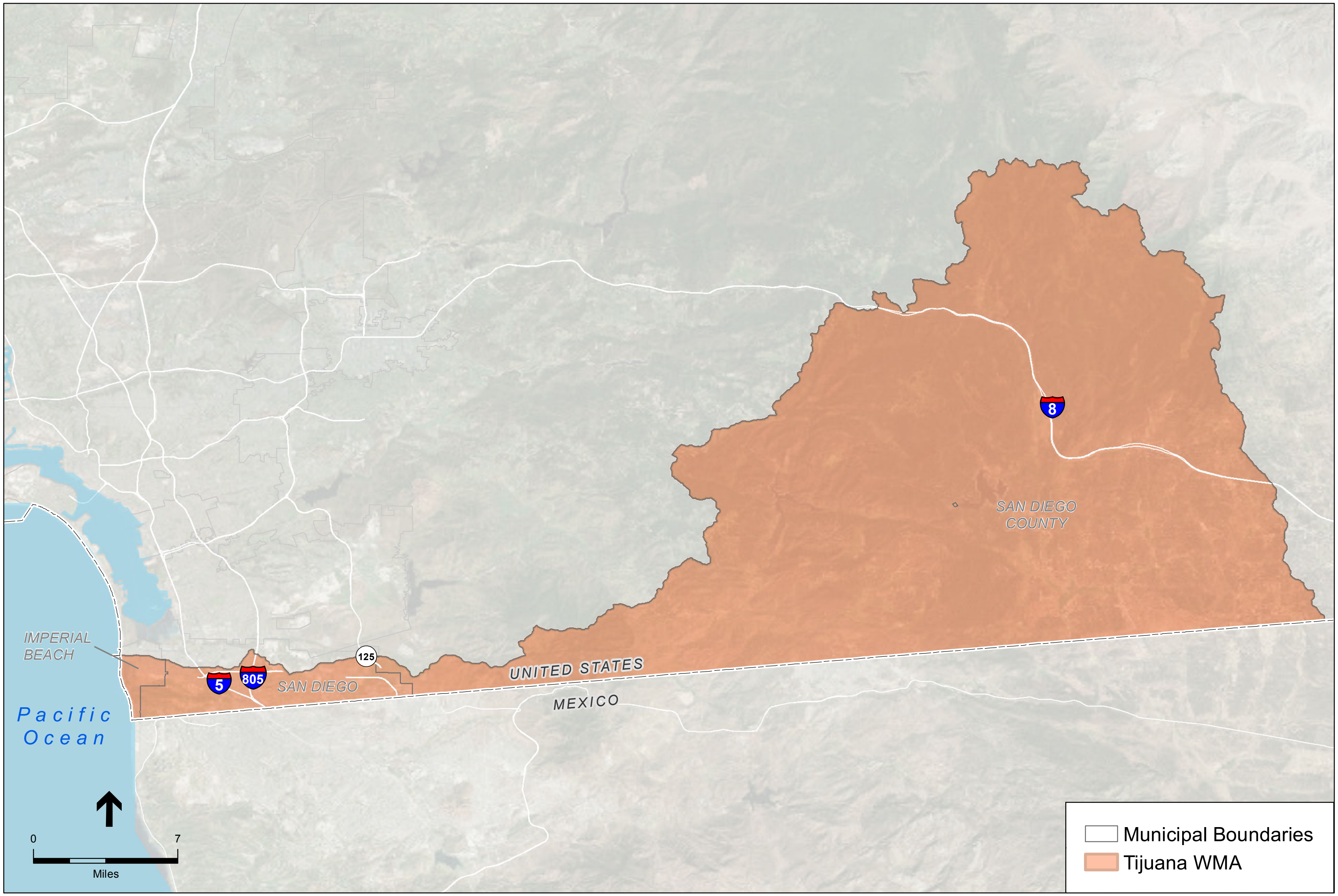


SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

Figure 3-49

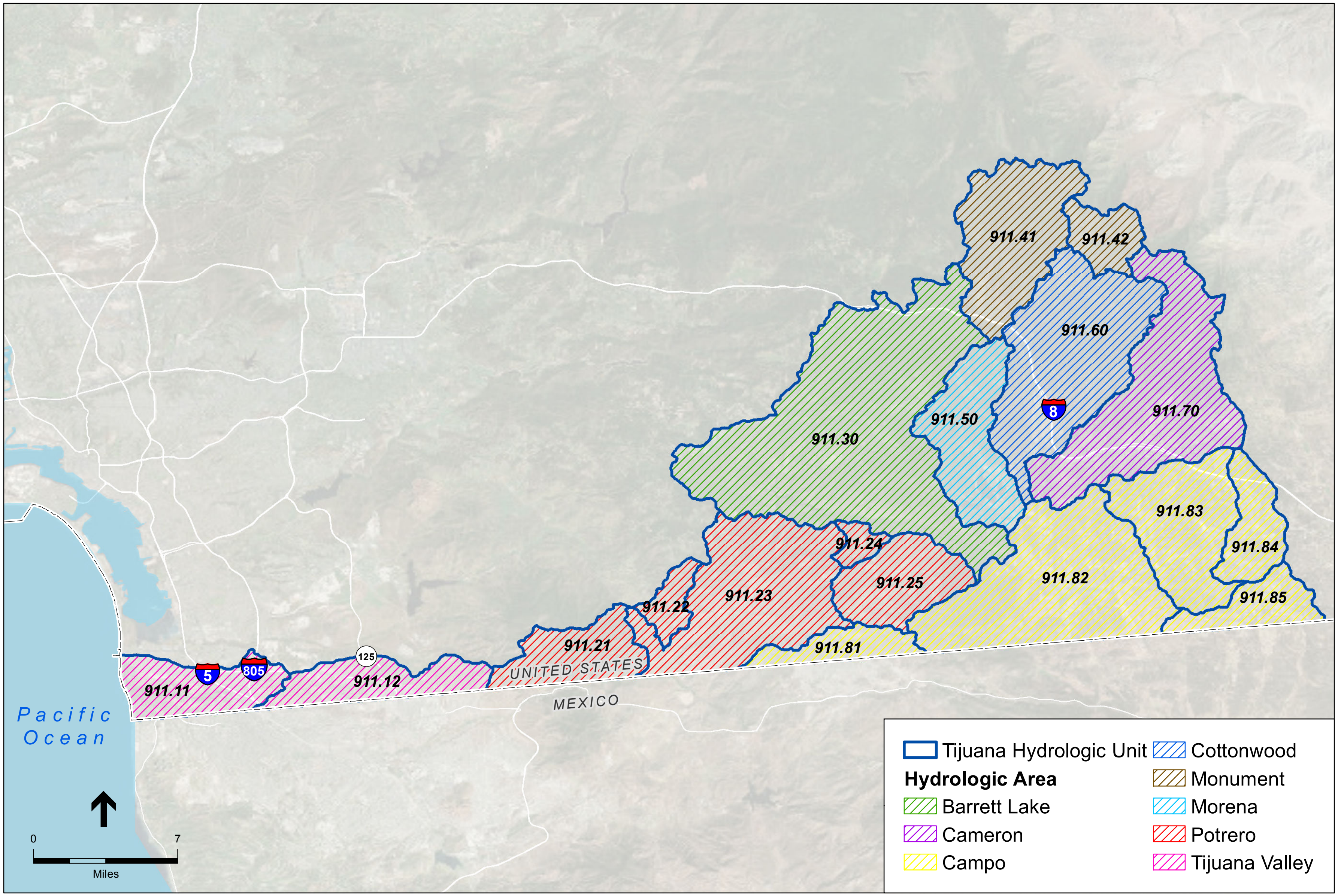
Critical Habitat within the San Diego Bay Water Management Area



SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

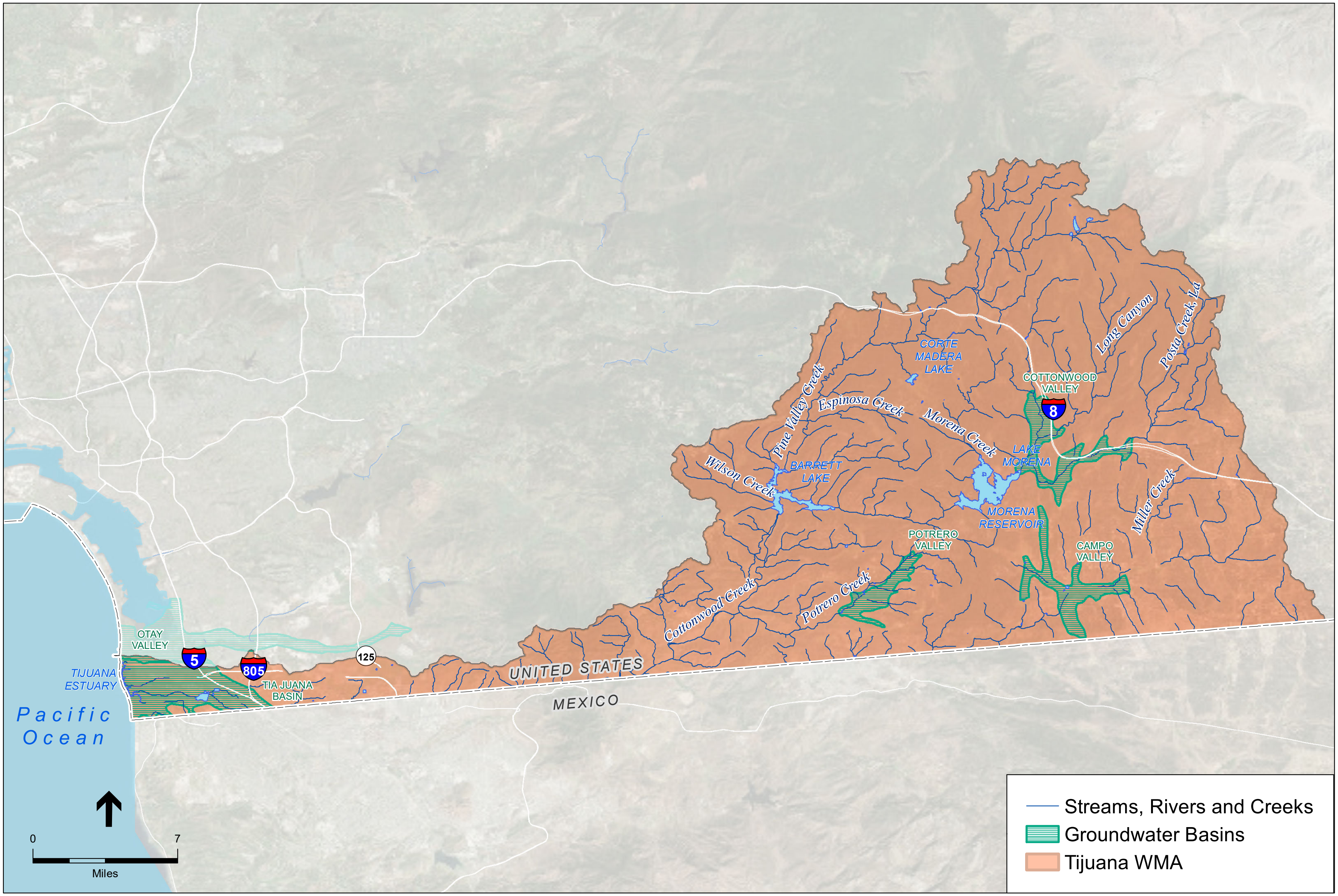
Figure 3-50
City Boundaries within the Tijuana Water Management Area



SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

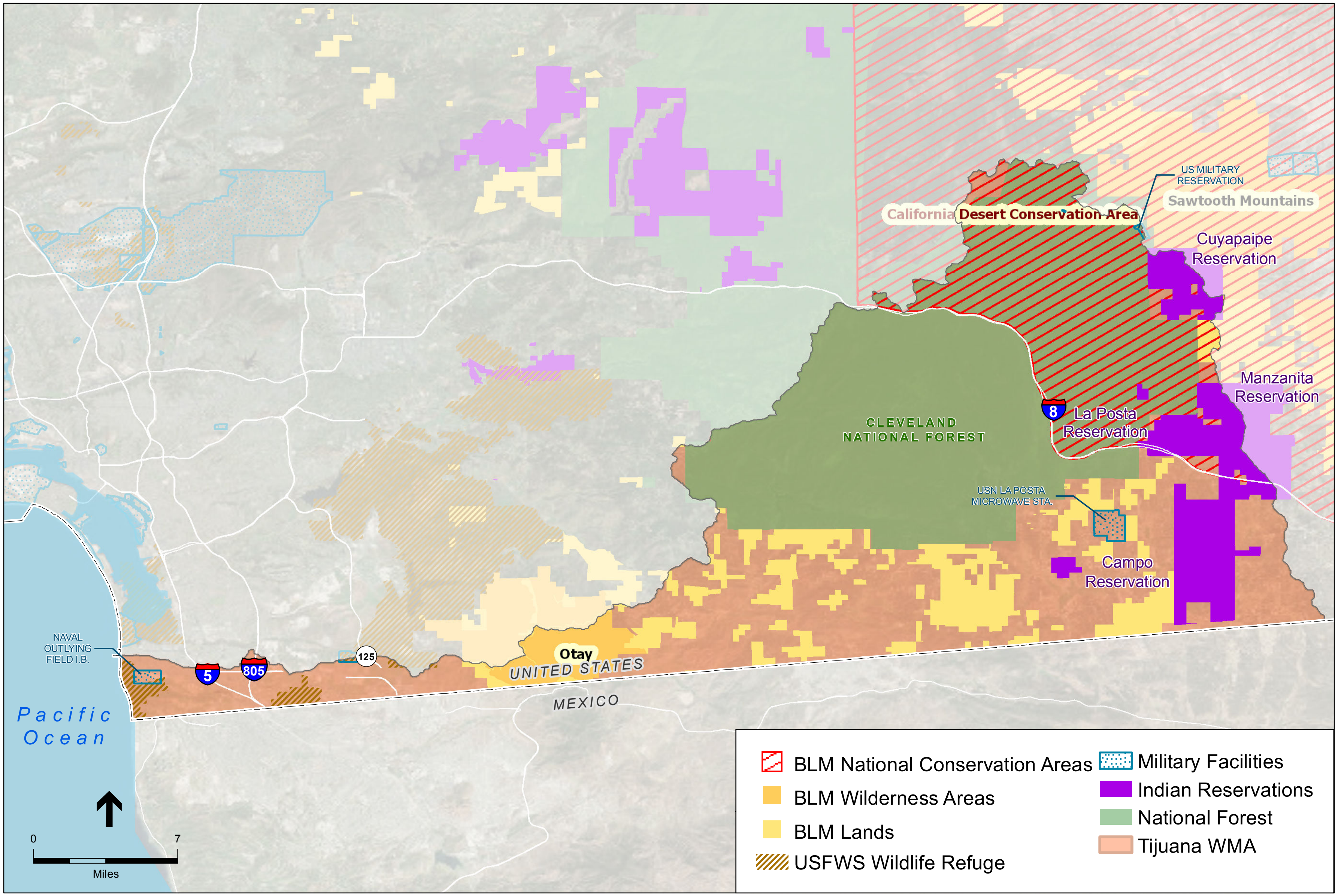
Figure 3-51
Hydrologic Units and Areas within the Tijuana Water Management Area



SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

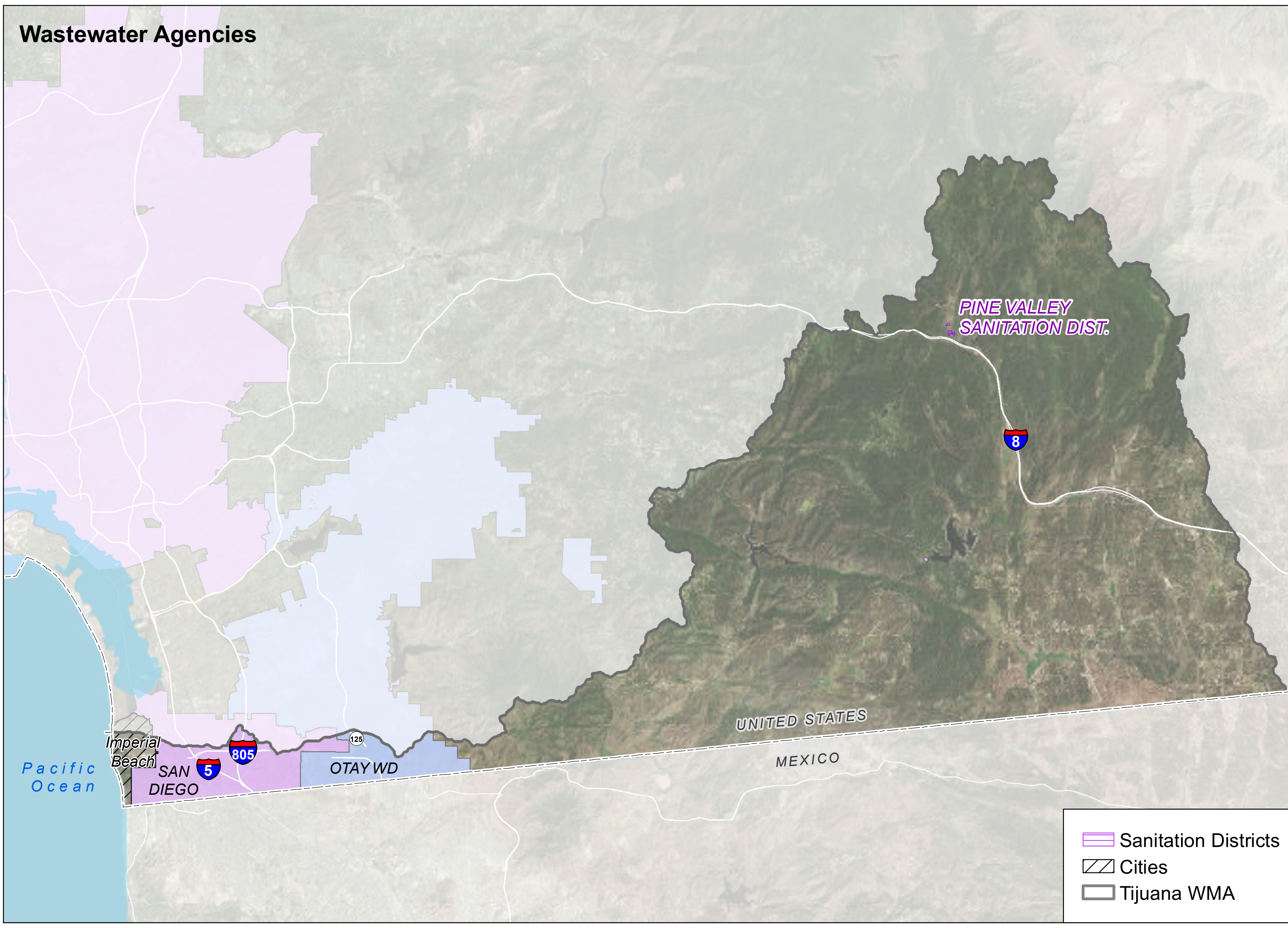
Figure 3-52
Water Features within the Tijuana Water Management Area

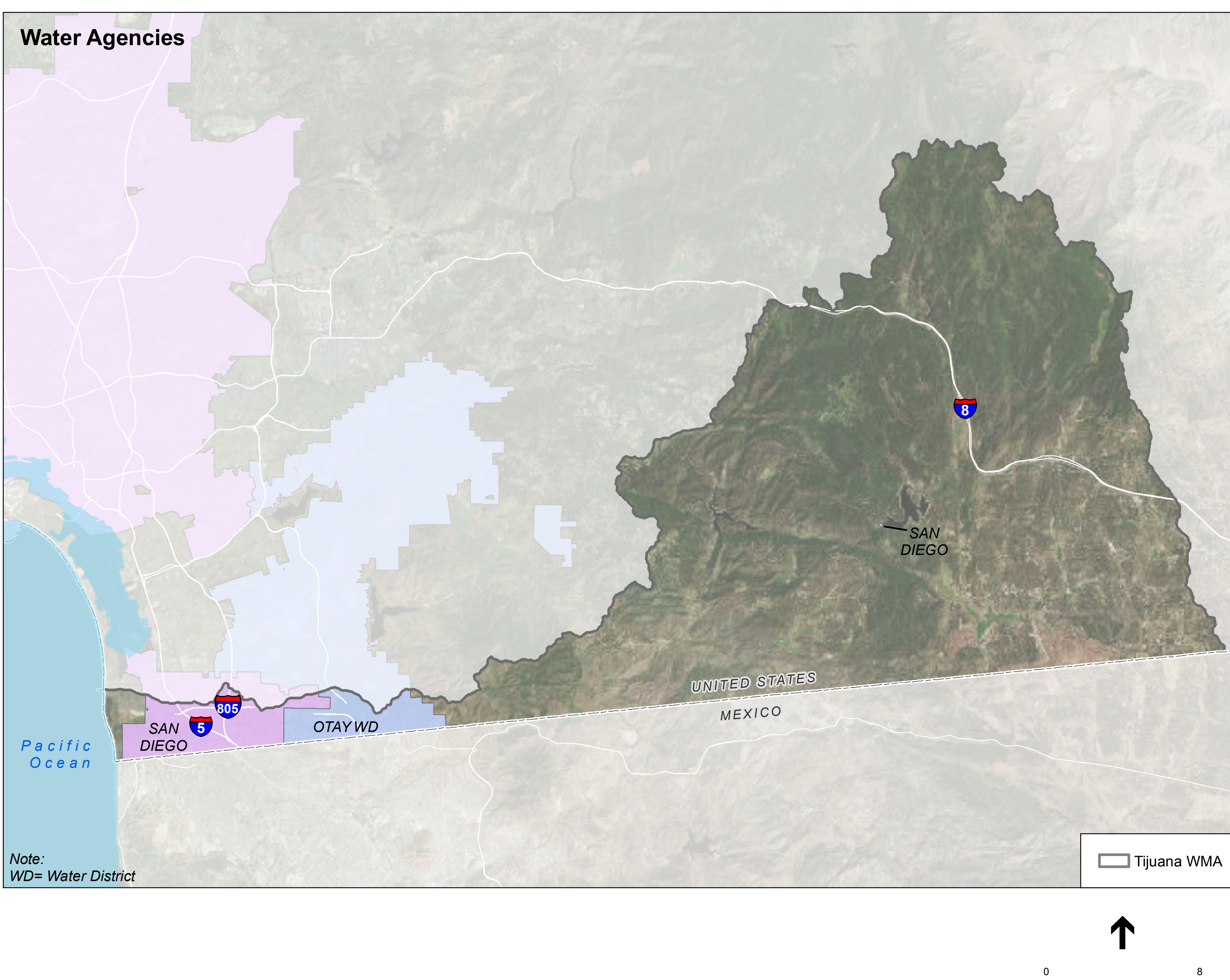


SOURCE: ESRI, 2016; SanGIS, 2016; Bureau of Land Management

SWRP . 160618

Figure 3-53
Land Use Agencies within the Tijuana Water Management Area

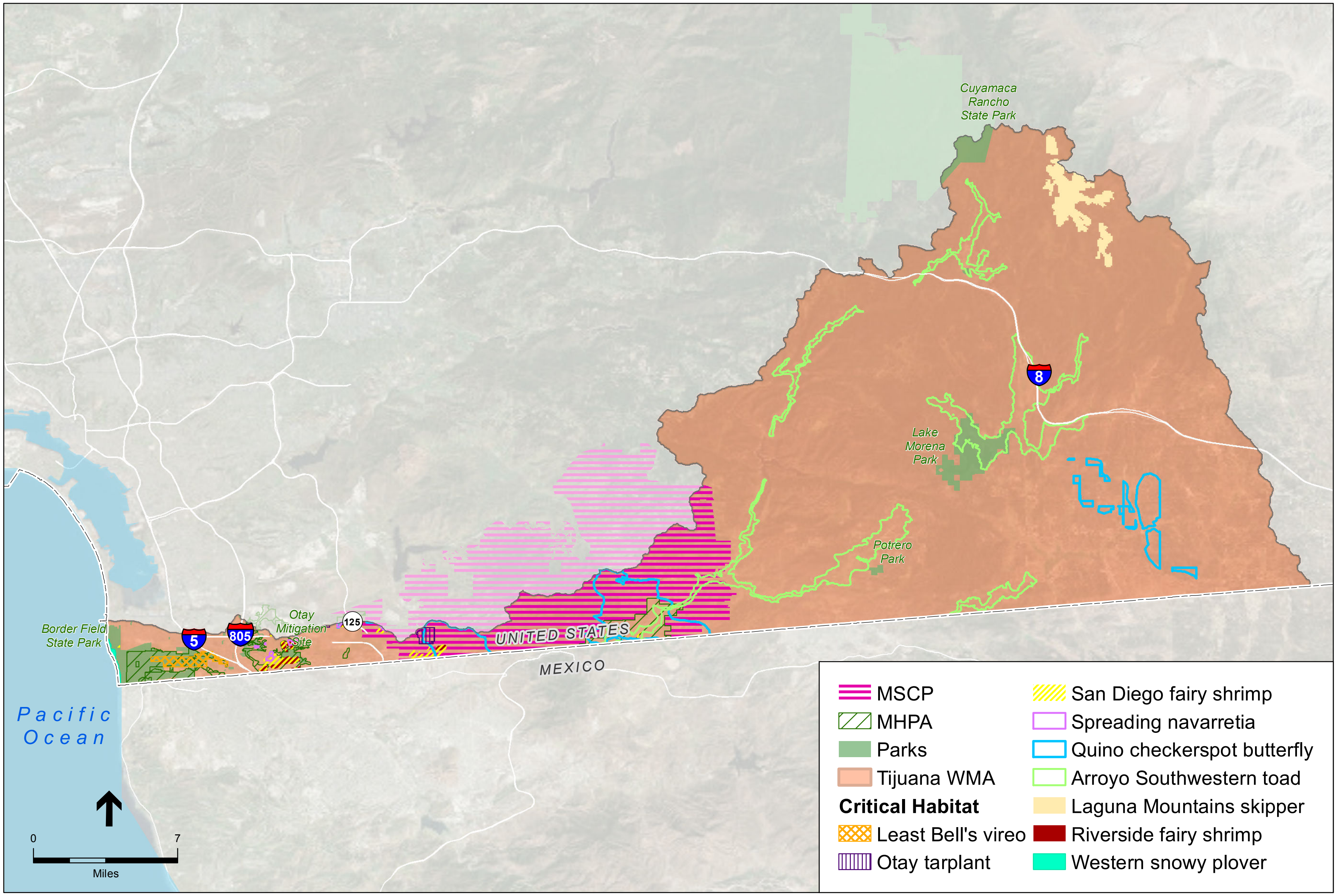




SOURCE: ESRI, 2016; SanGIS, 2016; IRWM, 2016

SWRP . 160618

Figure 3-54
Water Agencies and Wastewater Agencies
within the Tijuana Water Management Area



SOURCE: ESRI, 2016; SanGIS, 2016

SWRP . 160618

Figure 3-55
Critical Habitat within the Tijuana Water Management Area