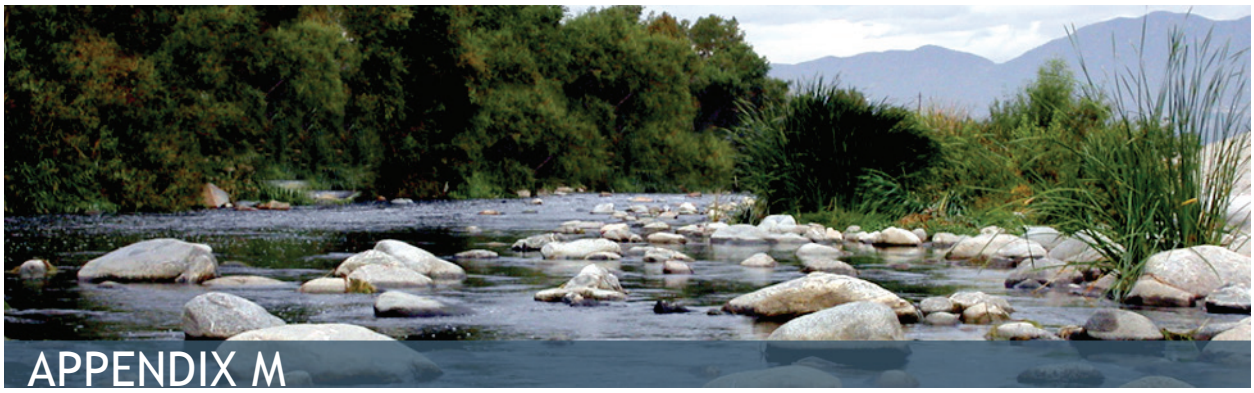


APPENDIX M

Upper San Gabriel River and Rio Hondo Subregional Plan

This page intentionally left blank.

Upper San Gabriel River and Rio Hondo Subregional Plan

Final

Prepared by:

RMC Water and Environment

In Association with:

Geosyntec consultants

December 2012

This page intentionally left blank.

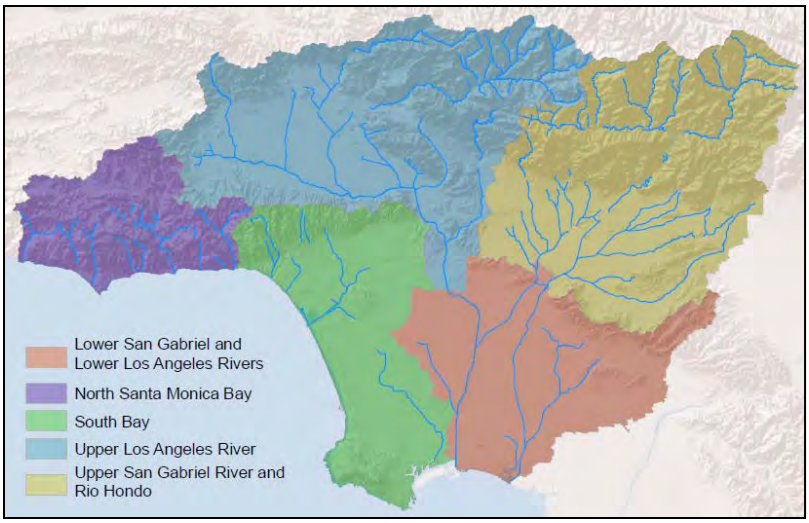
1 Background and Purpose of Subregional Plan

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

2 Upper San Gabriel River and Rio Hondo Description

2.1 Physical Setting

Figure 1: GLAC Subregional Boundaries



The Upper San Gabriel River and Rio Hondo Subregion of the GLAC IRWM Region is located in the northeast portion of the Los Angeles County urbanized area (Figure 1). The Upper San Gabriel River and Rio Hondo Watersheds contains large expanses of open space in the San Gabriel Mountains (including much of the Angeles National Forest) and the Puente, and San Jose Hills, with development concentrated in the interior valleys and the surrounding foothills. Several groundwater basins and runoff from the San Gabriel Mountains provide significant water supplies to the Subregion, although groundwater contamination from industrial sources and prior land uses poses a significant challenge in some locations. Although most of the major river and stream channels on the valley floors have been subject to channelization, several of these, including the San Gabriel River, have natural bottoms, which promote in-stream percolation of runoff.

Political Boundaries

The Subregion consists of 45 cities and unincorporated areas of Los Angeles County. Figure 2 depicts the county and city boundaries of the Upper San Gabriel River and Rio Hondo Subregion. The Subregion is home to approximately 2.3 million residents, and is expected to grow to 2.6 million residents by 2035 (Census 2010; SCAG, 2012).

Climate, Temperature, and Rainfall

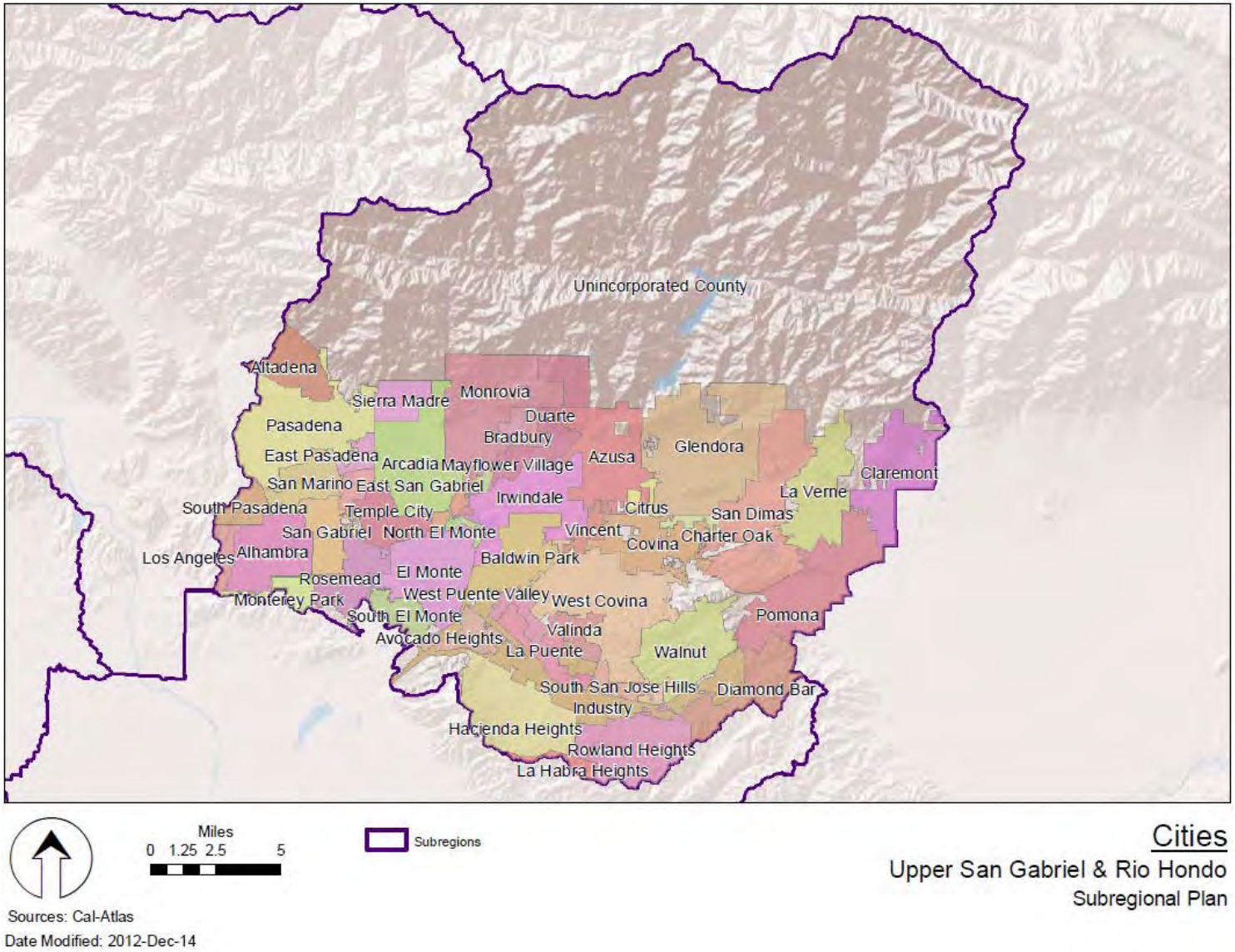
The Upper San Gabriel River and Rio Hondo Subregion is within a Mediterranean climate zone. Summers are typically dry and hot while winters are wet and cool. Precipitation typically falls in a few major storm events between November and March. Precipitation in the Upper San Gabriel and Rio Hondo Subregion averages 17 inches per year, though the foothills and mountains receive considerably more rain than valleys, causing considerable runoff and flooding potential. Due to the topography, portions of the San Gabriel Mountains also receive considerable snow during the winter months.

Geography and Geomorphology

The geography of the Upper San Gabriel and Rio Hondo Subregion can generally be divided into three distinct types: inland valleys (e.g. San Gabriel, Pomona, and Walnut), foothills that generally surround the valley, the San Gabriel Mountains, and the Puente Hills. The San Gabriel Mountains are part of the Transverse Ranges, which extend 350 miles east to west from the Eagle Mountains in San Bernardino County to the Pacific Ocean. The San Gabriel Mountains elevation ranges from sea level to over 10,000 feet and separates the Los Angeles basin from the Mojave Desert. The foothills of the San Gabriel Mountains reach 3,000 to 4,000 feet before rising rapidly into the San Gabriel Mountains, to a height of 10,064 feet at Mount San Antonio (or Mount Baldy). The grade of the mountain slopes in the San Gabriel Mountains average 65 to 70 percent, some of the steepest slopes in the world. The Puente Hills, which form the southern boundary of the Subregion, have an elevation ranging from sea level to 1,400 feet.

The San Gabriel Mountains and Puente Hills are young mountains, geologically speaking, and continue to rise at a rate of nearly three-quarters of an inch per year. Because of this instability, they are also eroding at a rapid rate. Alluvial deposits of sand, gravel, clay and silt in the coastal plain are thousands of feet thick in some areas, due in part to the erosive nature of the mountains. The Subregion is extensively faulted, with the San Andreas Fault bordering the north side of the San Gabriel Mountains and the Sierra Madre–Cucamonga fault zone on the south side.

Figure 2: Cities in the Subregion



2.1.1 Watersheds and Water Systems

Watersheds

The Upper San Gabriel and Rio Hondo Subregion primarily consists of the upper San Gabriel River watershed, and the Rio Hondo watershed (Figure 3). These watersheds begin in the San Gabriel Mountains, and stretch across the San Gabriel Valley, then down to the Pacific Ocean. In the case of the Rio Hondo, the river joins with the Los Angeles River outside of the Subregion. The portion of the San Gabriel River watershed which this Subregional plan is concerned with is the upper watershed located upstream of Whittier Narrows. The upper San Gabriel River watershed is made up of a number of tributaries, including: the west and east fork of San Gabriel River, Big Dalton Wash, Walnut Creek, and San Jose Creek. The Rio Hondo watershed is also made up of a number of tributaries, including the Arcadia Wash, Eaton Wash, Rubio Wash and Alhambra Wash.

Flood Management and Infrastructure

Flood management is important to protect human lives and property, particularly in the San Gabriel Mountain region where historically flooding has been an issue and runoff is influenced by wildfires and changes to the natural landscape. The Los Angeles County Flood Control District, with the Army Corps of Engineers, constructed, manages and maintains the Subregion's flood infrastructure, such as storm drains, culverts, dams, stormwater management ponds, and flood control channels. Major flood control facilities are shown in Figure 4.

The dams and reservoirs also operate as water conservation facilities. Many tributary stream channels to the San Gabriel River have concrete banks and bottoms due to frequent and historical flooding. This added imperviousness has reduced the amount of permeable acreage and recharge to the groundwater basin. A number of in-stream and off-stream groundwater replenishment facilities are in place to help offset the impact of the flood control features.

Figure 3: Watersheds of the Subregion

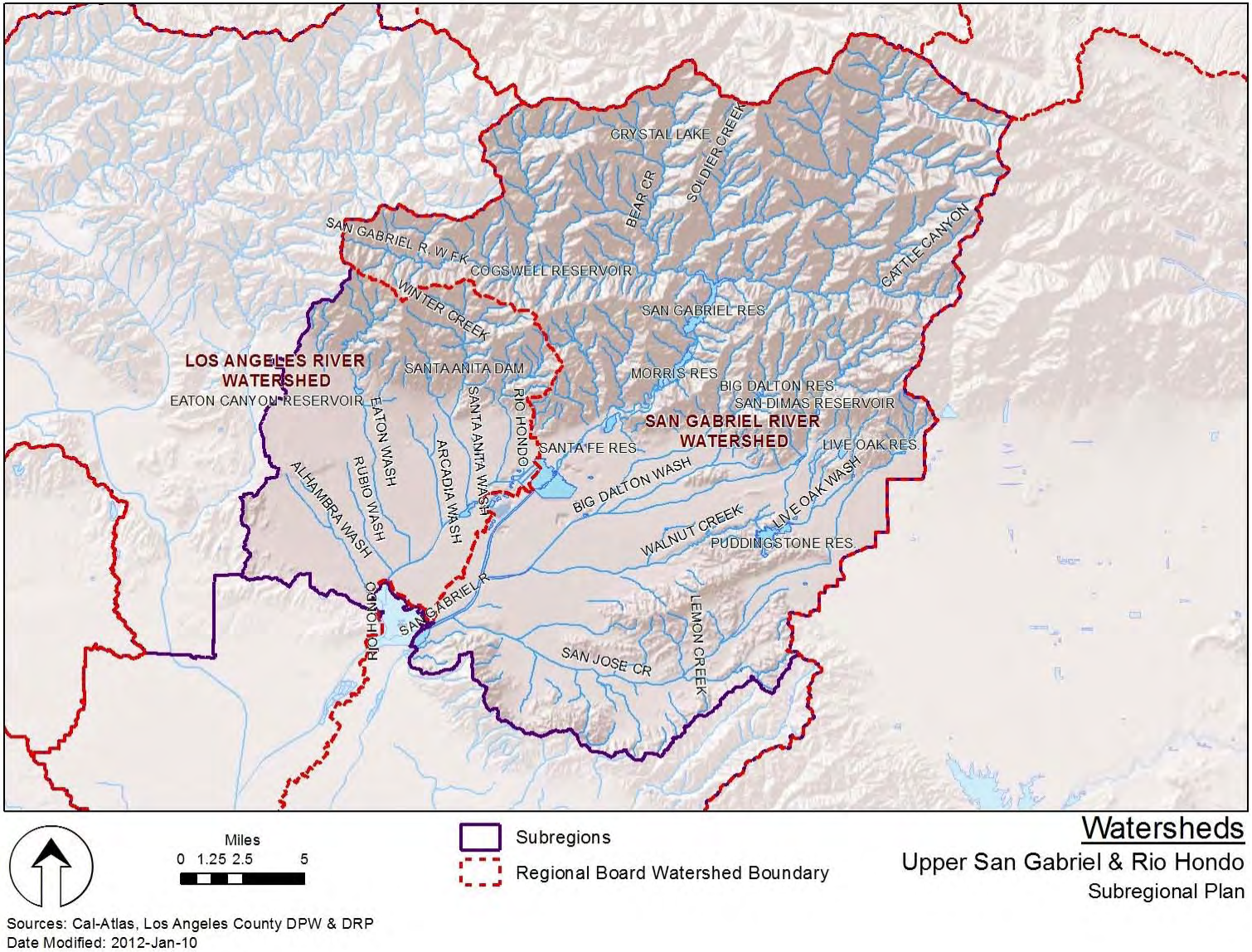
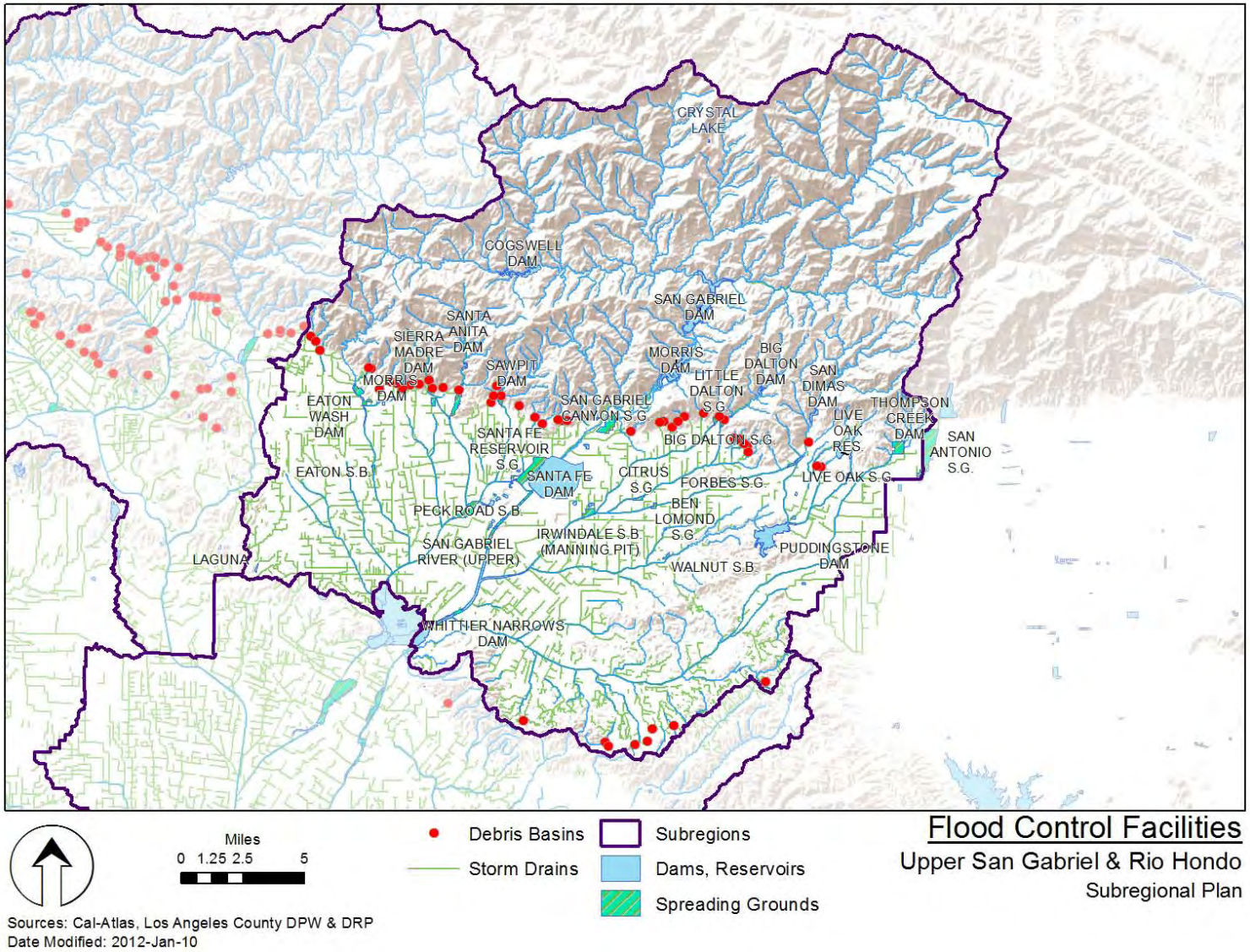


Figure 4: Flood Control Facilities



Water Suppliers and Infrastructure

The water suppliers in the Subregion can be divided into wholesalers and retailers. Wholesalers (Figure 5) provide imported and/or recycled water and to other agencies, while retailers (Figure 6) sell water to end users. These suppliers use a combination of imported water, recycled water, and groundwater to serve potable and non-potable demand in their service areas. Each of the suppliers show in these figures has written a comprehensive 2010 Urban Water Management Plan (UWMP) to estimate future water supply demand and availability, and which were utilized in the estimation of supplies later in this plan.

2.2 Sources of Water Supply

The Upper San Gabriel and Rio Hondo Subregion depends primarily on a combination of groundwater and imported water to meet its water demands. Local water supplies include surface water, recycled water, and groundwater basins. Imported water is provided by Metropolitan Water District of Southern California (MWDSC) and the San Gabriel Valley MWD. MWDSC obtains water through the California State Water Project (SWP) and the Colorado River Aqueduct (CRA), while San Gabriel Valley MWD obtains water from the SWP only. MWDSC calculates that it can reliably deliver water under not only normal conditions but under multiple dry year conditions. However, MWDSC also estimates that it will have sufficiency supplies to provide imported water for recharge in only three out of ten years. Imported supply is provided to the Subregion by MWDSC for replenishment and potable usage, and by the San Gabriel Valley MWD for replenishment at spreading grounds.

Factors that impact reliability of imported water supplies include operational constraints such as court ordered pumping restrictions on imported water from the San Joaquin-Sacramento River Delta (Delta) due to endangered species protection. Water quality concerns such as high salinity levels can require that water from the Colorado River be blended with higher quality SWP water. Invasive species, such as the quagga mussel, can force extensive maintenance of systems reducing operational flexibility. Climate change may impact supply reliability by reducing levels of precipitation impacting the snowpack in the Sierra Nevada Mountains, increasing the intensity and frequency of extreme weather such as droughts, and flooding events that increase the risk of levee failure in the Delta. Agencies, water districts and cities taking delivery of imported water receive an average blend of 75% CRA water and 25% SWP water.

Sources of supply vary throughout the Subregion, as shown in Table 1. The supply projections were developed based on 2010 UWMPs from the agencies whose water service areas cover a majority of the Subregion, as shown below, and were rounded up to account for any remaining, smaller water providers not captured in the below list.

- City of Pasadena (portion in Subregion)
- Foothill MWD (portion in Subregion)
- City of South Pasadena
- City of Alhambra
- California American Water Co. (not including Baldwin Hills)
- San Gabriel County Water District
- San Gabriel Valley Water Company
- City of Arcadia
- Azusa Light and Power
- Three Valleys Municipal Water District
- Suburban Water Systems, San Jose Hills District

- City of Sierra Madre
- City of Monrovia
- Valley County Water District

In addition to retail supply, replenishment supply is needed to supplement the groundwater basins in the Subregion. Table 2 shows the projected supplies to be used to meet replenishment needs.

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

Supply	2010	2035
Groundwater	199,000	223,000
Imported Water	101,000	127,000
Recycled Water	9,000	21,000
Surface Water	13,000	18,000
Desalinated Water	-	-
Water Use Efficiency	23,000	30,000
Stormwater Reuse	0	0
Total	**345,000**	**419,000**

Data source: 2010 Urban Water Management Plans of agencies listed above

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

Supply	2010	2035
Imported Water	38,000	38,000
Recycled Water	0	0
Stormwater	110,000	110,000
Total	**148,000**	**148,000**

Data source: Los Angeles County Department of Public Works Hydrologic Reports

[1] Replenishment supplies based on 10-year average of replenishment in the spreading grounds within the Subregion as reported in Los Angeles County Hydrologic reports. Included are groundwater basin recharge (100% contribution to groundwater supply).

Figure 5: Wholesale Water Suppliers

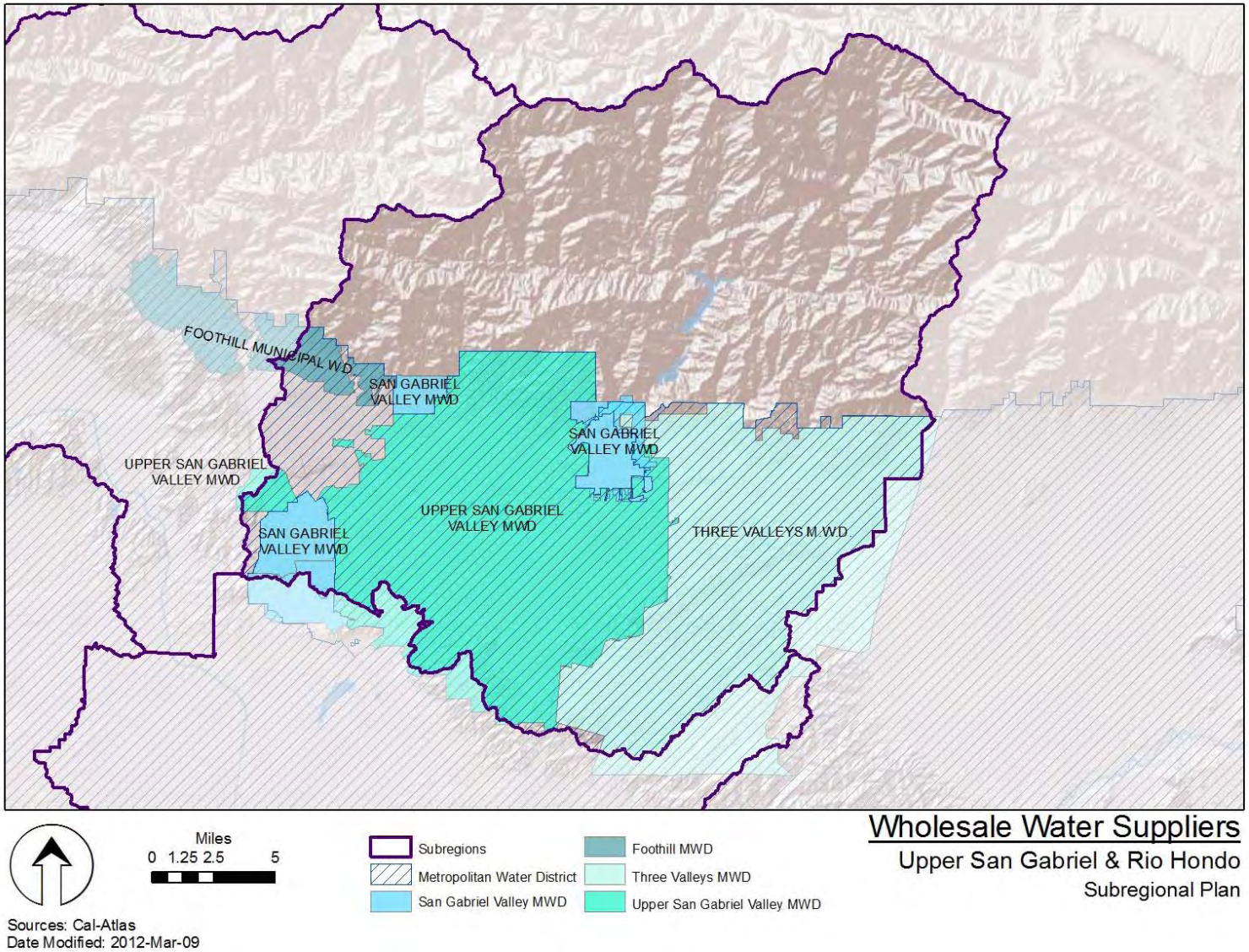
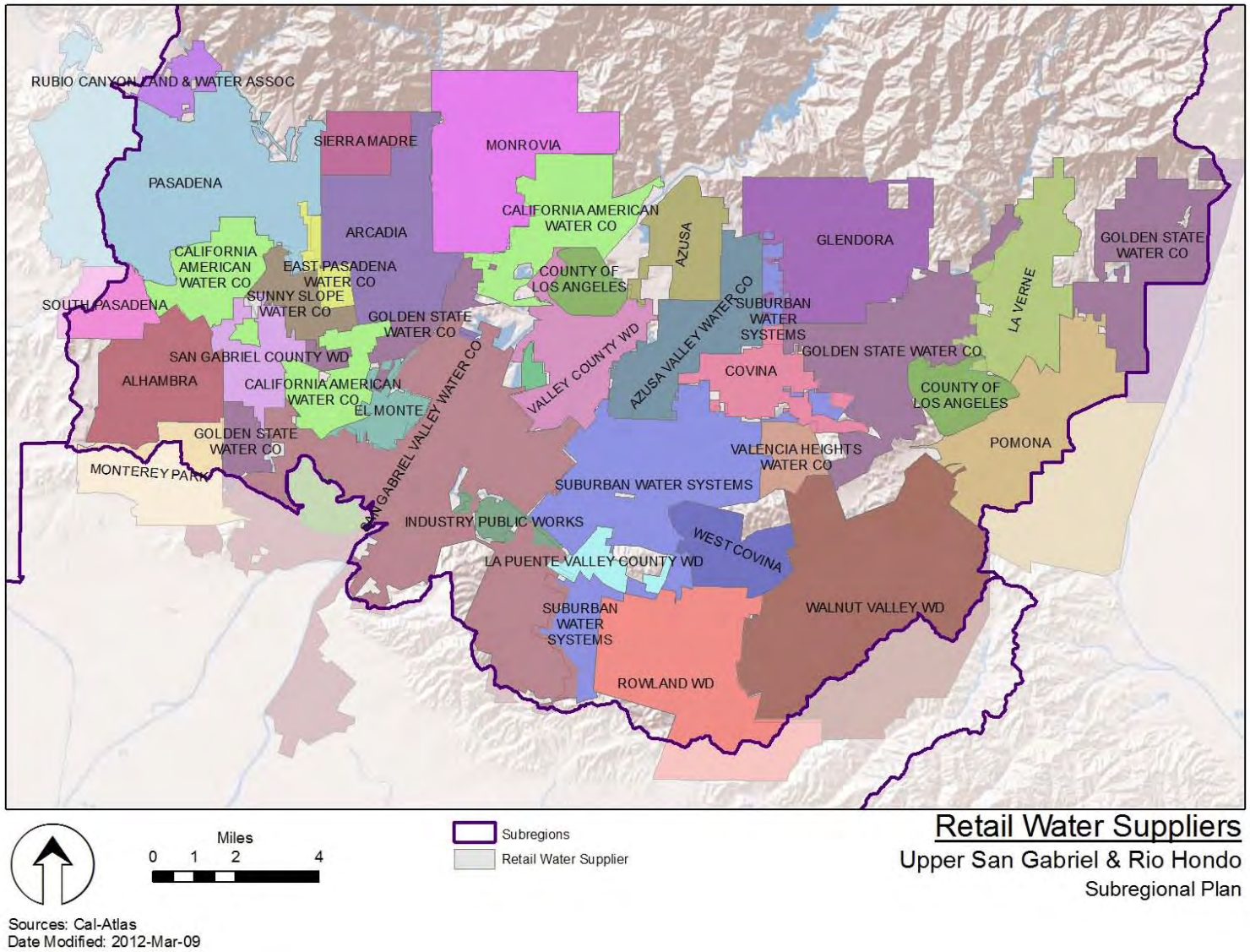


Figure 6: Retail Water Suppliers



Surface Water

The Subregion has developed a system of dams, flood control channels, and percolation ponds and basins for supplying local water and recharging groundwater (Figure 4). The San Gabriel and Rio Hondo rivers efficiently capture over 80 percent of the runoff in their watersheds, where the San Gabriel River alone has a greater than 90% efficiency rate for stormwater runoff conservation. In the upper reaches where this Subregion is located, most runoff is captured in recharge facilities and by rubber dams, though rubber dams are generally a part of the flood management infrastructure. (MWDSC RUWMP 2010)

The San Gabriel River and the Rio Hondo drain an area in the San Gabriel Valley of about 490 square miles upstream of Whittier Narrows. It should be noted that the San Gabriel River is a fully appropriated stream, meaning the full water capacity of the river has been allocated and no new rights may be appropriated, while the Rio Hondo is not.

The only water agency which uses surface water for direct use is the City of Pasadena which has rights to 8.9 cfs of Eaton Canyon runoff, though the yield of the Arroyo Seco and Eaton Canyon are highly variable depending on weather and rain patterns. Other surface water rights holders within the Subregion utilize their rights for groundwater recharge in the many spreading basins in the San Gabriel Valley.

Groundwater

Groundwater represents a significant portion of local supplies in the Subregion. The majority of groundwater yield in the Subregion is naturally recharged through the percolation of direct rainfall, and stream flow from surface runoff, percolation of imported water, and return flow from applied water. Some areas capture surface runoff and release it into spreading basins for additional percolation into the groundwater basin. Groundwater basins are also recharged with imported supplies by percolation in spreading basins, or in-lieu storage. The Los Angeles County Flood Control District operates several groundwater recharge facilities in the San Gabriel Valley providing recharge to Raymond and the Main San Gabriel basins. The Pasadena Water and Power Water Services Division also operates recharge facilities.

Groundwater basins act as underground reservoirs. During wet years, a basin can store excess water when available in wet years and then withdraw that water in dry years or during emergency situations when other sources are not available. Some basins, such as the Raymond Basin, have ample storage capacity and are able to store water for other agencies through conjunctive use programs. For example, Foothill MWD member agencies can store additional supplies from MWDSC for withdrawal at a later date. MWDSC also stores water in the Main San Gabriel Basin through arrangements with the Upper San Gabriel Valley MWD and TVMWD. The groundwater basins (shown in Figure 7) underlying this Subregion include:

- Main San Gabriel Basin
- Raymond Basin
- Six Basins (including the Canyon, Upper Claremont, Lower Claremont, Live Oak, Ganesha and Pomona Basins)
- Puente Basin
- Spadra Basin

The Raymond Basin is an adjudicated basin bound on the north by the San Gabriel Mountains, on the south and east by the San Gabriel Valley and on the west by the San Rafael Hills. It is replenished by surface water flows from the San Gabriel Mountains, and by rainfall directly on the surface of the vally floor. The Raymond Basin Management Board manages the basin, and tracks the groundwater pumpage of the 16 different water purveyors that pump water from the basin.

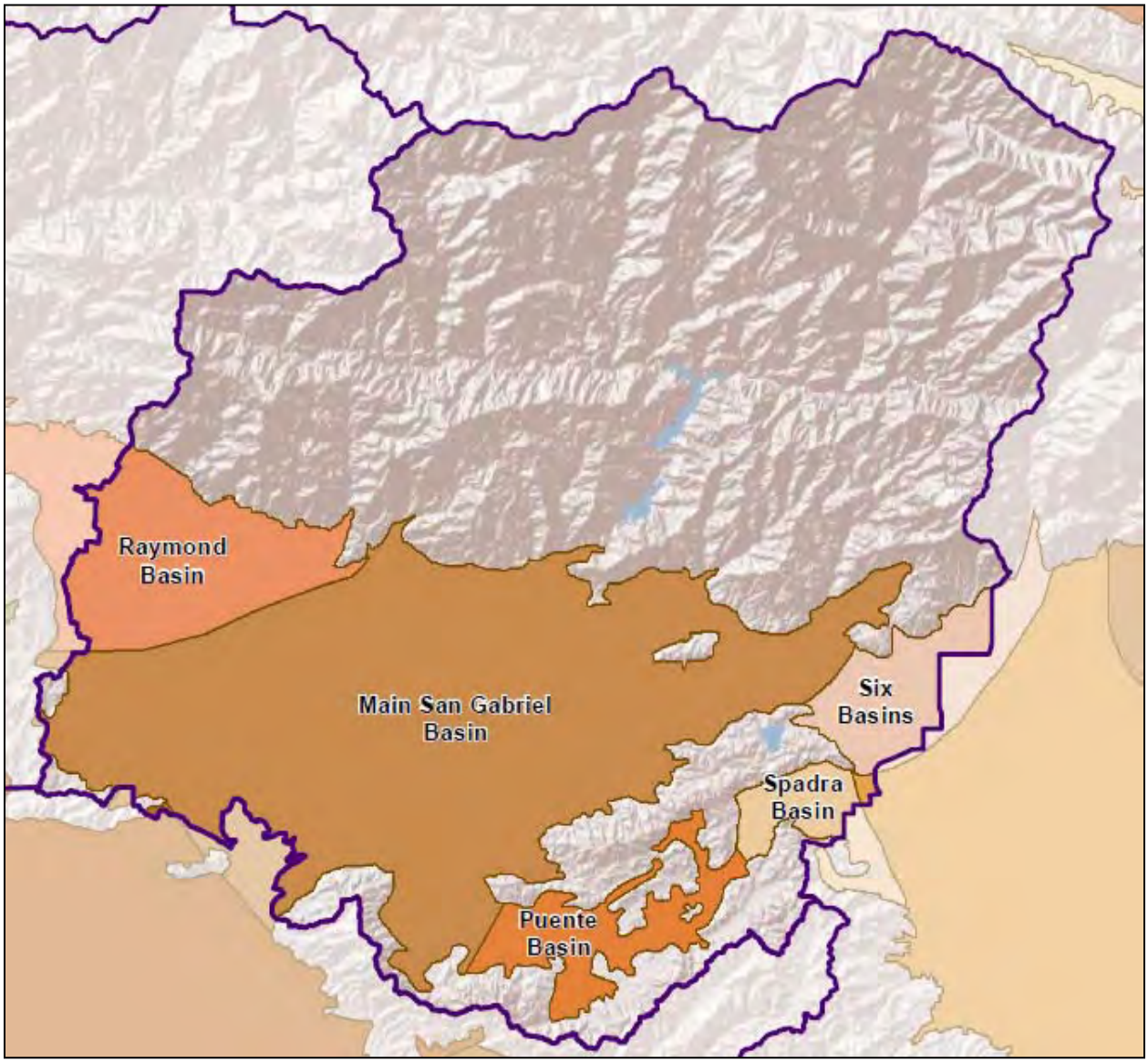
The Main San Gabriel Basin (Main Basin) includes most of the valley floor of the San Gabriel Valley located in the southeastern portion of Los Angeles County, and is also adjudicated. It is replenished by stream runoff from the adjacent mountains and hills, by rainfall directly on the surface of the valley floor, subsurface inflow from the Raymond Basin and Puente Basin, by return flow from applied water, and by imported water. This basin is managed by the Main San Gabriel Basin Watermaster. Three primary wholesale water districts overlay the Main Basin including Upper San Gabriel Valley MWD, San Gabriel Valley MWD, and TVMWD.

Six Basins is an adjudicated basin which includes six small groundwater basins: Canyon, Upper Claremont, Lower Claremont, Live Oak, Ganesha and Pomona Basins. It is replenished primarily by stream runoff from the adjacent mountains and hills, percolation of rainfall, and through replenishment at spreading grounds by stream and imported water. This basin is managed by the Six Basins Watermaster, and has nine different pumpers which include both public and private agencies. Previously, the Six Basins Watermaster was administrated by the TVMWD, but is now administrated by a private consultant as the TVMWD became a pumper within Six Basins. TVMWD is exploring possible projects in which direct stormwater capture is improved in the Live Oak and San Antonio Spreading Grounds, and it is anticipated that these projects will be online and producing additional groundwater for the cities of Claremont, Pomona, La Verne and San Dimas by 2020.

The Spadra Basin is a small, unadjudicated basin located south of the Six Basins area. Spadra Basin is used primarily by the City of Pomona and Cal-Poly Pomona to provide water for primarily non-potable uses, though it is also used by the City of Pomona to provide some potable water. Recharge of this basin is limited due to the conversion of agricultural land to urban and due to the lining of San Jose Creek.

The Puente Basin underlies an area in the south east portion of the Subregion and is not adjudicated, though it is hydrologically connected to the Main San Gabriel Basin. Puente Basin groundwater is used as a non-potable supply by overlying cities and communities (MWDSC, 2007)

Figure 7: Groundwater Basins of the Subregion



Sources: Los Angeles County DPW, Cal-Atlas

Imported Water

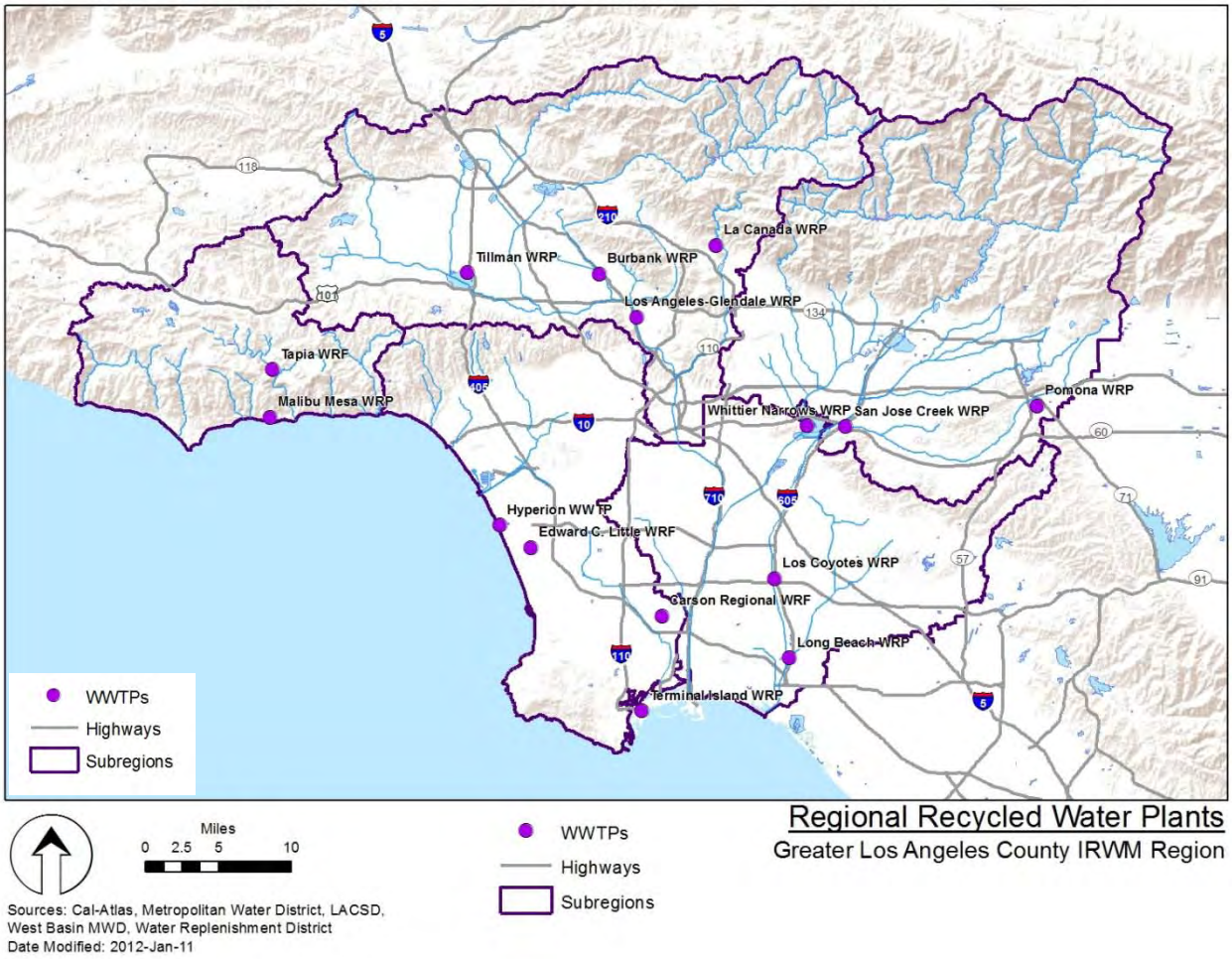
The Subregion significantly depends on imported water. The imported water wholesalers to the Subregion include the San Gabriel Valley MWD, Foothill Municipal Water District (FMWD), Upper San Gabriel Valley MWD, and TVMWD, the last three of which receive water from MWDSC. MWDSC imports water from the SWP and the CRA. In addition, San Gabriel Valley MWD receives an imported water allotment from the SWP. Additional information on imported water in the GLAC Region can be found in Appendix A.

Recycled Water

Recycled water supplied to the Subregion is produced by the Sanitation Districts of Los Angeles County at the Whittier Narrows Water Reclamation Plant (WNWRP), the San Jose Creek Water Reclamation Plant (SJCWRP) and the Pomona Water Reclamation Plant (PWRP), shown in Figure 8. The WNWRP has been producing recycled water since 1962 and produced approximately 7,860 acre-feet of recycled water in 2010. The SJCWRP, in operation since 1973, produced approximately 77,770 acre-feet of recycled water in 2010. The PWRP has been producing recycled water since 1927 (later rebuilt in 1966) and produced approximately 10,020 acre-feet of recycled water in 2010. These three plants are the source of recycled water for the Subregion's existing and proposed projects. The recycled water produced at these three plants, however, also serve multiple subregions.

In addition, there is potential for additional recycled water flows from these facilities, specifically the potential for increased production of recycled water in the Subregion if funding is available for capital improvements. These capital improvements could be at the treatment plants themselves to increase capacity, or by modifications of the upstream sewer collection system to divert more wastewater to the treatment plants.

Figure 8: Water Reclamation Facilities in the GLAC Region



Recycled water projects are being pursued or investigated by Walnut Valley Water District, City of Pomona, California State University Pomona, Rowland Water District, City of Industry, Upper San

Gabriel Valley MWD, and Foothill MWD. Many of those projects are supported by MWDSC's Local Projects Program rebates, California Department of Water Resources grants and loans, State Water Resources Control Board grants and loans, and Title XVI grants from the U.S. Bureau of Reclamation.

For some agencies, recycled water provides a significant portion of total water supplies. Recycled water is typically used for irrigation of large landscapes such as golf courses, freeway medians, parks, sports fields, and cemeteries. Existing recycled water projects in the Subregion are shown in Table 3. The Upper San Gabriel Valley MWD is considering using recycled water for groundwater replenishment in the future. Those projects supported by MWDSC that are under construction, in advanced planning, or undertaking feasibility studies include those shown in Table 4. These projects may potentially increase the recycled water supplies estimated under Section 2.2 out to 2035.

Table 3: Existing Recycled Water Projects

Agency	Project	Ultimate capacity (acre-feet)
City of Industry	City of Industry Regional Water System	6,304
City of Pomona	Pomona Reclamation Project	9,320
Foothill MWD	La Canada-Flintridge Country Club	224
Los Angeles County	LA Co. Sanitation District Projects	4,375
Rowland Water District	Rowland Reclamation Project	2,000
Upper San Gabriel Valley MWD	Direct Reuse Phases I and IIA	3,258
Walnut Valley Water District	Walnut Valley Reclamation Project	4,234

Table 4: Future Recycled Water Projects

Agency	Project	Ultimate Capacity (acre-feet)	Proposed Completion Date
City of Pomona	Pomona Reclamation Project	1,500	
Foothill MWD	Arroyo Seco – Flint Wash Project	240	2020
Foothill MWD	Eaton Canyon Project	500	2025
TVMWD	Thompson Creek	3,000	2020
La Puente Valley County Water District	Master Plan	280	
Upper San Gabriel Valley MWD	Direct Reuse, Phase IIA Expansion / Rosemead Extension Project	620	2020
Upper San Gabriel Valley MWD	Direct Reuse, Phase III	7,000	2018

Upper San Gabriel Valley MWD	Direct Reuse	4,900	2020
Upper San Gabriel Valley MWD	Groundwater Reliability Improvement Project (GRIP)	10,000	2020

Desalination

Due to the Subregion's lack of proximity to the ocean, ocean desalination projects would not occur within the Subregion. However, there may be opportunities to partner with an agency along the coast and transfer water through either a groundwater basin or through MWDSC in the future as desalination supplies become more cost competitive with imported water.

Stormwater Capture and Use

Currently, there are no set programs in place in the Subregion requiring stormwater capture and use, and instead ordinances and voluntary programs are in place to assist in the implementation of stormwater capture and use. For example, Los Angeles County has implemented a low impact development (LID) ordinance that requires new developments and redevelopment constructed after 2009 to include LID best management practices (BMPs) that may be implementable on particular sites.

2.3 Water Supply/Demand

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

Estimated demand projections for the Subregion are listed in Table 5. Demand was calculated using the 2010 UWMPs for:

- City of Pasadena (portion in Subregion)
- Foothill MWD (portion in Subregion)
- City of South Pasadena
- City of Alhambra
- California American Water Co. (not including Baldwin Hills)
- San Gabriel County Water District
- San Gabriel Valley Water Company
- City of Arcadia
- Azusa Light and Power
- Three Valleys Municipal Water District
- Suburban Water Systems, San Jose Hills District
- City of Sierra Madre
- City of Monrovia
- Valley County Water District

All agencies have incorporated water conservation measures into water planning and practice. This practice involves the implementation of best management practices (BMPs) as prescribed by the California Urban Water Conservation Council in order to meet the requirements of SBx7-7 (Steinberg, 2009), also known as the 20x2020 Plan. A number of agencies, including both wholesalers and local retailers, assist the Subregion by implementing incentive programs that provide rebates to water conservation and recycled water use projects and programs.

Table 5: Subregion Demand Projections for Direct Use (acre-feet per year)

	2010	2015	2020	2025	2030	2035
Demand	202,000	214,000	224,000	231,000	237,000	243,000
Supply	345,000	380,000	393,000	402,000	411,000	419,000

2.4 Water Quality

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

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

The SWRCB sets statewide policies and develops regulations for the implementation of water quality control programs mandated by state and federal statutes and regulations. The RWQCBs develop and implement Basin Plans designed to preserve and enhance water quality. The determination of whether water quality is impaired is based on the designated beneficial uses of individual water bodies, which are established in the Basin Plan. As mandated by Section 303(d) of the Federal Clean Water Act, the SWRCB maintains and updates a list of “impaired” water bodies that exceed state and federal water quality standards. To address these impairments, the RWQCBs identify the maximum amount of pollutants that may be discharged on a daily basis without impairing the designated beneficial uses, and are known as Total Maximum Daily Loads (TMDLs). In addition to development of the TMDLs the RWQCBs develop and implement the NPDES permits for discharges from wastewater treatment and water reclamation plants of treated wastewater effluent to surface water bodies.

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

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

Surface Water Quality

The watersheds in the Upper San Gabriel River and Rio Hondo Subregion serve many beneficial uses including: municipal and domestic supply, groundwater recharge, recreation, freshwater habitat, wildlife habitat, terrestrial aquatic habitat, and spawning. Typically, surface water quality is better in the headwaters and upper portions of watershed, and is degraded by urban and stormwater runoff as the rivers move through urban areas. As a result, the major watersheds in the Subregion are 303(d) listed for several constituents as shown in Table 6. (SWRCB, 2012) The locations of permitted dischargers are shown in Figure 9. Please note that Figure 9 does not show MS4 and Caltrans discharges as these are non-point discharge permits.

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

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

Table 6: 303(d) Listed Waters with Approved TMDLs

303(d) Listed Waters and Impairments[1]	TMDL
San Gabriel River	
Metals and Selenium	San Gabriel River Metals and Selenium TMDL
San Gabriel River East Fork	
Trash	San Gabriel River East Fork Trash TMDL
San Jose Creek	

303(d) Listed Waters and Impairments[1]	TMDL
Toxics	San Gabriel River Metals and Selenium TMDL
Monrovia Canyon Creek	
Metals: Lead	
Legg Lake	
Trash	Legg Lake Trash TMDL
Rio Hondo	
Nutrients: Ammonia, Nutrients (Algae), pH	Los Angeles River Nutrient TMDL
Bacteria	Los Angeles River Bacteria TMDL
Metals: Copper, Lead, Zinc, Cadmium	Los Angeles River Metals TMDL
Trash	Trash TMDL for the Los Angeles River Watershed
Coyote Creek	
Metals: Copper, Lead	San Gabriel River Metals and Selenium TMDL
Peck Road Park Lake	
Nutrients: Organic Enrichment/Low Dissolved Oxygen	Peck Road Park Lake TMDLs
Toxics: Chlordane, DDT	
Odor	
Trash	
Metals: Lead	No TMDL necessary as lead determined to be meeting numeric targets
Santa Fe Dam Park Lake	
pH	Santa Fe Dam Park Lake TMDLs
Metals: Copper, Lead	No TMDL necessary as lead determined to be meeting numeric targets
Puddingstone Reservoir	
Metals: Mercury	Puddingstone Reservoir TMDLs
Nutrients: Organic Enrichment/Low Dissolved Oxygen	
Toxics: Chlordane, DDT, PCBs	

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

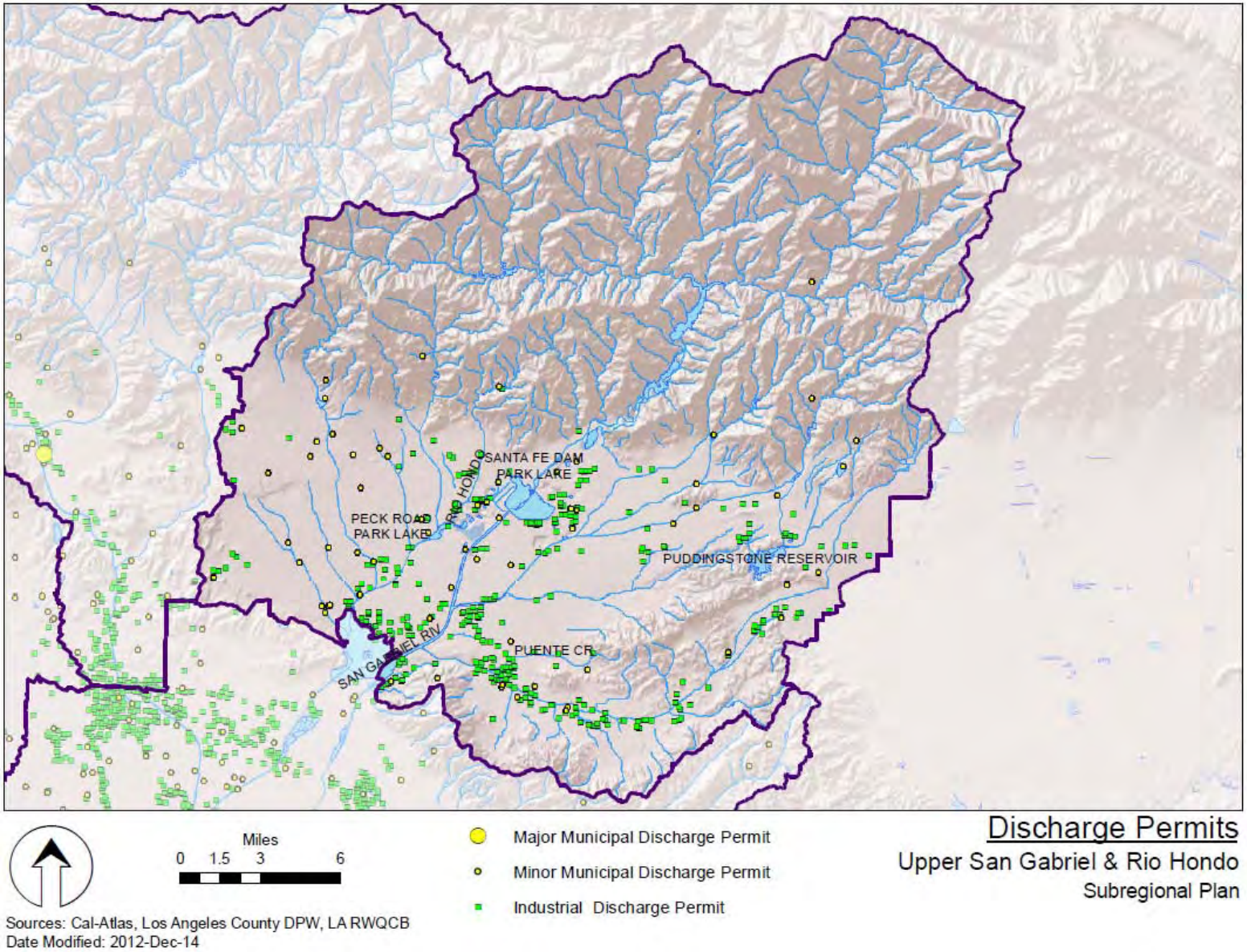
Table 7: 303(d) Listed Waters without Approved TMDLs

303(d) Listed Waters and Impairments[1]
San Gabriel River
Indicator Bacteria
Nutrients: Ammonia
Coliform Bacteria
Walnut Creek Wash
Benthic-Macroinvertebrate Bioassessments
Indicator Bacteria
pH
San Jose Creek
TDS
pH
Coyote Creek
Toxics: Diazinon
Indicator Bacteria
pH
Sawpit Creek

303(d) Listed Waters and Impairments[1]
Bis(2ethylhexyl)phthalate (DEHP)
Fecal Coliform
Crystal Lake
Nutrients: Organic Enrichment/Low Dissolved Oxygen
Legg Lake
Nutrients: Ammonia, odor
Metals: Copper, Lead
pH

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

Figure 9: Permitted Dischargers as of 2011



Groundwater Quality

Groundwater quality in the San Gabriel Basin (which includes all basins discussed in the Groundwater Supply section except for Raymond Basin and Six Basins) is managed by the San Gabriel Basin Water Quality Authority (WQA). The WQA reviews and adopts a basin-wide groundwater quality management and remediation plan on an annual basis. This plan includes all projects that the WQA is facilitating, and identifies various funding sources to ensure full funding for each project. The San Gabriel Valley's groundwater basin has water quality issues across the basin that are being addressed by WQA projects with a focus on 1) accelerating removal of contaminant mass in the basin, 2) preventing migration of contamination into critical groundwater supplies, 3) integrating cleanup with water supply, and 4) minimizing economic impact to the public.

One of the primary constituents of concern in the groundwater basins of the Subregion is volatile organic compounds (VOCs) which are used primarily in industrial and commercial activities. Over time, VOCs have leached into the groundwater from ground disposal of chemicals. Additionally, the basin has been found to have high levels of NDMA, nitrate, phosphate, and TDS, primarily caused by industrial and commercial activities. Groundwater quality specific to each basin will be discussed below.

Water pumped from the Main San Gabriel Basin is used as potable supply. Though water quality is good in most areas, constituents of concern for the Main San Gabriel Basin include high TDS, nitrate, VOCs, perchlorate, and NDMA. Due to industrial and commercial contamination, five Operable Units (OUs) have been defined by the US EPA's Superfund Program: Baldwin Park OU, El Monte OU, Puente Valley OU, Whittier Narrows OU, and Area 3 OU. Each of these OUs has a specific plan laid out to address contamination remediation. Several treatment facilities are in place to treat groundwater pumped out of this basin. (San Gabriel Basin Water Quality Authority, 2012)

The Puente Basin underlies an area in the south east portion of the Subregion and is managed by the Puente Basin Watermaster. Puente Basin groundwater is used as a non-potable supply due to its poor quality, and is used for blending with recycled water, construction water and irrigation. Constituents of concern include TDS, Nitrate and VOCs. Remediation is underway to remove VOCs in the US EPA's Puente Valley Operable Unit which is located in the western portion of the basin. (MWDSC, 2007)

Six Basins has varying water quality, much of which can easily be considered potable through blending or other simple remediation efforts. Primary constituents of concern include nitrate, perchlorate and VOCs. Some areas also have high levels of arsenic and radon. Several of the pumpers in Six Basins treat the groundwater for these contaminants. New projects to offset the shutdown of wells due to water quality have been considered and studies are being completed to determine a means of improving this area's groundwater quality. (MWDSC, 2007)

The Raymond Basin underlies the north-western portion of the Subregion and is managed by the Raymond Basin Management Board. This basin provides potable supply, with good to fair groundwater quality in most areas. Constituents of concern include TDS, nitrate, perchlorate, and VOCs. There is one Superfund site located at the Jet Propulsion Laboratory (JPL) due to liquid waste seepage which released perchlorate and VOCs into the groundwater. Water agencies which pump from the Raymond Basin have treatment facilities in place to treat groundwater for VOCs and Perchlorate. (MWDSC, 2007) This basin is an unmanaged basin primarily used as a non-potable supply due to water quality issues. Constituents of concern include nitrate and TDS. Perchlorate and VOCs have also been detected in the basin.

2.5 Environmental Resources

The Subregion contains areas that have been highly urbanized as well as areas in the San Gabriel Mountains that provide a variety of natural resources that serve as habitat for wildlife. Below is a discussion of the existing environmental resources found in the Subregion.

2.5.1 Habitat

A variety of habitats can be found in the Subregion in the San Gabriel Mountains, Whittier Narrows, and the estuarine area of the San Gabriel River and Rio Hondo watersheds. In terms of water resources, these habitats include both upland and terrestrial aquatic habitat areas.

Upland habitat provides a buffer to terrestrial aquatic habitat as well as linkages to species through the landscape. Terrestrial aquatic habitat areas provide habitat to innumerable species of flora and fauna. Terrestrial aquatic habitat areas within the Subregion can be seen in Figure 10 and include:

- **Freshwater terrestrial aquatic habitats:** Terrestrial aquatic habitats such as depressional marshes, lakes and ponds. For the purposes of this Subregional Plan, freshwater terrestrial aquatic habitats include man-made habitats such as flood control basins and ponds which may include areas of freshwater terrestrial aquatic habitats. It is important to note that although some spreading grounds and some stormwater Best Management Practices such as detention basins, swales and depressional areas, also provide ecosystem benefits, they belong under a separate category and should not be subject to the same protection criteria
- **Riverine terrestrial aquatic habitats:** Streambed and terrestrial aquatic habitats associated with rivers and streams, including upper and lower riverine habitats and dry washes. Man-made habitats considered riverine aquatic habitats include concrete-lined channels and soft-bottomed channels. Note that “riparian” is sometimes used to mean riverine aquatic habitats.

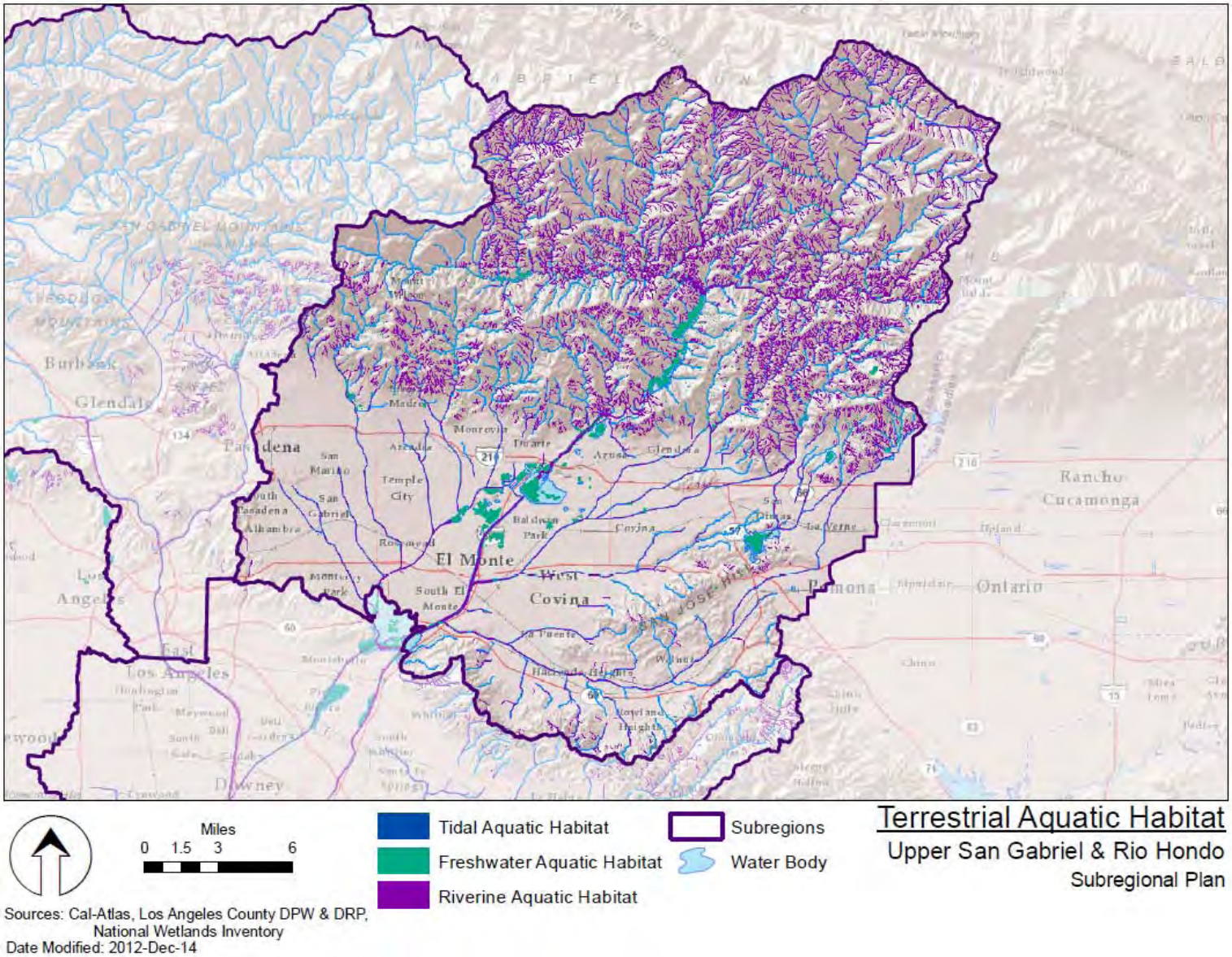
2.5.2 Significant Ecological Areas and Environmentally Sensitive Habitat Areas

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

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

Proposed development is governed by SEA regulations. The regulations, currently under review, do not preclude development, but to allow limited, controlled development that does not jeopardize the unique biotic diversity within the County. The SEA conditional use permit requires development activities be reviewed by the Significant Ecological Area Technical Advisory Committee (SEATAC). Additional information about regulatory requirements is available on the Los Angeles County website. (LACDRP, 2011)

Figure 10: Terrestrial aquatic habitats of the Subregion



Within the Subregion, SEAs include:

- Buzzard Peak-San Jose Hills
- Duleya Densiflora Population
- Galium Grande Population
- Powder Canyon-Puente Hills
- Rio Hondo Colege Wildlife Sanctuary
- San Antonio Canyon Mouth
- San Dimas Canyon
- Santa Fe Dam Floodplain
- Sycamore-Turnbull Canyons
- Tonner Canyon-Chino Hills
- Way Hill
- Whittier Narrows Dam County Recreation Area

These SEAs can be seen in Figure 11.

2.5.3 Ecological Processes

The natural, open space areas in the Subregion include the San Gabriel Mountains to the north and the Puente Hills to the south. This is a biologically rich area that provides critical habitat to endangered species and upland habitat, and connectivity between various habitat types.

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

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

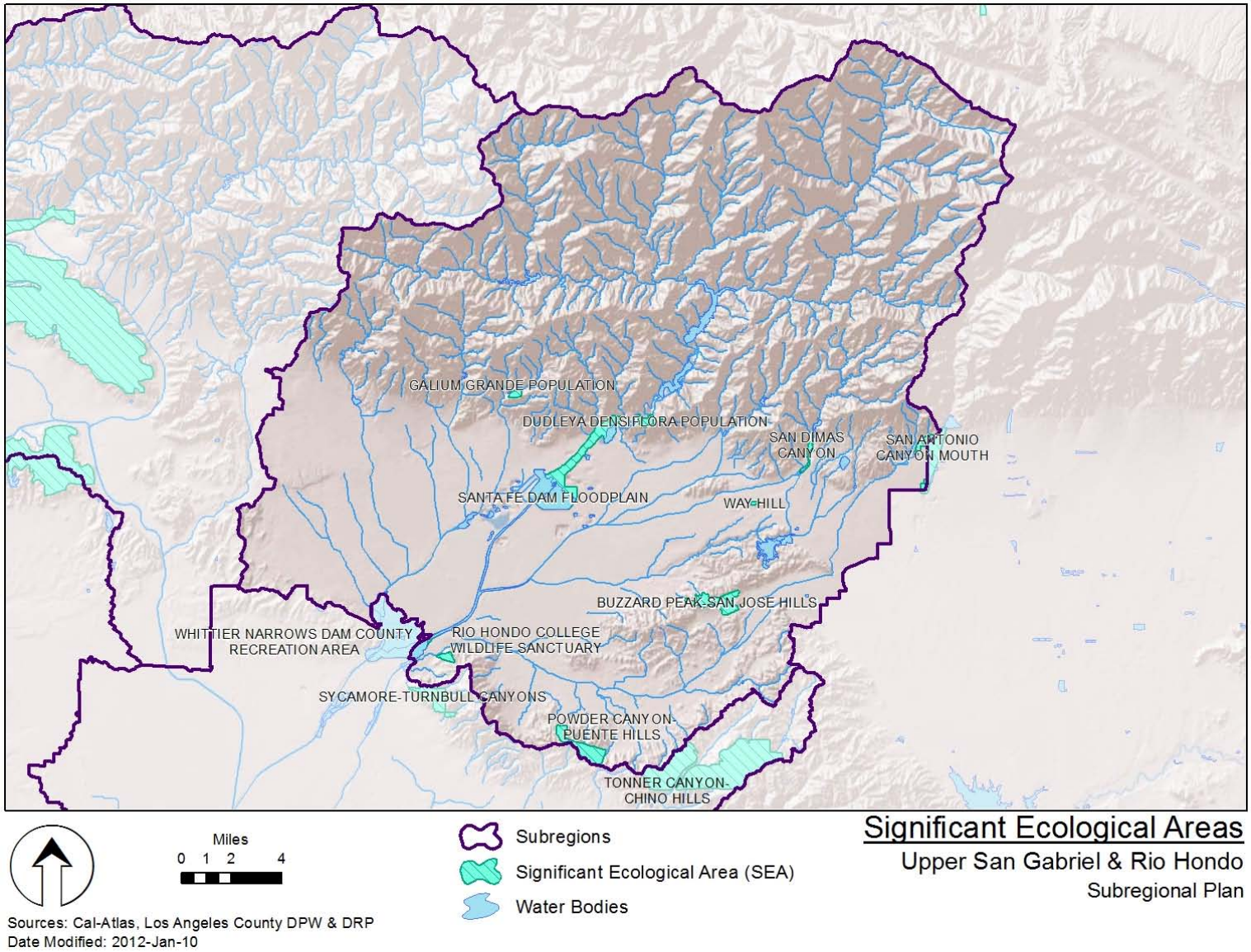
Fire

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

In scattered developed areas characterized by heavy brush and trees and steep inaccessible slopes, the combination of dry brush and tinder with Santa Ana winds make the mountain areas vulnerable to wildland fire disasters. Development in local mountains complicates fire prevention and protection due to winding roadways that restrict access. Ridge-top development is particularly vulnerable as the heat of fires pulls the fire uphill to homes while often sparing homes in the valley bottoms.

Increased fire frequency alters plant communities by creating conditions that select for some species over others. There is evidence that the increased frequency of fires has eliminated drought-hardy plants from chaparral hillside communities.

Figure 11: Significant Ecological Areas of the Subregion



Invasive Species

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

Slope Stability

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

Flooding

Flash flooding is a common occurrence in the canyon areas of the Subregion due to heavy winter storms. As discussed previously, there are a number of debris basins in place to prevent the flow of debris from reaching the urbanized foothills. Riverbank flooding has been greatly reduced with the various flood control measures in place which were discussed previously in this report.

2.5.4 Critical Habitat Areas

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

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

Within the Subregion, there is 8,100 acres of designated critical habitat defined for the Brauton's milk-vetch, Coast California gnatcatcher, and Mountain yellow-legged frog, as shown in Figure 12.

2.6 Open Space and Recreation

The Subregion's open space resources are extensive, due to the presence of a large portion of the Angeles National Forest National Recreation Area. The Angeles National Forest Recreation Area provides a large expanse of open space which can absorb rainfall that contributes to groundwater recharge and produce runoff that feeds local streams and rivers.

The preservation of environmental resources within the Angeles Nation Forest Recreation Area is generally the responsibility of the Land Management Plan for the Southern California Forests. Additional open space is located in the undeveloped portions of the foothills south of the Angeles National Forest. Protection of the open space in these areas is generally the responsibility of local Park Agencies and General Plans. Preservation of such spaces can protect existing water resources and native habitat, as

these open spaces absorb rainfall, produce runoff that feeds local streams, and may contribute to groundwater.

Open space and recreation areas in the Subregion can be seen in Figure 13. Acreage of recreation and open space lands within the Subregion is shown in Table 8. In total, of the Subregion's 365,000 acres, approximately 199,000 acres (or 55%) are considered open space or recreation land areas. A majority of the areas are National Forest Land within the San Gabriel Mountains.

Table 8: Existing Recreation and Open Space Land Area

Land Type	Acres
Developed Urban Park and Recreation Area	3,100 acres
Open Space Lands (including terrestrial aquatic habitats and National Forest)	192,000 acres
Greenways	2,100 acres
Other/Miscellaneous	1,400 acres
Total Area in Subregion	**198,600 acres**

2.7 Land Use

Land use within the Upper San Gabriel River and Rio Hondo Subregion reflects the historic pattern of urbanization as most of the interior valley is occupied with residential, industrial, commercial, and institutional uses while most of the foothills and mountains are principally open space. The overall land use breakdown for the Upper San Gabriel River and Rio Hondo Subregion is as follows: 7 percent commercial and industrial, 21 percent residential, 2 percent open space and recreation, 3 percent transportation, and 67 percent other open space.

Land use types may include the following:

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

A breakdown of land use in the Subregion is depicted on Figure 14. Agricultural areas tend to be located in the easterly portion of the Main Basin and along power transmission rights-of-way corridors adjacent to the San Gabriel River. There are several major industrial areas adjacent to the San Gabriel River and within other portions of the valley. The greatest area of land use is residential and commercial.

Table 9: Land Use in the Upper San Gabriel River and Rio Hondo Subregion

Land Use Type	Acres	Percentage
Vacant	312,907	65%
Residential	100,525	21%
Commercial	21,569	4%
Industrial	12,570	3%
Transportation, Utilities	12,766	3%
Open Space / Recreation	10,856	2%
Agriculture	3,737	1%
Mixed Urban	3,126	1%
Water	2,665	1%
No Data	2	<1%
Total	**480,723**	**100%**

Figure 12: Critical Habitat

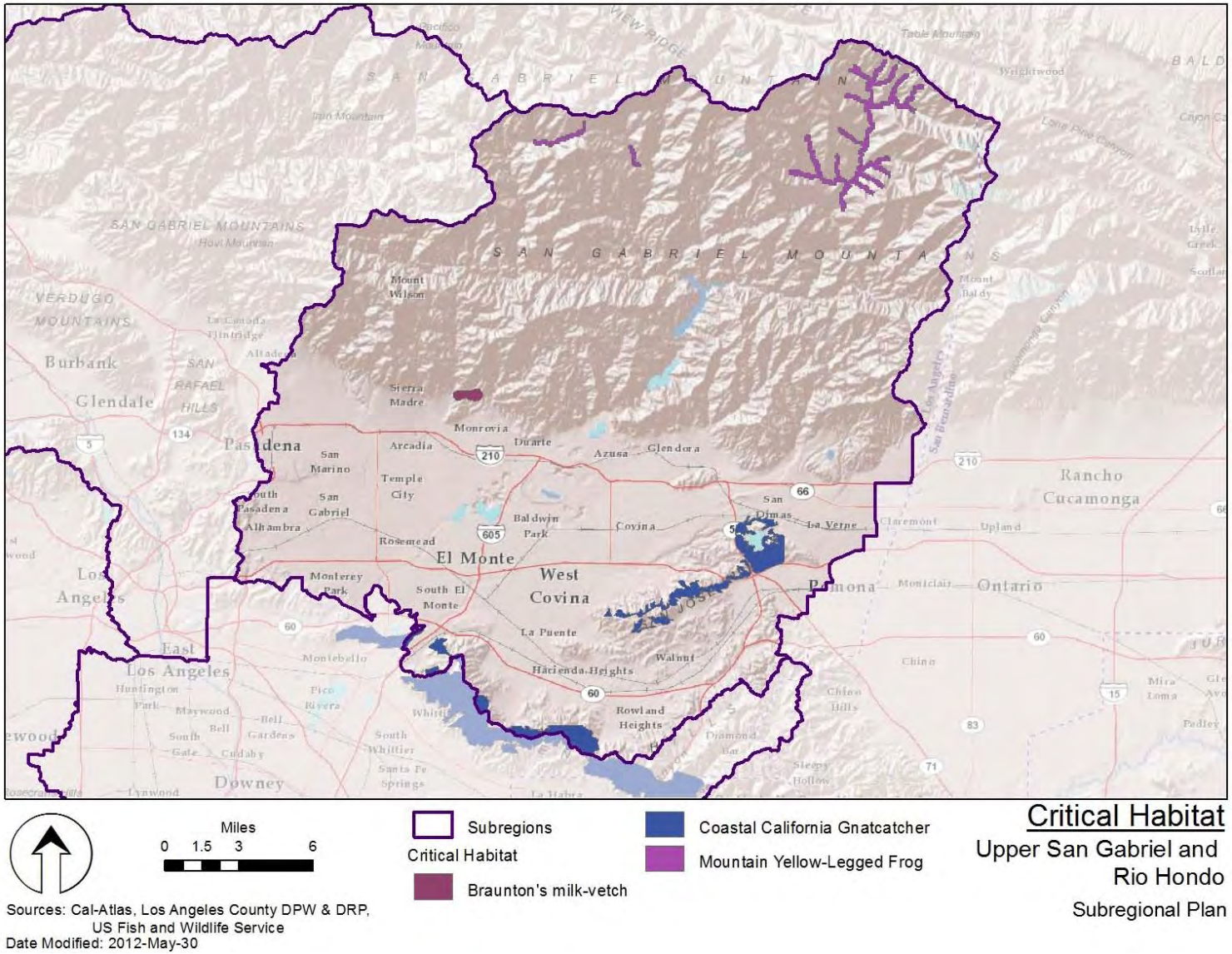
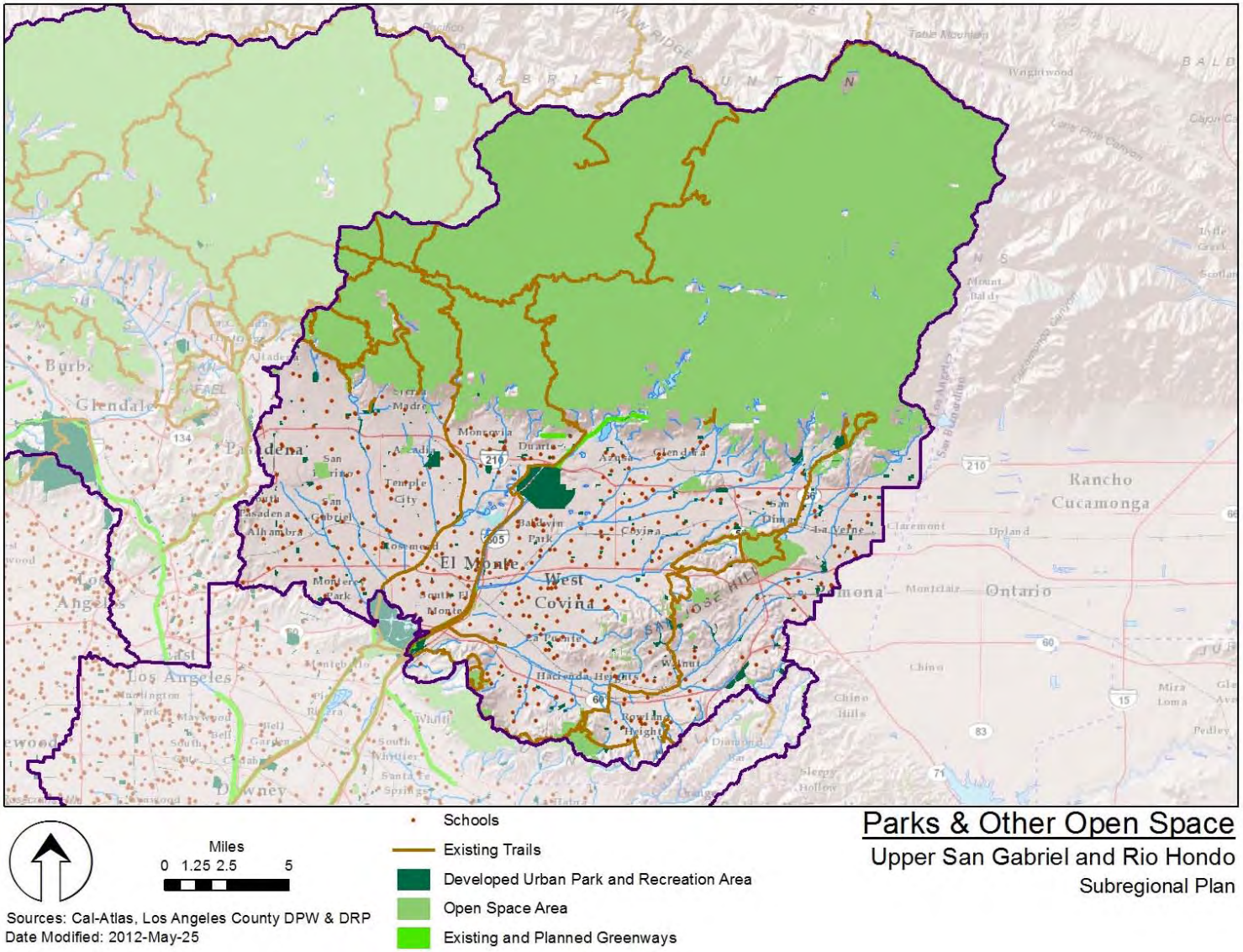
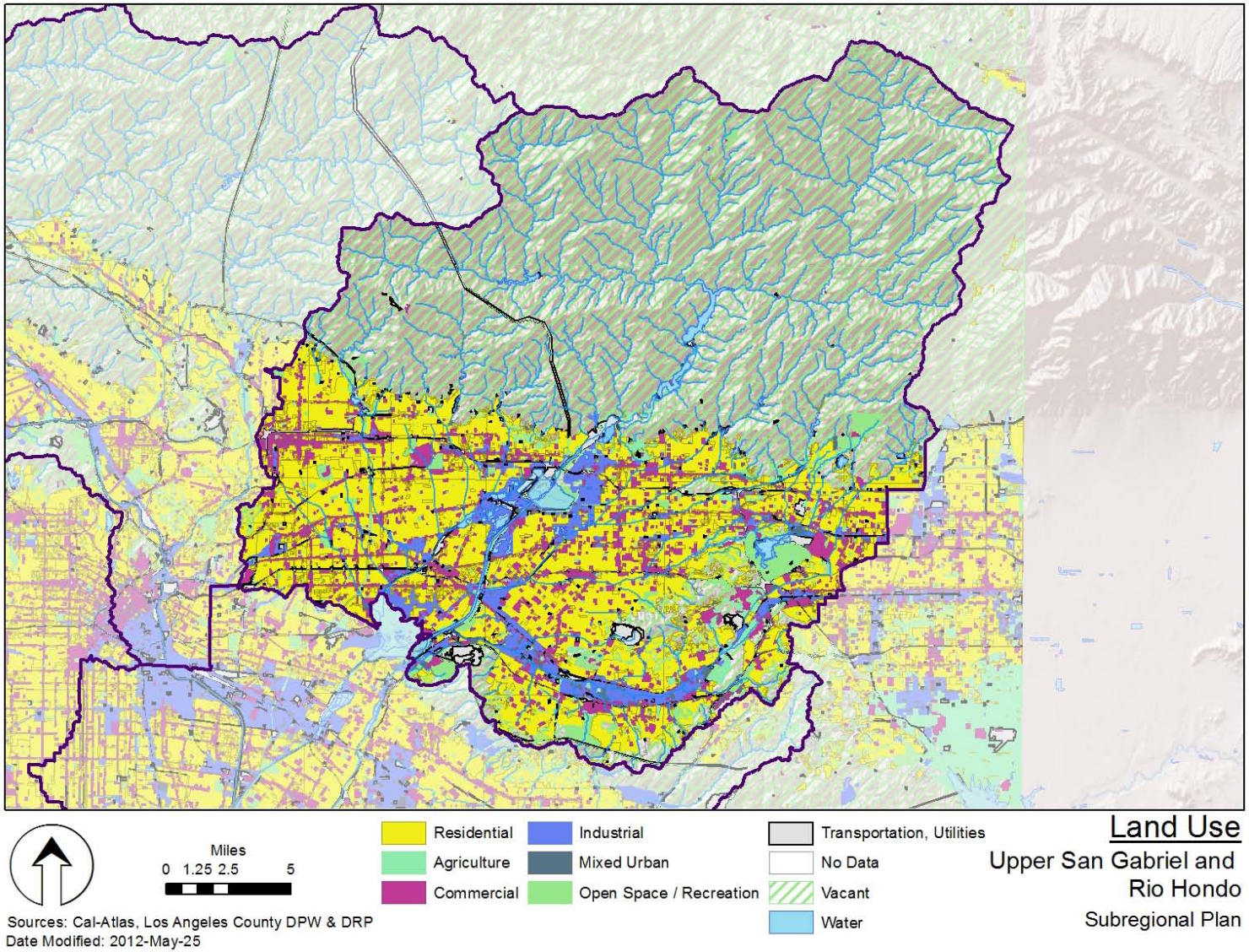


Figure 13: Parks, Recreation and Other Open Space



Sources: Cal-Atlas, Los Angeles County DPW & DRP
Date Modified: 2012-May-25

Figure 14: Land Use



3 Subregional Objectives and Targets

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

3.1 Objective and Target Development

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

Five objectives have been articulated, based on recent water resource planning documents. Workgroups composed of Stakeholders from within the Region were involved in establishing the Plan's objectives and targets. To establish quantifiable benchmarks for implementation of the plan, planning targets were defined based on much discussion within the regional workgroup. Objectives for five water resource areas were identified for the Subregion, which are discussed below (and summarized in Table 10).

3.2 Water Supply

Optimizing local water supply resources is vital for the Subregion to reduce its reliance on imported water and improve reliability of local water supplies should imported water supplies be reduced or interrupted due to environmental and/or political reasons. The Subregion plans on achieving this objective by conserving water through water use efficiency measures, creating an additional ability to pump more groundwater, increasing the indirect potable reuse and non-potable reuse of recycled water, and increasing the infiltration, capture, and use of stormwater. In total, water supply targets will yield an additional 49,000 AFY of local supply for direct use, and 30,000 AFY of local supply for groundwater recharge.

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

3.3 Water Quality

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

The Subregion plans on achieving these objectives by increasing the capacity to capture and treat runoff and prevent certain dry weather flows (see table above). The water quality target was determined by setting a goal of capturing ¾" of storms over the Subregion. The Subregion's target is to develop 11,500 AF of new stormwater capture capacity (or equivalent). An emphasis will be given to the higher priority areas which will be determined by project-specific characteristics provided by the project proponent, including land use in the proposed project area, runoff and downstream impairments. The assumptions and calculations used to determine this target and catchment prioritization can be found in the *Surface Water Quality Objectives and Targets TM* attached as Appendix C.

3.4 Habitat Objective and Targets

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

3.5 Open Space and Recreation Objective and Targets

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

3.6 Flood Management Objective and Targets

Improved integrated flood management systems can help reduce the risk of flooding, and protect lives and property. The Subregion plans on meeting this objective by reducing 250 acres of local unmet drainage needs, and removing 40 million cubic yards of sediment from debris basins and reservoirs. The local unmet drainage target was determined by looking at Special Flood Hazard Areas (SFHAs), also known as flood plains, as defined by FEMA, compared to land uses and the presence of structures. The sediment removal target was established using historical records to estimate sediment inflow, and estimate the sediment trapped within a 20-year period. Detailed assumptions and calculations used to develop the Subregion's flood target can be found in the *Flood Management Objectives and Targets TM* attached as Appendix E.

Table 10: Upper San Gabriel River and Rio Hondo Subregion Objectives and Planning Targets

Objectives		Regional Planning Targets
Improve Water Supply		
Optimize local water resources to reduce the Subregion's reliance on imported water.	Water Use Efficiency	Conserve 17,000 AFY of water by 2035 through water use efficiency and conservation measures.
	Groundwater	Create ability to pump an additional 14,000 AFY using a combination of treatment, recharge, and storage access
	Recycled Water	Develop 13,000 AFY of indirect potable reuse. Increase non-potable reuse of recycled water by 12,000 AFY.
	Ocean Desalination	No ocean desalination water supply projected for the region.
	Stormwater	Increase capture and use of stormwater runoff by 13,000 AFY that is currently lost to the ocean. Increase stormwater infiltration by 17,000 AFY.
Improve Water Quality		

Improve water quality of receiving water through enhanced stormwater capture.	Runoff (Wet Weather Flows)	Develop[2] 11,500 AF of new stormwater capture capacity (or equivalent) spatially dispersed to reduce region-wide pollutant loads, emphasizing higher priority areas[3].
Enhance Habitat		
Protect, restore, and enhance natural processes and habitats.	Habitat targets were not developed to the subregional level – only to the regional level.	
Enhance Open Space and Recreation		
Increase watershed friendly recreational space for all communities.	Open space and recreation targets were not developed to the subregional level – only to the regional level.	
Improve Flood Management		
Reduce flood risk in flood prone areas by either increasing protection or decreasing needs using integrated flood management approaches.	Sediment Management and Integrated Flood Planning	Reduce flood risk in 250 acres of flood prone areas by either increasing protection or decreasing needs using integrated flood management approaches. Remove 40 million cubic yards of sediment from debris basins and reservoirs.

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

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

4 Partnership and Multi-benefit Opportunities

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

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

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

4.1 GLAC IRWMP Integration Process and Tools

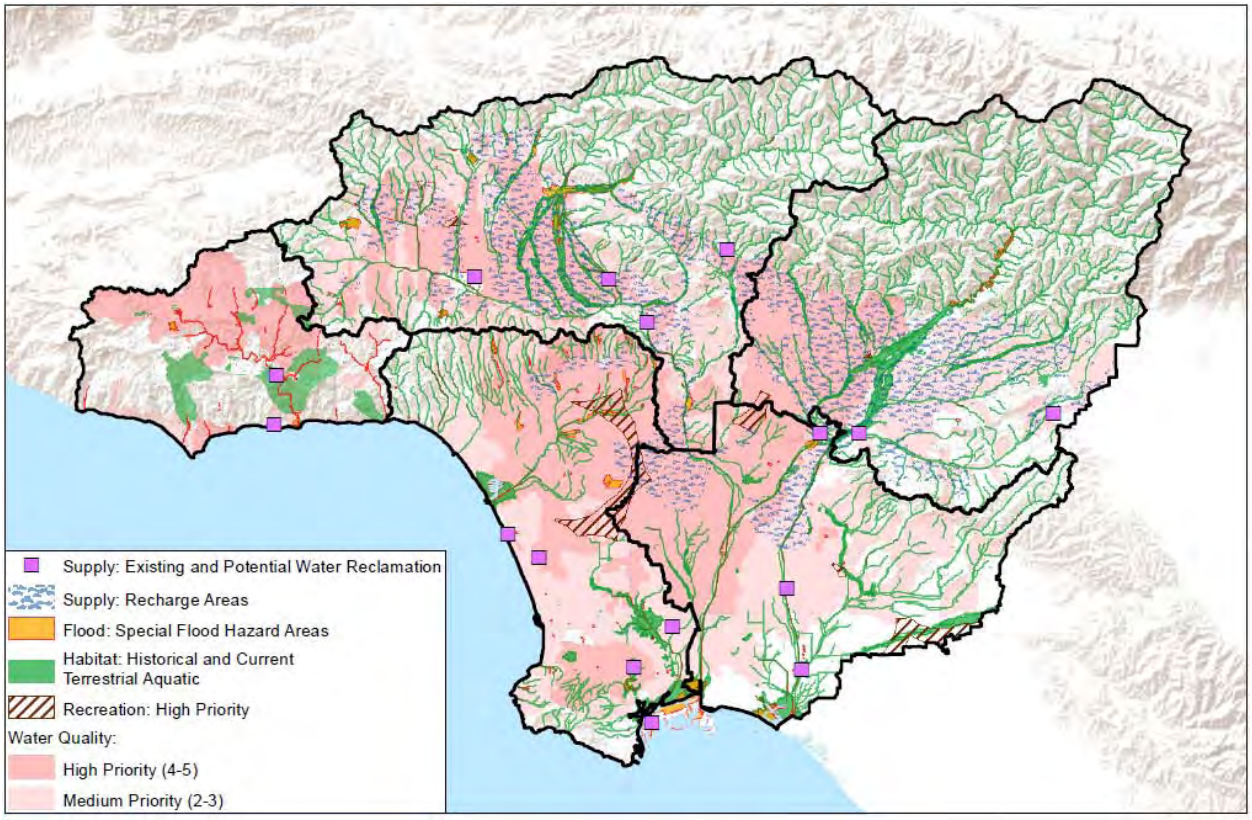
As part of the objectives and targets update process, the GLAC Region compiled and developed several geo-referenced data layers to assist in spatially identifying priorities and potential opportunities to achieve water supply, water quality, habitat, recreation and flood management benefits. These data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

Potential Benefits Geodatabase

The GLAC IRWMP Potential Benefits Geodatabase is a dynamic tool that should be updated as new data is made available in order to maintain its relevance in the IRWM planning context. However, in order to

provide an analysis of potential integration and partnership opportunities for the 2013 GLAC IRWM Plan, current data layers were overlaid and analyzed. The key layers used are shown in Figure 15 and described in Table 11. It should be noted that these datasets may not be complete or in need of further refinement and therefore will be updated on an as-needed basis – which is part of the dynamic process previously described. Therefore, the Geo-database should only be used as an initial step in identifying multi-benefit potential and by no means used to invalidate the potential for achieving benefits in other areas.

Figure 15: GLAC Region Potential Benefits Geodatabase Layers



Using the Geodatabase

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

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

the potential benefit layers, additional benefits could be added to existing project or linked to other projects and proponents through those benefits.

Table 11: Potential Benefit Geodatabase Layers

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

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

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

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

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

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

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

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

4.2 Upper San Gabriel and Rio Hondo Integration and Partnership Opportunities

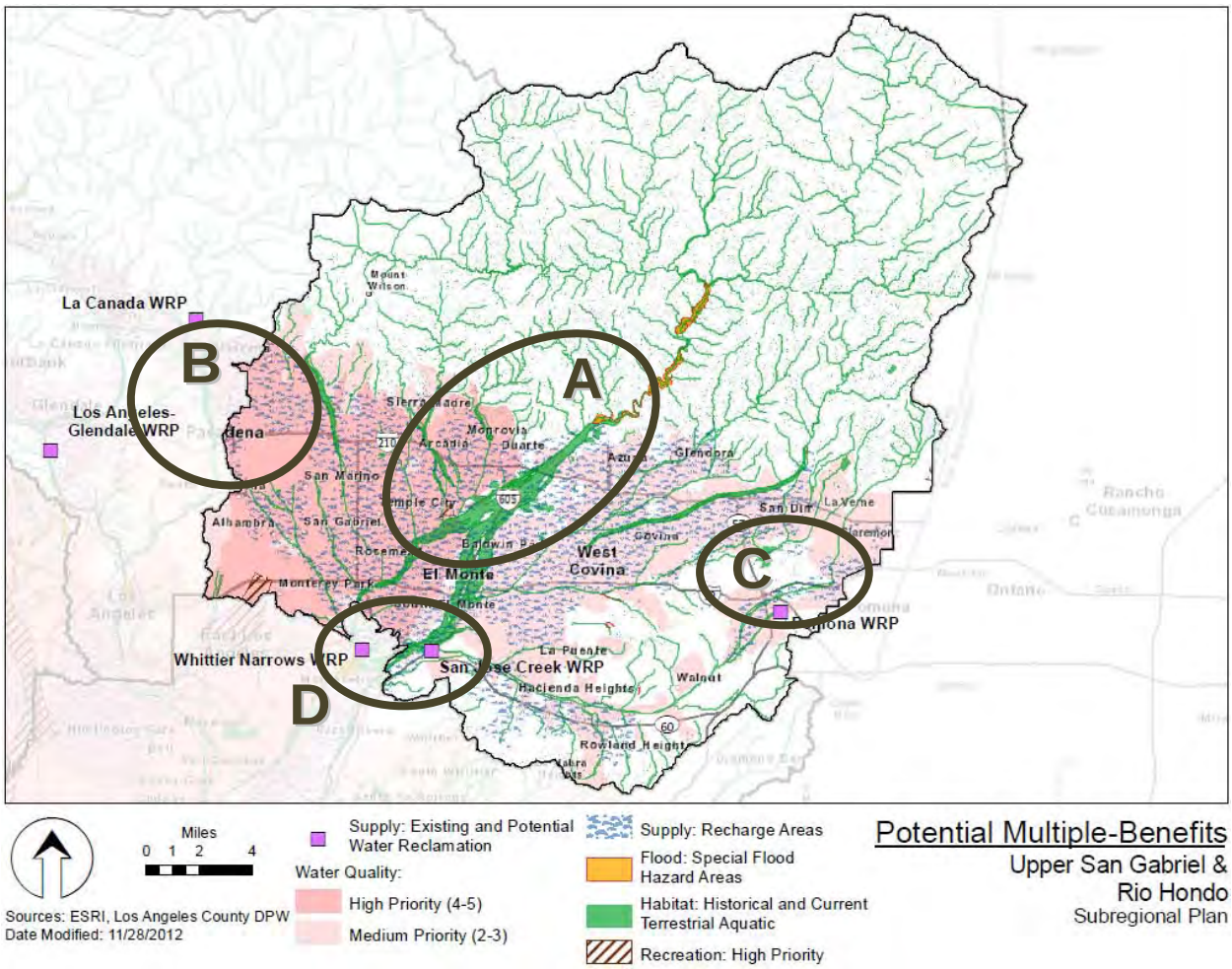
Planning for the GLAC Region is primarily done on a sub-regional level, given that each subregion has a unique set of physical characteristics and stakeholders that create opportunities for project identification and collaboration. Therefore, the Geodatabase layers are more useful when examined and discussed on a subregional scale. Figure 16 focuses on the Upper San Gabriel and Rio Hondo Subregion and highlights

just a few unique areas within the subregion that have potential for generating multiple benefit projects. These areas described here are meant to provide examples of potential multiple benefits areas and are not meant to be a comprehensive inventory of opportunities. As subregions move forward to identify potential projects, it will be necessary to examine localized site characteristics (such as land uses) to confirm that it will be possible to meet the potential benefits discussed below.

The Subregion's integration potential is notable relative to other subregions in a few ways:

- There are significant areas that are suitable for groundwater recharge.
- About half of the watershed is upland open space and half is urbanized.
- Improving groundwater quality and basin replenishment are important supply sources.
- There is access to unused stormwater supply and recycled water supply (though this may be dependent on the time of year or agreements for future supplies).

Figure 16: Upper San Gabriel and Rio Hondo Subregion Potential Multiple-Benefits



A: Main San Gabriel Basin Water Quality and Basin Recharge

The headwaters of the San Gabriel River flow from the upland rural watershed into the lower more urbanized watershed that also serves as the main source of the Main San Gabriel Groundwater Basin. As

Figure 16 shows, projects in the area have a great potential to provide water quality, supply habitat and integrated flood management benefits through integrated project development. Proximity to existing recharge and recycled water facilities also provide a foundation for further use of local supplies. Given the urbanized nature of this area, decentralized stormwater capture programs and BMPs could also be implemented. In addition, projects in this area could also include a habitat component to provide valuable habitat benefits.

B. Inter-Regional Raymond Basin Water Supply and Quality

The Raymond Basin and the City of Pasadena are divided between the Upper Los Angeles River and Upper San Gabriel and Rio Hondo Subregions. This provides intra-regional opportunities between the ULAR and USGRH subregions for replenishment of the Raymond Basin to benefit both regions through both stormwater capture and accessing recycled water supplies from the Los Angeles-Glendale Water Reclamation Plant. This area, which includes the Rio Hondo watershed, also has been identified as a high priority drainage for achieving water quality benefits and therefore multiple benefits project opportunities. Partnerships between the City of Pasadena, other Raymond Basin pumpers, City of Los Angeles/City of Glendale and LACFCD could result in very beneficial integrated projects.

C. Six Basins/Puente Basin Area Supply and Quality Improvement

The Six Basins and Puente Basin groundwater basins area can provide opportunities to provide regional water supply partnerships that could serve to maximize groundwater use through treatment and supply interties between neighboring agencies. Districts such as Walnut Valley Water District and Rowland Water District could work with neighboring agencies (such as cities of LA Verne, Pomona and Golden State Water Company) to increase water quality to levels that could be useful in offsetting their dependence on imported supply.

D. Intra-Regional Montebello Forebay Recharge and Open Space

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

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

References

Alhambra, City of, 2011. 2010 Urban Water Management Plan.

Arcadia, City of, 2011. 2010 Urban Water Management Plan.

Azusa Light and Power, 2011. 2010 Urban Water Management Plan.

California American Water Co., 2011. 2010 Urban Water Management Plan.

Foothill MWD, 2011. 2010 Urban Water Management Plan.

Los Angeles County Department of Regional Planning (LACDRP), 2011. Los Angeles County General Plan 2035. Public Review Draft.

Metropolitan Water District of Southern California (MWDSC), 2010. Integrated Regional Plan.

MWDSC, 2007. Groundwater Assessment Study. Report Number 1308. http://www.mwdh2o.com/mwdh2o/pages/yourwater/supply/groundwater/GWAS.html

Monrovia, City of, 2011. 2010 Urban Water Management Plan.

Palos Verdes Peninsula Land Conservancy, 2011. Restoration and Land Stewardship. http://www.pvplc.org/_lands/stewardship.asp

Pasadena, City of, 2011. 2010 Urban Water Management Plan.

Regional Water Quality Control Board - Los Angeles Region (RWQCB), 2011. State of the Watershed - Report on Water Quality, The San Gabriel River Watershed.

RWQCB, 2011b. Shapefiles of Permitted Storm Sewer System (MS4) Discharges, Industrial General Discharges, and Caltrans Discharges.

San Gabriel Basin Water Quality Authority, 2012. *San Gabriel Basin Groundwater Quality Managementand Remediation Plan*. March 21.

San Gabriel County Water District, 2011. 2010 Urban Water Management Plan.

San Gabriel Valley Water Company, 2011. 2010 Urban Water Management Plan.

Sierra Madre, City of, 2011. 2010 Urban Water Management Plan.

State Water Resources Control Board (SWRCB), 2010. 2010 Integrated Report (Clean Water Act Section 303(3) List / 305(b) Report) - Statewide. http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml

South Pasadena, City of, 2011. 2010 Urban Water Management Plan.

Southern California Association of Governments (SCAG), 2012. Adopted 2012 RTP Growth Forecast. http://www.scag.ca.gov/forecast/index.htm

Suburban Water Systems, San Jose Hills District, 2011. 2010 Urban Water Management Plan.

Three Valleys Municipal Water District, 2011. 2010 Urban Water Management Plan.

U.S. Census Bureau, 2012. 2010 Census Data. Census tract.

Valley County Water District, 2011. 2010 Urban Water Management Plan.

Appendix A - Regional Imported Water Information

State Water Project

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

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

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

Colorado River Aqueduct

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

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

Appendix B - Water Supply Targets TM

Appendix C - Water Quality Targets TM

Appendix D - Open Space for Habitat and Recreation Plan

Appendix E - Flood Targets TM

Appendix F - Regional Imported Water Information