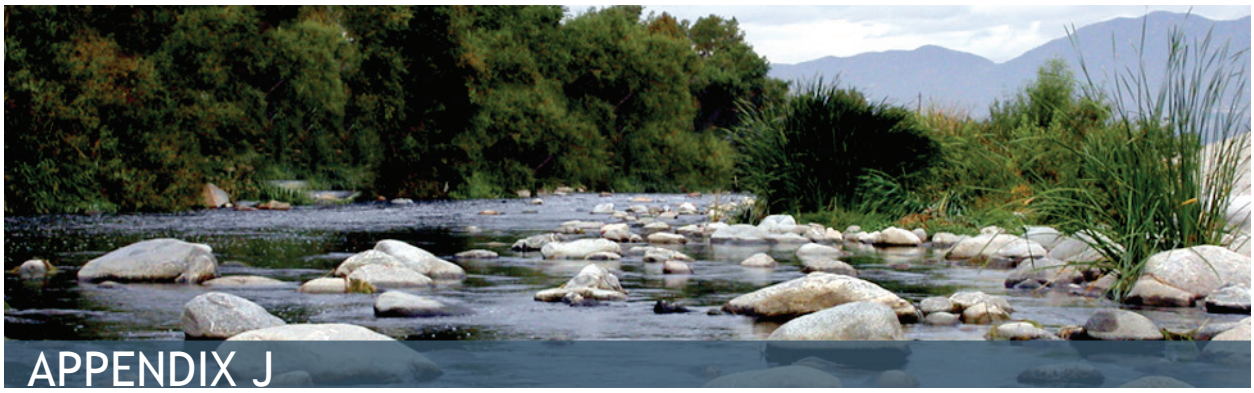

APPENDIX J

North Santa Monica Bay Subregional Plan

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North Santa Monica Bay Subregional Plan

Final

Prepared by:

RMC Water and Environment

In Association with:

Geosyntec consultants

December 2012

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1 Background and Purpose of Subregional Plan

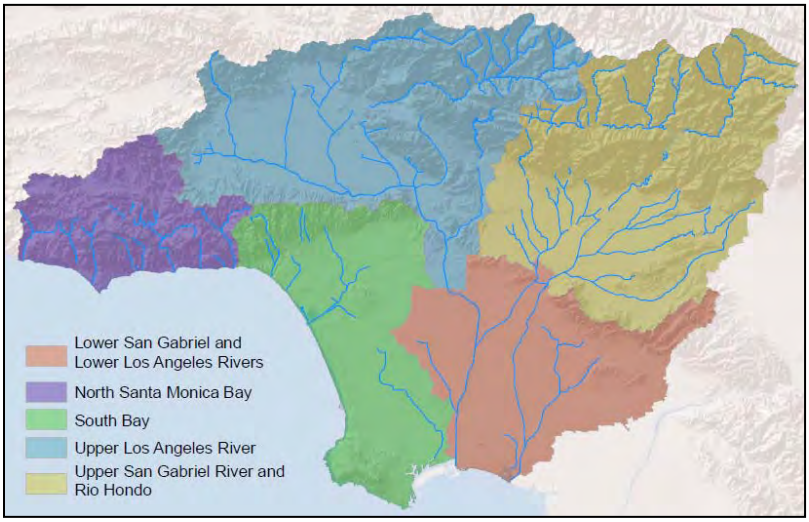
The North Santa Monica Bay Subregional plan is one of five Subregional plans that make up the Greater Los Angeles County Integrated Regional Water Management Plan (GLAC IRWM Plan). This Subregional plan describes the North Santa Monica Bay's physical setting, sources of water supply, water quality, environmental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

2 North Santa Monica Bay Subregion Description

2.1 Physical Setting

The North Santa Monica Bay is one of five Subregions within the Greater Los Angeles County Integrated Regional Water Management Region (GLAC IRWM Region). It is located at the western extent of Los Angeles County and comprises 203 square miles (Figure 1). This Subregion's boundaries reflect the combined watershed boundaries of Malibu Creek, Topanga Creek, and western Los Angeles County coastal watersheds from the mouth of Topanga Creek west to the county line to include the Arroyo Sequit Watershed. These watersheds include portions of Ventura County, including the City of Oak Park, a portion of Thousand Oaks, and unincorporated Ventura County.

Figure 1: GLAC Subregional and Watershed Boundaries



In contrast to other subregions within the region, 89% of the North Santa Monica Bay Subregion is comprised of undeveloped open space. The remaining 11% of land use is primarily residential and concentrated along the coastline and interior valleys.

The natural conditions include an array of significant vegetative and habitat resources, key watersheds that drain through wooded canyons into the Santa Monica Bay, spectacular views, rugged mountains, sheltered coves, and steep unstable slopes. There is a high potential for brush fires and many large faults pose a high seismic risk. During the 1994 Northridge earthquake, there were large surface ruptures near Las Virgenes Road south of Agoura Road.

Most of the area is within the boundaries of the Santa Monica Mountains Recreation Area, a unit of the National Park System. In addition to federal park land, there are a variety of open space land owners, including:

- Other Federal Land
- State Department of Parks and Recreation
- Los Angeles County Parkland
- Other Los Angeles County Land (non-parkland)

- Mountain Resources Conservation Authority
- Santa Monica Mountains Conservancy Land
- University of California Reserve
- Mountain Restoration Trust
- COSCA Open Space
- City of Calabasas Parkland
- City of Los Angeles Land
- Other City of Los Angeles Land (non-parkland)
- City of Thousand Oaks Parkland
- Las Virgenes MWD
- Miscellaneous Public Land
- Other Private Land

The Subregion is also home to over a dozen endangered and threatened species, including the southernmost Steelhead Trout population in the state.

Political Boundaries

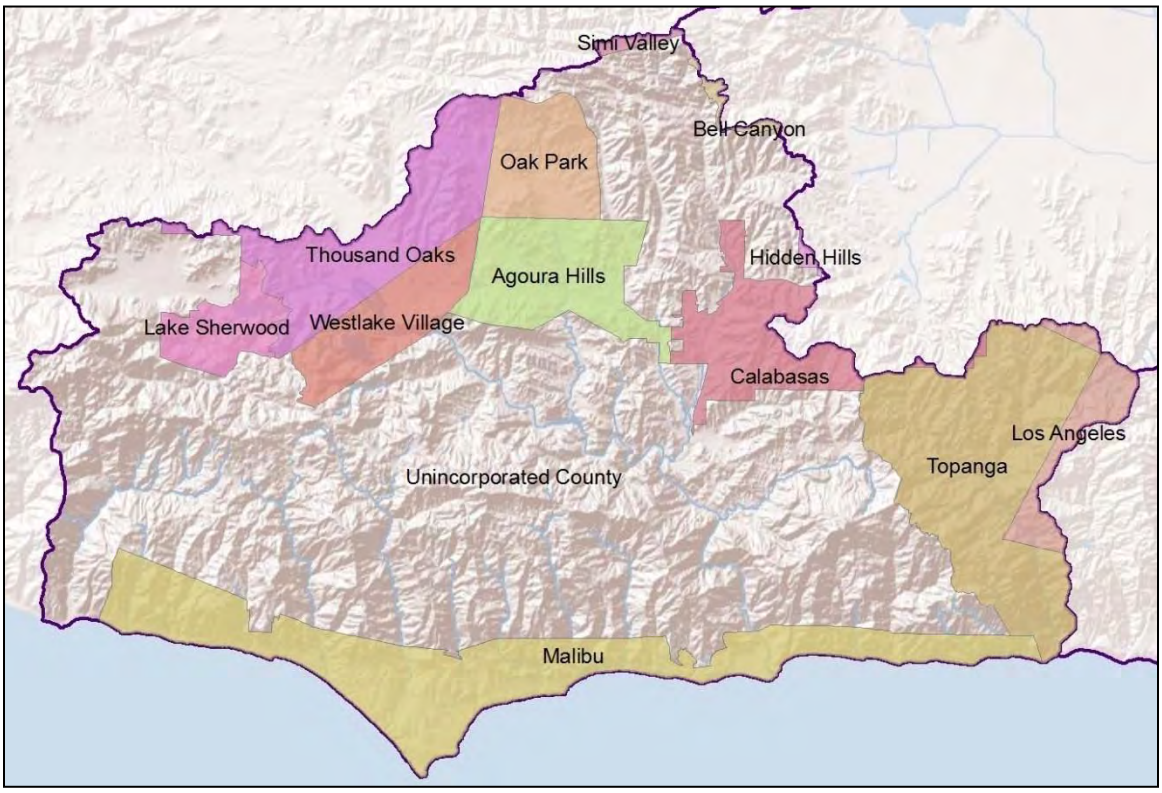
The Subregion consists of primarily four cities and unincorporated areas of Los Angeles County. Figure 2 depicts the county and city boundaries of the North Santa Monica Bay Subregion. Based on census tract information from the 2010 census, the 2010 population of the Subregion is estimated to be 107,000. According to population growth projections from the Southern California Association of Governments (SCAG) for Los Angeles County, population is expected to increase at an average rate of 0.5% per year out to 2035. Applying this growth projection to the estimated 2010 populations in the Subregion indicates that by 2035 the population is expected grow to 122,000. (SCAG, 2012; U.S. Census Bureau, 2012)

Climate, Temperature, and Rainfall

The North Santa Monica Bay Subregion is within a Mediterranean climate zone. Summers are typically dry and warm while winters are wet and cool. Precipitation falls in a few major storm events between November and March. However, the Subregion also experiences infrequent periods of extremely hot weather, winter storms, and dry hot Santa Ana winds.

Because of its location on the Santa Monica Bay, morning fog is a common occurrence in May, June and early July (caused by ocean temperature variations and currents). As a general rule, the beach temperature is from 5 to 10 degrees Fahrenheit (3 to 6 degrees Celsius) cooler than it is inland. The warmest temperatures tend to occur in September. The rainy season is from late October through late March. Winter storms usually approach from the northwest and pass quickly through the GLAC Region. There is very little rain during the rest of the year. Yearly rainfall totals are unpredictable as rainy years are occasionally followed by droughts.

Figure 2: Cities in the Subregion



Geography and Geology

The geography of the Subregion can generally be divided into three distinct types: a narrow coastal plain, the Santa Monica Mountains and Simi Hills, and the Conejo Valley, which separates the two ranges. The Santa Monica Mountains and Simi Hills are part of the east-west Transverse Ranges between the Pacific Ocean and the inland valleys, The Santa Monica Mountains extend for approximately 40 miles.

The Santa Monica Mountains are extensively faulted. The two most prominent faults in the Santa Monica Mountains consist of the Sycamore Canyon and Boney Mountain Faults at the western end of the range and the Malibu Coast Fault that runs east to west along the coastal boundary of the park. (NPS, 2012)

The most common geologic formation of the Subregion is the Conejo Volcanics, which dominates the rugged ridgeline of the western Santa Monica Mountains. Malibu Creek cuts through the Santa Monica Mountains to drain the Simi Hills. The headwaters of Malibu and Topanga Creeks, the two largest watersheds in the Subregion, are dominated by the Miocene marine Modelo Formation, a depositionally distinct unit of Monterey Shale, California's primary petroleum source rock. The Monterey and Modelo Formation (12% of surface area) are recognized as a source of elevated concentrations of hazardous trace elements in runoff. Tertiary marine and non-marine sedimentary formations constitute almost 50% of surface area in the Subregion, volcanic accounting for 32%, and Quaternary sediments accounting for 15%. (USGS, 2002)

2.2 Watersheds and Water Systems

Watersheds

The North Santa Monica Bay Subregion is defined by the watershed boundaries of Malibu Creek, Topanga Creek and western Los Angeles County coastal watersheds from the mouth of Topanga Creek west to the western boundary of Arroyo Sequit at the county line (Figure 3). The major watersheds are Malibu Creek (including Las Virgenes and Medea Creeks), Topanga Canyon Creek, Triunfo Creek, Trancas Creek, Zuma Creek and Los Alisos Creek. These watersheds feed both the Pacific Ocean (Santa Monica Bay) and numerous riparian corridors.

Flood Management and Infrastructure

Flood management is important to protect human lives and property, particularly in the North Santa Monica Bay where, historically, flooding has been an issue exacerbated by wildfires and changes to the natural landscape. The Los Angeles County Flood Control District manages most of the Subregion's flood infrastructure such as storm drains, culverts, and debris basins. Flood Control Facilities in the Subregion are shown in Figure 4.

Water Suppliers

The wholesale water suppliers in the North Santa Monica Bay Subregion include West Basin Municipal Water District (West Basin), Calleguas Municipal Water District, and MWDSC (Figure 5). Retail water agencies include Las Virgenes Municipal Water District and Los Angeles County Waterworks District #29 (Figure 6). These suppliers use a combination of imported water and recycled water to serve potable and non-potable demand in their service area. Each of these major suppliers has written a comprehensive 2010 Urban Water Management Plan (UWMP) to estimate future water supply demands and availability, and which were utilized in estimation of the Subregion's supplies and demand discussed below.

2.3 Sources of Water Supply

The North Santa Monica Bay Subregion depends primarily on imported water to meet its potable water demands. Local water supplies are primarily non-potable supplies, including recycled water and a small, non-potable groundwater basin. Imported water is provided by the wholesale agencies West Basin MWD and Calleguas MWD, both of which purchase the water from MWDSC that imports water from the State Water Project (SWP) from northern California, and from the Colorado River Aqueduct.

Factors that impact reliability include operational constraints such as court ordered pumping restrictions on imported water from the San Joaquin-Sacramento River Delta (Delta) for 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. The entire Subregion receives between 93% and 100% State Water Project Water, and between 0% and 7% Colorado River Water. Individual agencies, districts and cities taking delivery of imported water receive an average blend of 0% to 50% Colorado River water, and 50%-100% State Water Project water, depending on the wholesale agency.

Figure 3: Watersheds of the NSMB Subregion

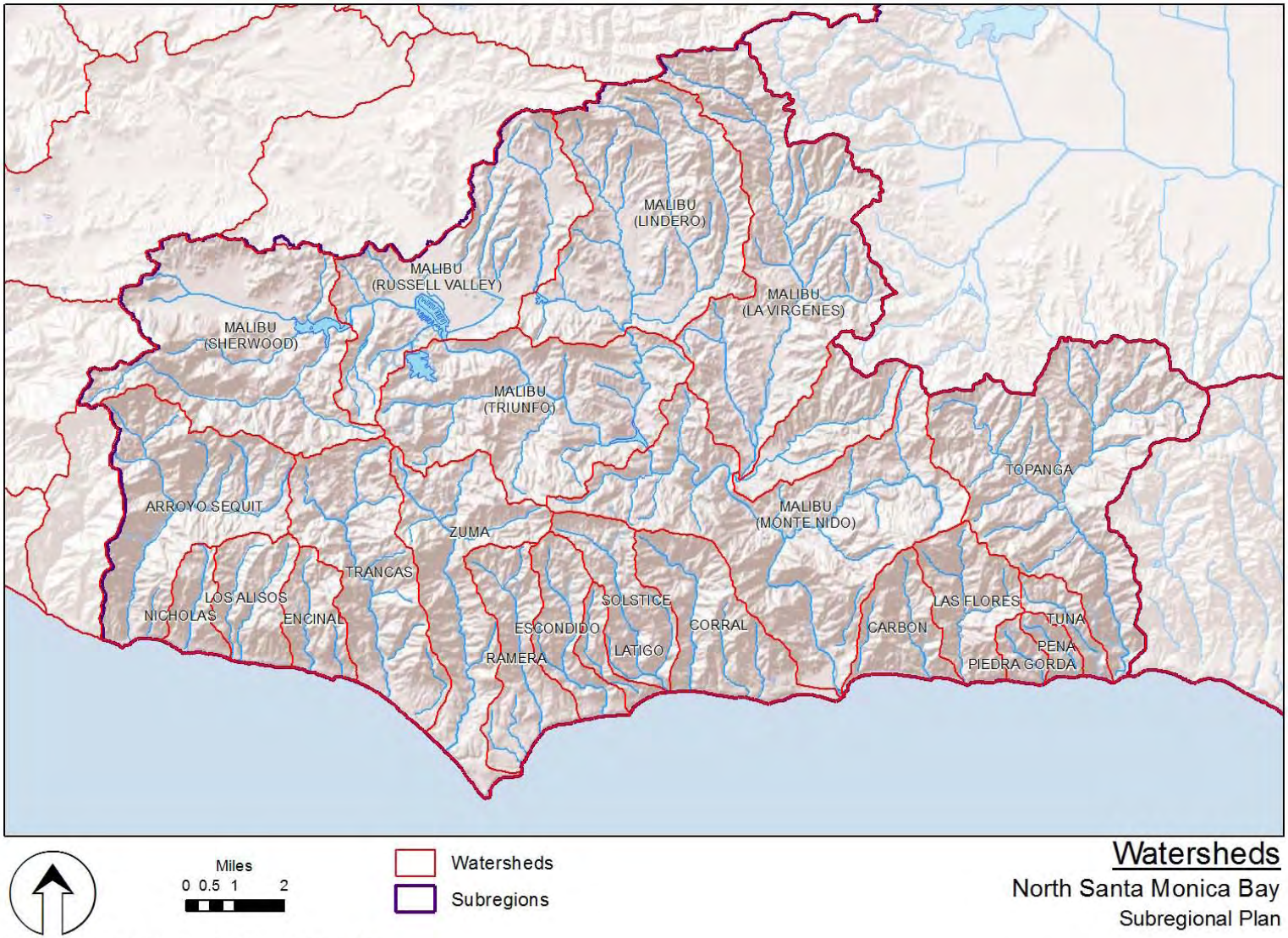


Figure 4: Flood Control Facilities

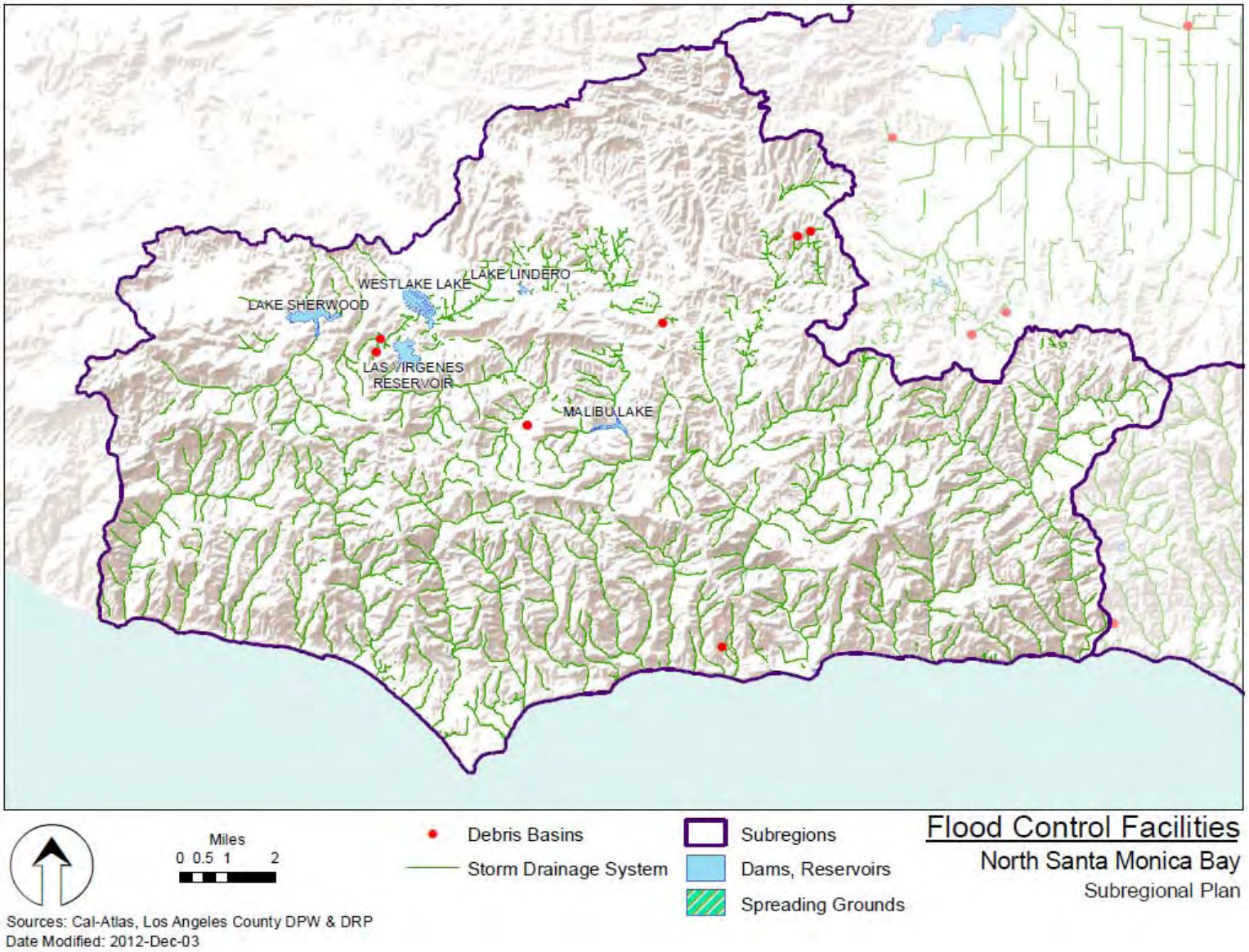


Figure 5: Wholesale Water Suppliers

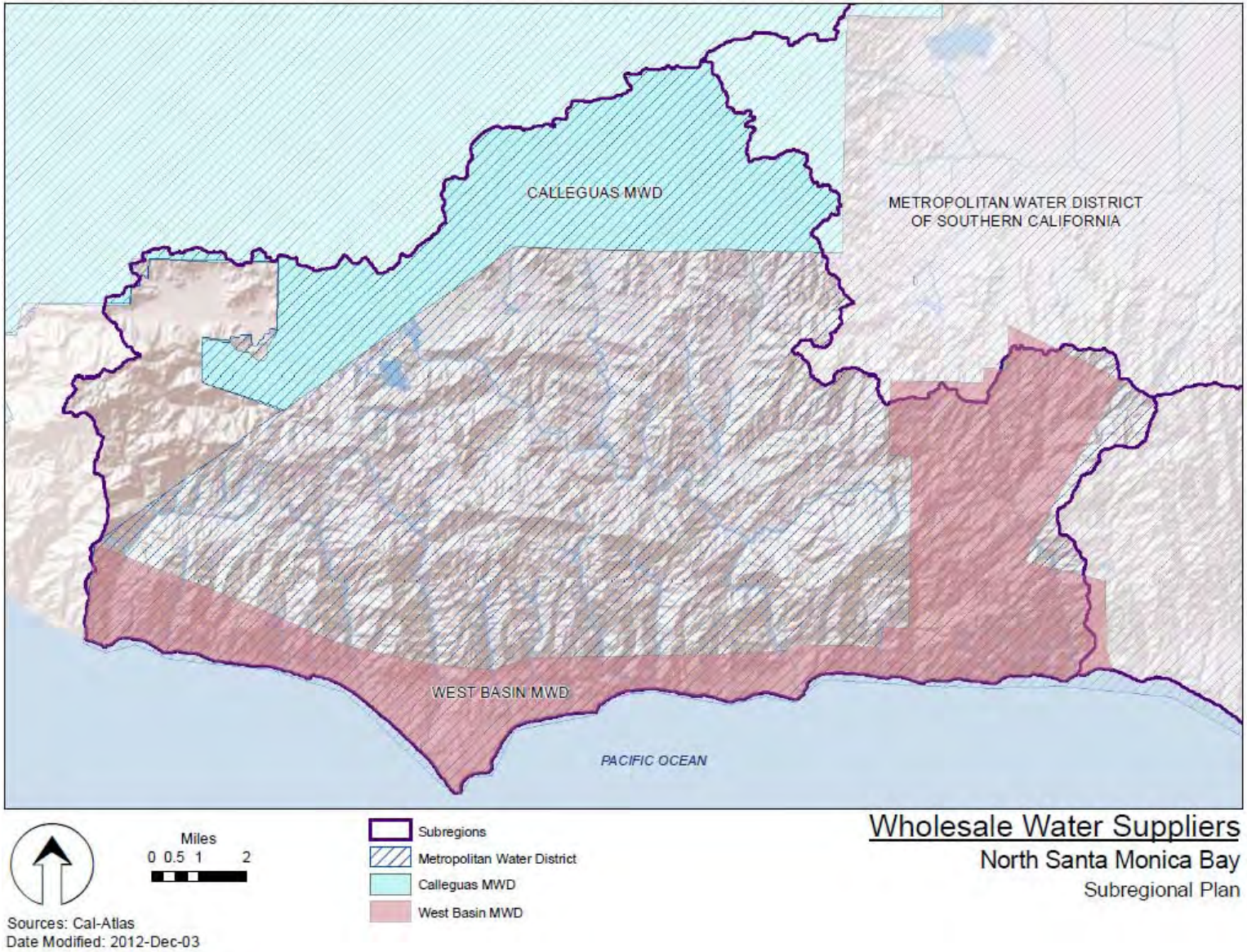
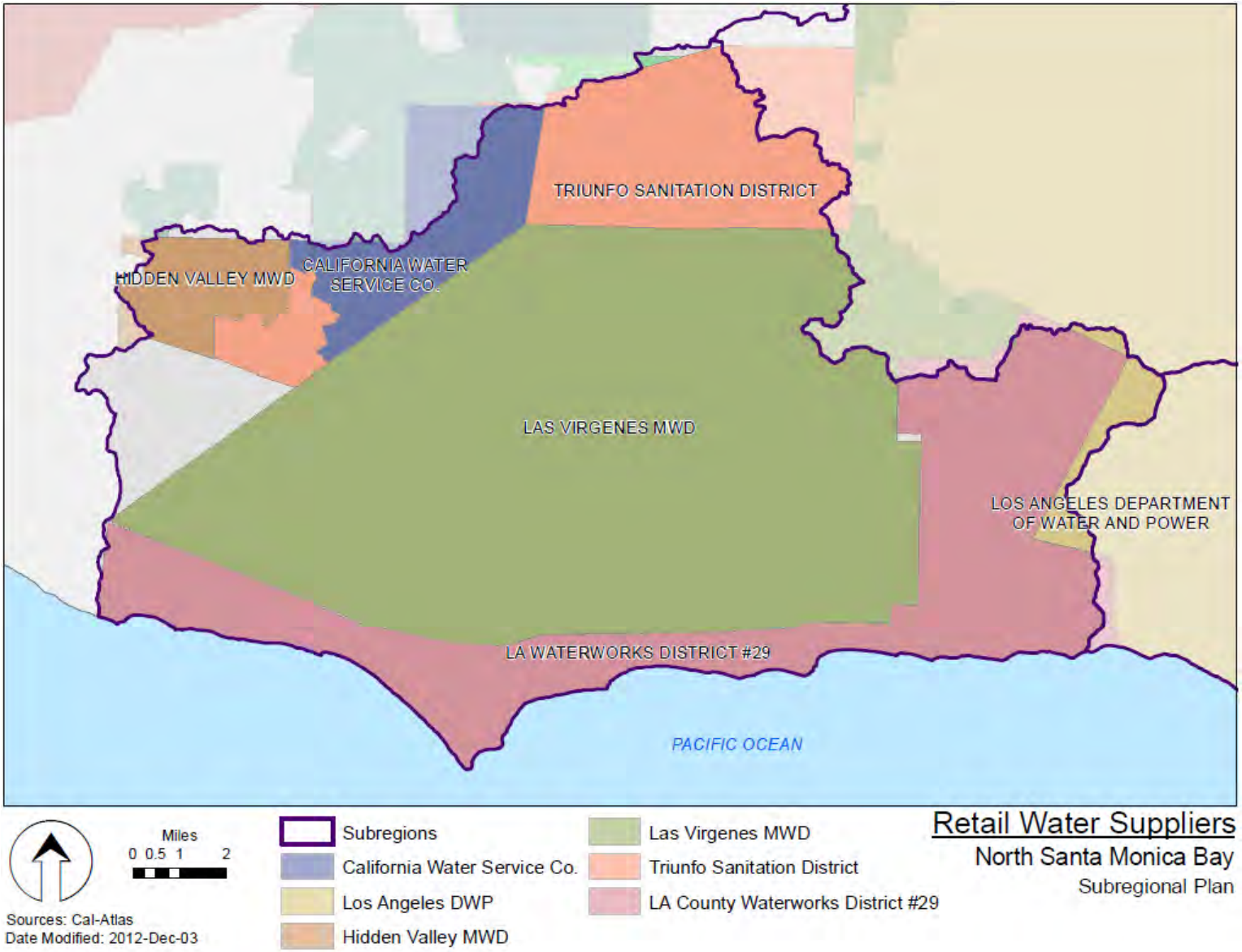


Figure 6: Retail Water Suppliers



2.4 Sources of Water Supply

The North Santa Monica Bay Subregion depends primarily on imported water to meet its potable water demands. Local water supplies are primarily non-potable supplies, including recycled water and small, non-potable groundwater basins. Imported water is provided by the wholesale agencies West Basin MWD and Calleguas MWD, both of which purchase the water from MWDSC that delivers water imported primarily from via State Water Project (SWP) from northern California, and also from the Colorado River Aqueduct.

Sources of supply vary throughout the Subregion, as shown in Table 1. This table was developed based on 2010 Urban Water Management Plans (UWMPs) from the following agencies:

- Las Virgenes MWD (portion within the Subregion – 87% area)
- City of Malibu
- California Water Services Company, Westlake
- Lake Sherwood
- Triunfo Sanitation District

It should be noted that though conservation supplies between 2010 and 2035 are listed as zero, this may not necessarily be the case as some agencies included projected conservation with demand, rather than including it as a supply.

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

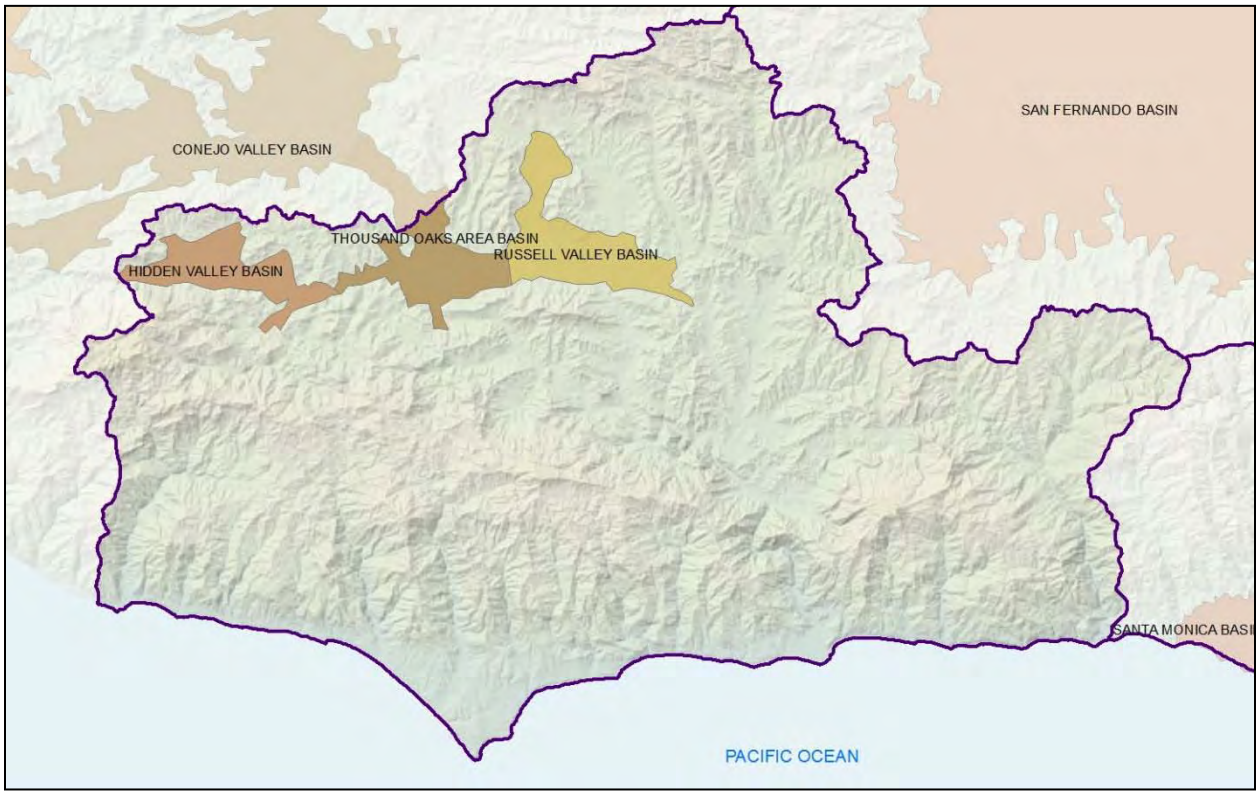
Supply	2010	2035
Groundwater	200	200
Imported	39,000	47,000
Recycled (Non-Potable Reuse)	6,000	9,000
Surface Water Diversions	0	0
Desalinated Ocean Water	0	0
Water Use Efficiency	0	0
Stormwater Capture and Use	0	0
Total	**45,000**	**56,000**

Data sources: 2010 Urban Water Management Plans of agencies listed above
Supplies are rounded to the nearest thousand acre-feet per year.

Groundwater

Groundwater represented less than one percent of the Subregion's supplies in 2010. The Hidden Valley, Russell Valley and Thousand Oaks Area Basins are the only groundwater basins underlying the Subregion (Figure 7). Each is relatively small and produces poor quality water that is not potable. Las Virgenes MWD pumps water from the Russell Valley Basin to augment supplies for its recycled water system. The maximum yield of this basin is 400 AFY, and the basin is not adjudicated. These groundwater basins are not utilized by water agencies within the Subregion. (MWDSC, 2007)

Figure 7: Groundwater Basins of the NSMB Subregion



Sources: Cal Atlas, Los Angeles County DPW

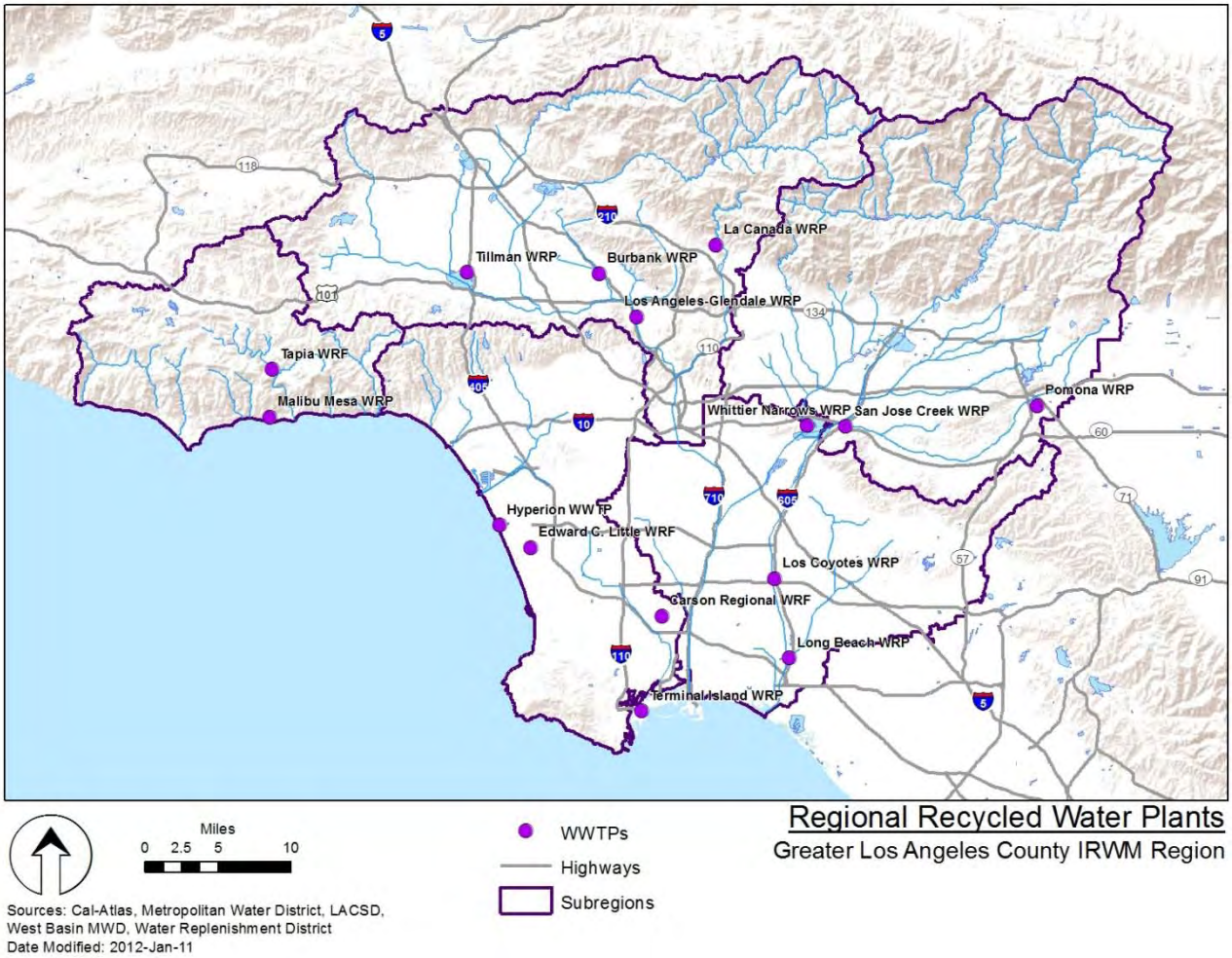
Imported Water

This Subregion is highly dependent on imported water, with 2010 use at 38,000 AFY increasing to 50,000 AFY in 2035. The primary imported water wholesaler in the Subregion is MWDSC, which delivers to West Basin MWD, Calleguas MWD, and Las Virgenes MWD.

Recycled Water

Current average annual recycled water production in the Subregion is approximately 6,000 AFY which represents approximately 15 percent of the Subregion's total supplies in 2010, and is primarily used for landscape irrigation. The use of recycled water is projected to increase to 10,000 AFY in 2035. Tertiary treated recycled water is provided by the Malibu Mesa Water Reclamation Plant (WRP) which has a capacity of 0.2 MGD, and the Tapia Water Reclamation Facility (WRF) which has a capacity of 16 million gallons per day (MGD) (to be reduced to 12 MGD due to treatment upgrades). Unused recycled water is currently discharged to creeks and rivers, disposed through land spraying, or discharged to City of Los Angeles sewers. Between April 15th and November 15th of the year, a discharge prohibition is in place for the Tapia WRF, with exceptions for treatment plant upset or operational emergencies, qualified storm events, and stream flow augmentation to support endangered species when Malibu Creek flow drops below 2.5 cubic feet per second (cfs) for a designated number of days. Figure 8 shows the recycled water facilities within the GLAC Region.

Figure 8: Water Reclamation Facilities in the GLAC Region



Desalinated Ocean Water

Though the Subregion does not have any desalination projects within its boundaries, the West Basin MWD's Ocean Water Desalination Demonstration Facility and Water Education Center located in Redondo Beach (located in the South Bay Subregion) may benefit the North Santa Monica Bay Subregion in the future. This facility is used to evaluate and demonstrate ocean protection, energy recovery and cost reduction technologies with the goals of ensuring a full scale ocean-water desalination facility will be done in a cost and energy efficient manner while protecting the ocean.

Stormwater Use

The City of Malibu's 15-acre Legacy Park Project is an innovative water quality improvement project that transformed 15 acres in the heart of the city into a central park capable of capturing up to 2.6 million gallons of runoff per storm for treatment and disinfection. This integrated multi-benefit project improves water quality to Malibu Creek, Malibu Lagoon, and nearby beaches by capturing, detaining, screening, filtering, and treating stormwater runoff from the local watershed to remove pathogens, nutrients, and other pollutants, and also integrates and beneficially uses captured and treated stormwater to offset potable water usage. The project also creates a public and ecosystem amenity providing valuable habitat, education and passive recreation opportunities.

Additionally, Los Angeles County has implemented a low impact development (LID) ordinance that requires new developments and redevelopment constructed after 2009 include LID best management

practices (BMPs) that may be implementable on particular sites. This program may ultimately result in additional capture and use of stormwater to replace irrigation water, in particular.

2.5 Water Supply/Demand

As water agency boundaries are not aligned with the Subregional boundaries, the water supply and demand estimates made here are based on the percentage of each water agency's service area included in the Subregion. Water demand was estimated based on review of 2010 UWMPs for:

- Las Virgenes MWD (portion within the Subregion)
- City of Malibu
- California Water Services Company, Westlake
- Lake Sherwood
- Triunfo Sanitation District

Demand projections for the Subregion can be seen in Table 2. Demand was calculated using the 2010 UWMPs for Las Virgenes MWD and Los Angeles County Water Works (LACWW) District 29. Given that the LACWW District 29 includes Marina Del Rey which is not within this Subregion, the portion of demand included in the Subregion was calculated by taking the proportion of the projected population for the areas within the Subregion (ranging from 67% in 2010 to 61% in 2035) and applying it to the total demand estimated in LACWW's UWMP.

Water demand is projected to increase little between 2010 and 2035, likely due to the inclusion of conservation in demand projections in agencies' 2010 UWMPs.

Table 2: Subregion Demand Projections for Direct Use (acre-feet per year)

2010	2015	2020	2025	2030	2035
41,000	42,000	40,000	41,000	44,000	43,000

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

2.6 Water Quality

The GLAC Region has suffered water quality degradation of varying degrees due to sources associated with urbanization, including 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, and are often updated to control constantly changing water quality issues.

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 municipal separate storm sewer systems (MS4) and water reclamation plants to surface water bodies.

The Subregion has 303(d) listings related to both human activities and natural sources. Natural geologic formations in the area are believed to be the source of high levels of various constituents (including elevated specific conductivity, selenium, chloride, metals, phosphorus, and sulfate) found in water bodies draining the Monterey and Modelo Formations. Human activity can produce poor water quality due to trash, nutrients from wastewater treatment effluent, metals, and toxic pollutants. Pathogens are contributed both by developed and natural areas. These pollutants are carried in stormwater runoff and contributed by point source discharges, impacting streams, canyon ecosystems, beaches and offshore waters, threatening public health as well as the long-term health of the Santa Monica Bay.

Even though agencies and cities in the Subregion have significantly reduced pollutants that are discharged to water bodies from individual point sources, 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 North Santa Monica Bay Subregion serve many beneficial uses including: recreation (swimming, fishing, picnicking, etc.), and habitat (for aquatic life and wildlife, in wetlands, etc.). Typically, surface water quality is better in the headwaters and upper portions of watershed, and is degraded by urban and stormwater runoff closer to the Pacific Ocean. Malibu Creek watershed water quality is non-typical at least in terms of mineral content in that the highest mineral water concentrations are found in undeveloped, Monterey Formation-dominated northern headwaters, which dilute in the downstream direction, even as water flows through developed areas. As a result of anthropogenic and natural inputs, the major watershed in the Subregion (Malibu Creek and its subwatersheds) and receiving waters (Santa Monica Bay), and various near-shore areas and beaches are 303(d) listed for several constituents as shown in Table 3 and Table 4. (SWRCB, 2012) The locations of permitted discharges 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 include a source assessment for each impairment, and determine the major sources of each, as listed below:

- **Malibu Creek Nutrient TMDL – major sources:** Tapia Water Reclamation Facility, septic systems, runoff from residential and commercial areas, runoff from undeveloped areas, agriculture and livestock, golf courses, groundwater, and atmospheric deposition
- **Malibu Creek Trash TMDL – major sources:** Litter discarded to channels, creeks and lakes
- **Malibu Creek Bacteria TMDL – major sources:** Runoff from residential and commercial areas, dry weather storm drain loads, septic systems, and wildlife (in particular, birds)
- **Santa Monica Bay Beaches Wet Weather Bacteria TMDL – major sources:** Runoff from residential, commercial, industrial, and agricultural and undeveloped areas
- **Santa Monica Bay Beaches Dry Weather Bacteria TMDL – major sources:** Sanitary sewer and sewage plant overflows and spills, and dry weather urban runoff
- **Santa Monica Bay Nearshore Debris TMDL – major sources:** Litter discarded to channels, creeks, lakes, and beaches and the ocean

- **Santa Monica Bay DDTs and PCBs TMDL – major sources:** Sediments, Hyperion, JWPCP, dewatering from the cleanup of contaminated sites, dewatering related to construction projects, and runoff

Over the next ten years, several additional TMDLs are scheduled to be developed, in addition to the TMDLs developed as of early 2012. This will require the implementation of projects and programs by permitted dischargers, the county, and the cities in the Subregion.

Table 3: North Santa Monica Bay Subregion 303(d) listed waters with Approved TMDLs

303(d) Listed Waters and Impairments[1]	TMDL
Lake Lindero	
Nutrients: Algae, Eutrophic, Odor	Malibu Creek Nutrient TMDL
Trash	Malibu Creek Trash TMDL
Lake Sherwood	
Nutrients: Algae, Ammonia, Eutrophic, Organic Enrichment/Low Dissolved Oxygen	Malibu Creek Nutrient TMDL
Las Virgenes Creek	
Coliform Bacteria	Malibu Creek Bacteria TMDL
Nutrients: Algae, Organic Enrichment/Low Dissolved Oxygen, Scum/Foam – unnatural	Malibu Creek Nutrient TMDL
Trash	Malibu Creek Trash TMDL
Lindero Creek	
Coliform Bacteria	Malibu Creek Bacteria TMDL
Nutrients: Algae, Scum/Foam – unnatural	Malibu Creek Nutrient TMDL
Trash	Malibu Creek Trash TMDL
Malibou Lake	
Nutrients: Algae, Eutrophic, Organic Enrichment/Low Dissolved Oxygen	Malibu Creek Nutrient TMDL
Trash	Malibu Creek Trash TMDL
Malibu Creek	
Coliform Bacteria	Malibu Creek Bacteria TMDL
Nutrients: Algae, Scum/Foam – unnatural	Malibu Creek Nutrient TMDL
Trash	Malibu Creek Trash TMDL
Malibu Lagoon	
Bacteria: Coliform Bacteria	Malibu Creek Bacteria TMDL
Nutrients: Eutrophic, pH	Malibu Creek Nutrient TMDL
Swimming Restrictions	Malibu Creek Bacteria TMDL
Viruses (enteric)	Malibu Creek Bacteria TMDL
Trash	Malibu Creek Trash TMDL
Medea Creek (Lower and Upper)	
Nutrients: Algae	Malibu Creek Nutrient TMDL
Coliform Bacteria	Malibu Creek Bacteria TMDL
Trash	Malibu Creek Trash TMDL
Palo Comado Creek	
Coliform Bacteria	Malibu Creek Bacteria TMDL
Santa Monica Bay	
Debris	Santa Monica Bay Nearshore Debris TMDL (draft)

303(d) Listed Waters and Impairments[1]	TMDL
Bacteria	Santa Monica Bay Beaches Wet Weather Bacteria TMDL Santa Monica Bay Beaches Dry Weather Bacteria TMDL
DDTs, PCBs, Sediment Toxicity, Fish Consumption	Santa Monica Bay DDTs and PCBs TMDL
Stokes Creek	
Coliform Bacteria	Malibu Creek Bacteria TMDL
Triunfo Creek	
Bacteria	Malibu Creek Bacteria TMDL
Westlake Lake	
Nutrients: Algae, Ammonia, Eutrophic, Organic Enrichment/Low Dissolved Oxygen	Malibu Creek Nutrient TMDL
Beaches: Escondido, Nicholas Canyon, Point Dume, Robert H. Meyer Memorial, Trancas (Broad), Zuma, Sea Level, Dan Blocker Memorial (Corral), Escondido, Leo Carrillo, Paradise Cove, Puerco, Amarillo, Malibu, Las Flores, Carbon, La Costa, Las Tunas, Topanga, Big Rock	
Bacteria	Santa Monica Bay Beaches Wet Weather Bacteria TMDL Santa Monica Bay Beaches Dry Weather Bacteria TMDL
PCBs, Pesticides	Santa Monica Bay DDTs and PCBs TMDL

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

Table 4: North Santa Monica Bay Subregion 303(d) listed waters without Approved TMDLs

303(d) Listed Waters and Impairments[1]
Lake Lindero
Chloride Selenium Specific Conductivity
Lake Sherwood
Mercury
Las Virgenes Creek
Benthic-Macroinvertebrate Bioassessments Invasive Species Sedimentation/Siltation Selenium
Lindero Creek
Benthic-Macroinvertebrate Bioassessments Selenium Invasive Species
Malibu Beach
Toxics: DDT
Malibu Creek
Benthic-Macroinvertebrate Bioassessments Invasive Species Selenium Fish Barriers (Fish Passage) Sedimentation/Siltation Sulfates

303(d) Listed Waters and Impairments[1]
Malibu Lagoon Beach (Surfrider)
Benthic Community Effects DDT PCBs
Medea Creek
Benthic-Macroinvertebrate Bioassessments Sedimentation/Siltation Invasive Species Selenium
Topanga Creek
Lead
Triunfo Creek
Lead Mercury Sedimentation/Siltation Benthic-Macroinvertebrate Bioassessments
Westlake Lake
Lead (recommended for delisting)

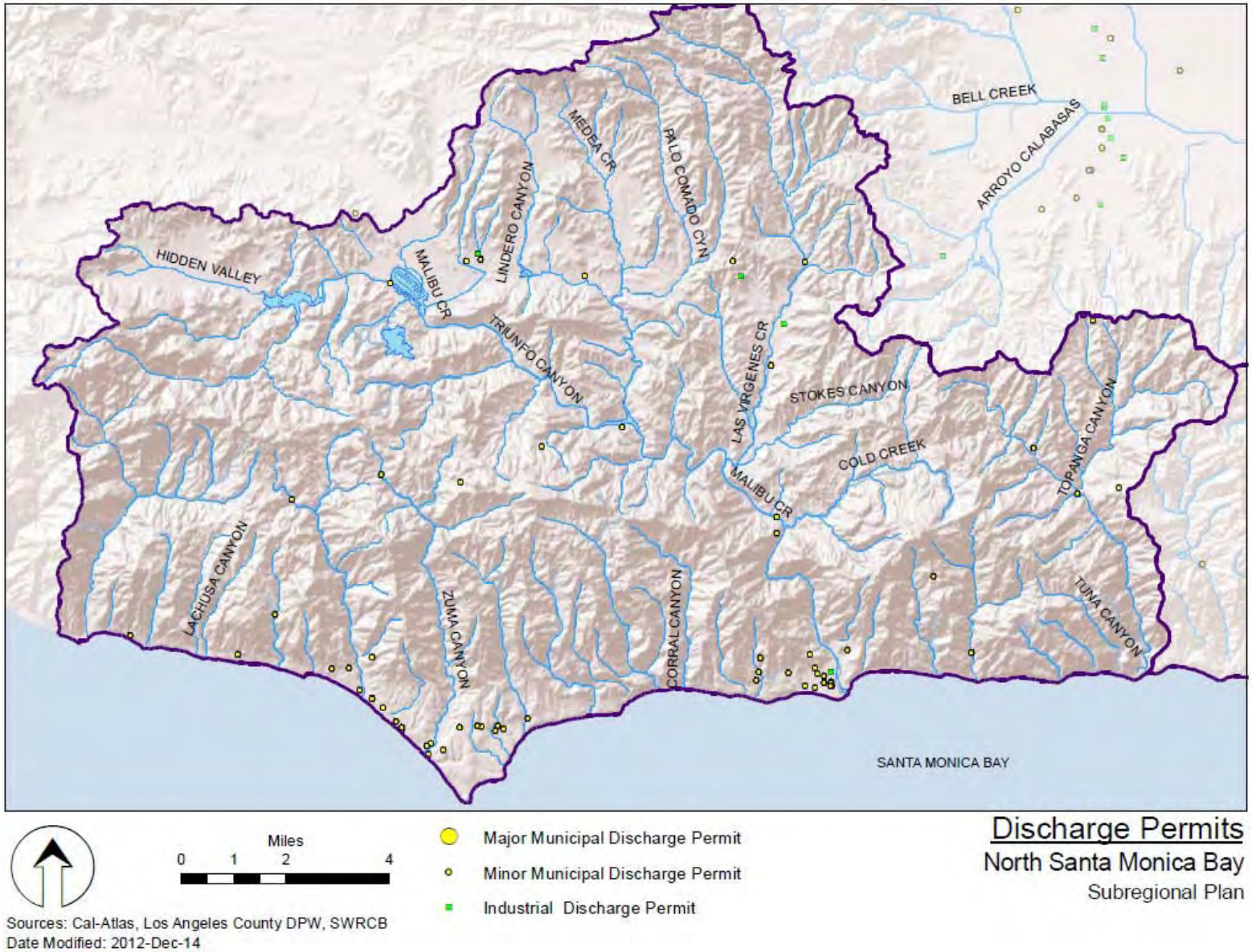
1. According to the US EPA's 2010 Integrated Report (Clean Water Act Section 303(d) List / 305(b) Report

Groundwater Quality

Groundwater quality, like surface water quality, can be affected by both natural sources and human activities. Typically, groundwater quality is defined in terms of drinking water quality standards such as state or federal maximum contaminant levels (MCLs). The Russell Valley, Thousand Oaks Area and Hidden Valley groundwater basins are the only groundwater basins underlying the Subregion. The Russell Valley groundwater basin, which underlies a very small portion of the Subregion, is used by the Las Virgenes MWD for non-potable uses. Quality concerns in this basin include high levels of total dissolved solids (TDS) and sulfate which both exceed drinking water MCLs. As there are no plans to utilize the basin for municipal supply, future water quality conditions are not a significant concern.

The Thousand Oaks Area Basin and Hidden Valley Basin groundwater quality is generally poor with high levels of TDS.

Figure 9: Permitted Discharges as of 2011



Near-Shore Ocean Water Quality

There are several indicators of coastal water quality. One of the most publicized is the annual report by Heal the Bay, in addition to the 303(d) listings and TMDLs discussed previously. The annual report evaluates California beaches from Memorial Day to Labor Day giving them a grade of A to F based on results of tests for bacterial pollution, which are used as indicators of how likely the water is to make swimmers sick. Statewide, 92% of California beaches earned A or B grades over the summer, the same as last year, according to the 2011 report.

Unfortunately, some Southern California beaches did not receive a passing grade including Topanga State Beach which was one of the most polluted beaches scoring the grade of "F". A Source Identification Pilot Program (SIPP) is currently being conducted at this beach by researchers from Stanford University, UCSB, UCLA, U.S. EPA and the Southern California Coastal Water Research Project. Their research will include a source tracking protocol to better identify microbial pollution sources.

Paradise Cove Beach, adjacent to Ramirez Canyon Creek, has historically exhibited high levels of fecal indicator bacteria. Property owners in the area and the City of Malibu have installed a runoff treatment facility, called the Paradise Cove Stormwater Treatment Facility, near the mouth of Ramirez Creek that was completed in July 2010. A monitoring program has been implemented in order to see whether water quality will be improved.

2.7 Environmental Resources

The environmental resources of the North Santa Monica Bay Subregion are unique compared to those of other Subregions with respect to land use, aquatic resources, open space, and recreation. Over 85 percent of the Subregion is still undeveloped open space. The environmental resources include riparian habitat, streams, beaches, ocean waters, rocky intertidal habitats, sand dunes, beach bluffs, mountains, and parklands. The remaining land uses in the area are primarily residential and are concentrated along the coastline and interior valleys. There is very little to no heavy industry.

2.7.1 Wetlands

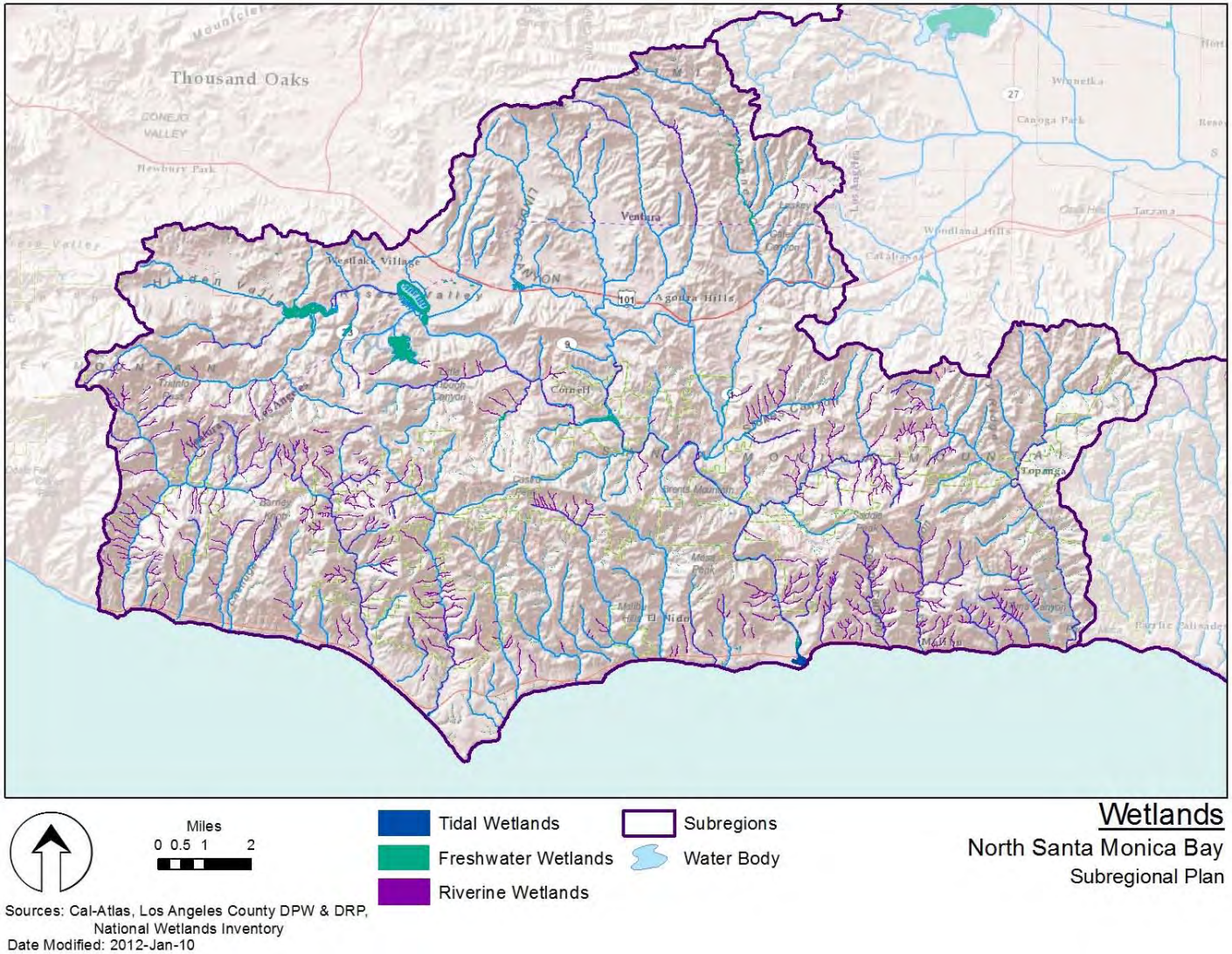
Subregional wetlands include Malibu Lagoon and Topanga Lagoon. Tidal wetlands are characterized by differences in salinity and the tidal cycle. When functioning fully, the wetlands help mitigate flooding, filter and recharge groundwater, and provide feeding and breeding habitat for fish and waterfowl.

Malibu Lagoon

Malibu Lagoon is a large, 40-acre brackish marine wetland at the mouth of Malibu Creek along the edge of Santa Monica Bay. Today, it suffers from poor water quality, lack of shallow water habitat, disruption of upstream flow, introduction of non-native plants and animals, and debris and bacteria from urban runoff. To restore the wetland, the Malibu Lagoon Restoration and Enhancement Project is underway. Phase 1 has been completed which involved the removal and relocating of an existing parking lot for a net gain of two acres of habitat and a new parking lot with stormwater capture and treatment features.

Phase 2 was stalled in 2011 by a lawsuit but is scheduled to commence in June of 2012. Phase 2 will lower the elevation of the lagoon and create a single meandering channel with a series of secondary tributary channels. A series of interpretive and access features will also be constructed to educate visitors and students about how tidal lagoons function and the plants and animals that occupy lagoons. The new design elements are expected to greatly improve circulation, dissolved oxygen levels, species diversity and richness, and educational and visitor serving opportunities such as bird watching and surfing. (RWQCB, 2011)

Figure 10: Wetlands of the NSMB Subregion



Topanga Lagoon

Historically, Topanga Lagoon covered more than 30 acres. In 1934, Pacific Coast Highway (PCH) was realigned inland, placing over 800,000 cubic feet of fill material directly into the lagoon, reducing its surface area by 94% to its present day size of less than 2 acres.

Water quality in the lagoon is impaired due to elevated bacteria (total coliform, fecal coliform, E.coli) levels. Although yet to be identified, there are several potential sources for high bacteria counts including poorly maintained septic systems (all 4,500 homes and commercial buildings in the watershed are on septic systems), graywater systems, and corralled animals. The lagoon is further threatened by the presence of invasive exotic vegetation including Arundo donax, Castor bean, German ivy, Morning glory, and Pampas grass which have all become well established, crowding out native Cattails and Willows. Planning is underway to develop a strategy for treating water quality problems and restoring the lagoon. (RCDSMM, 2011)

2.7.2 Riparian Habitat

Riparian habitat is typically a corridor of variable width that occurs along perennial, intermittent, and ephemeral streams and rivers. The Santa Monica Mountains are home to a rich and diverse riparian habitat that includes several significant plant communities, as well as a variety of wildlife species. The Los Angeles County General Plan and other planning efforts seek to preserve riparian woodlands, Sycamore-alder riparian woodlands, southern and valley oak woodlands and California walnut woodlands in addition to animal habitat linkages and wildlife corridors.

Buffer zones have been established adjacent to areas of important preserved biological resources, including natural streams and drainages. These zones protect biological resources from grading and construction activities, artificial lighting, and increased erosion and runoff. New landscaping adjacent to preserved biological resources cannot include invasive, non-indigenous species that would negatively impact the preserved resource. The following is a discussion of habitats in some of the major water bodies within the Subregion.

Malibu Creek

Malibu Creek drains the southern slopes of the Simi Hills and slopes of the Santa Monica Mountains to flow through the Conejo Valley, and enters the Santa Monica Bay in Malibu. The Malibu Creek watershed drains 109 square miles and reaches as high as 3,000 feet in Ventura County. Approximately 80% of the land in the Malibu Creek watershed is undeveloped. Major tributaries include Triunfo, Medea and Las Virgenes Creeks. Malibu Creek’s main stem begins at the confluence of Triunfo Creek (below Westlake Village) and Medea Creek, which was dammed to create Malibou Lake, and flows 13.4 miles though Malibu Canyon to Malibu Lagoon. Further downstream, the creek drops 100 feet over Rindge Dam as it descends to Malibu Lagoon.

Whether Malibu Creek is perennial or intermittent is an important regulatory distinction. California benthic macroinvertebrate bioassessment measures apply to perennial streams, but not to intermittent streams or streams that dry up to leave isolated pools in the dry season. Many reaches of Malibu Creek and tributaries do not flow year round.

Topanga Creek

Topanga Creek is located in the Topanga Creek Watershed which is Santa Monica Bay's third largest watershed covering approximately 18 square miles, 75% of which is undeveloped. Although it is one of the least altered and most biologically diverse drainages in Santa Monica Bay, its resources suffer from impacts of human activities. Of special concern are the degraded lagoon and several stretches of stream bank in the lower watershed.

In the upper Topanga Creek, the issue of greatest concern is habitat degradation due to road maintenance practices along Topanga Canyon Road. Over the years, Caltrans has replaced extensive sections of stream bank with grouted riprap, concrete, and boulders as emergency flood repairs following storm damage to Topanga Canyon Road. Due to the emergency nature of these repairs, most are poorly engineered and require extensive maintenance. Many of these repairs have filled and constrained the stream channel, inducing landslides, increasing sedimentation, and impeding fish migration, including that of the endangered Steelhead trout. The upper Topanga Creek is also listed on the State 303d list of impaired water bodies. In support of restoration of the creek and lagoon, the SMBRP and other agencies have conducted a comprehensive Topanga Creek Watershed and Lagoon Restoration Feasibility Study to identify ways to restore the watershed's resources.

Malibou Lake

Malibou Lake is a small, artificial lake about 41.5 acres in size in the Santa Monica Mountains located between the beaches of Malibu and the Conejo Valley of Ventura and Los Angeles Counties. It was created in 1922-23 with the completion of a bridge dam at the confluence of the Medea and Triunfo creeks. The lake did not actually fill until 1926. This private lake in Malibu Creek State Park is adjacent to Malibu Creek State Park and Paramount Ranch (part of the Santa Monica Mountains National Recreation Area). The rustic, private community surrounding the lake consists of approximately 300 acres and 137 residences. (LakeMalibou.com, 2012)

2.7.3 Santa Monica Mountains

The Santa Monica Mountains, within the geomorphic province of the Tranverse Ranges, extend approximately 40 miles east-west from the Hollywood Hills in Los Angeles to Point Mugu in Ventura County. The highest point in the mountains is Sandstone Peak at 3,100 feet.

Most of the area is within the Santa Monica Mountains National Recreation Area (SMMNRA). Preservation of lands within the mountains are managed by the Santa Monica Mountains Conservancy, the National Park Service, the California State Parks, and County and municipal agencies. There are over twenty individual state and municipal parks are in the Santa Monica Mountains. Those in the Subregion include Malibu Creek State Park, Cold Creek Preserve, and Topanga State Park, as well as National Park Service lands in Cheeseboro, Palo Comado, Zuma/Trancas and Solstice Canyons, and Paramount and Peter Strauss Ranches. (NPS, 2012)

The California Coastal Commission has found the Santa Monica Mountains ecosystem to be the largest, most pristine, physically complex, and biologically diverse example of a Mediterranean ecosystem in coastal Southern California. As a result of the large, interconnected blocks of habitat, the ecosystem supports an extremely diverse community of flora and fauna.

The Santa Monica Mountains have the greatest ecological diversity of all major mountain ranges within the Transverse Ranges province. According to the National Park Service, the Santa Monica Mountains contain 40 separate watersheds and over 170 major streams with 49 coastal outlets (National Park Service.2000, Draft general management plan and environmental impact statement, Santa Monica Mountains National Recreation Area, California). The many different types of habitats support at least 17 native vegetation types. The main generic plant communities are coastal sage scrub, chaparral, riparian woodland, coast live oak woodland, and grasslands. Over 400 species of birds, 35 species of reptiles and amphibians, and more than 40 species of mammals have been identified in this diverse ecosystem. More than 80 sensitive species of plants and animals are listed or proposed for listing within this ecosystem. The 150,000 acres in the SMMNRA is estimated to be 90 percent free from development (National Park Service, 2000).

2.7.4 City of Malibu

The City extends 27 miles along the coast but extends only one mile inland on average. It forms a long and significant connecting link between the coast and the large, undisturbed habitat areas of the Santa Monica Mountains. The city itself contains substantial areas of undeveloped native habitat. Most development has occurred in the general vicinity of Point Dume and in those areas closest to the ocean, including several canyons (e.g. Las Flores, Malibu Creek, Ramirez, and Trancas). The most widespread vegetation type within the city is coastal sage scrub. Moving inland, the biodiversity increases to include chaparral as the primary vegetation type.

There are a large number of watersheds in Malibu with over 30 streams discharging into the ocean. The riparian corridors along many of these streams connect the habitats within the city to the large inland watersheds, which are of particular significance to endangered steelhead trout. (Dixon, 2003)

2.7.5 Significant Ecological Areas and Environmentally Sensitive Habitat Areas

Significant Ecological Areas (SEAs) are ecologically important areas that are designated by the County of Los Angeles as having valuable plant or animal communities. Any development proposals located within a SEA and outside incorporated city boundaries are reviewed by the Significant Ecological Area Technical Advisory Committee (SEATAC) which recommends changes to a project and mitigation measures to protect the habitat. Similar to the SEAs are Environmentally Sensitive Habitat Areas (ESHAs), which are designated by the Coastal Commission via local coastal programs. ESHAs include Ramirez Canyon Park, Escondido Canyon Park, Solstice Canyon Park and Corral Canyon Park with associated streams that reach to the Pacific Ocean.

There are eight SEAs in the Subregion including a portion of Zuma Canyon, Upper La Sierra Canyon, Las Virgenes, Palo Comando Canyon, Cold Creek Canyon, Hepatic Gulch, a portion of Malibu Canyon and Lagoon, Malibu Coastline, Malibu Creek State Park Buffer Area, Point Dume, and Tuna Canyon (Figure 11). (LACDRP, 2011)

2.7.6 Areas of Special Biological Significance

In the mid-1970s, to protect sensitive coastal habitats, the SWRCB designated 34 areas on the coast of California as Areas of Special Biological Significance (ASBS), including the area between Mugu Lagoon in Ventura County and Latigo Point in Los Angeles County (Figure 12). There have been prohibitions to stormwater runoff in the last few years in support of these areas. (SWRCB, 2005)

Figure 11: Significant Ecological Areas of the NSMB Subregion

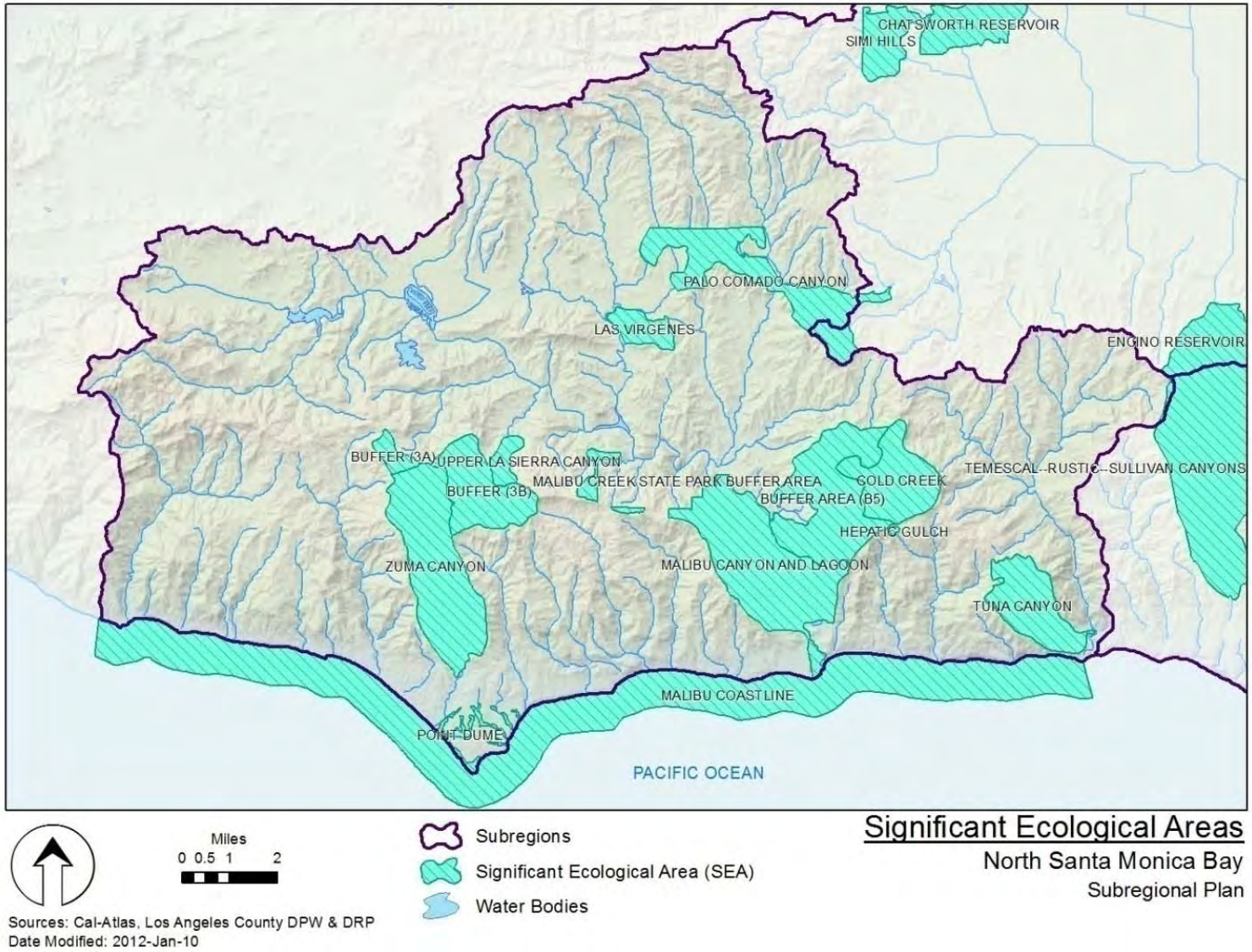
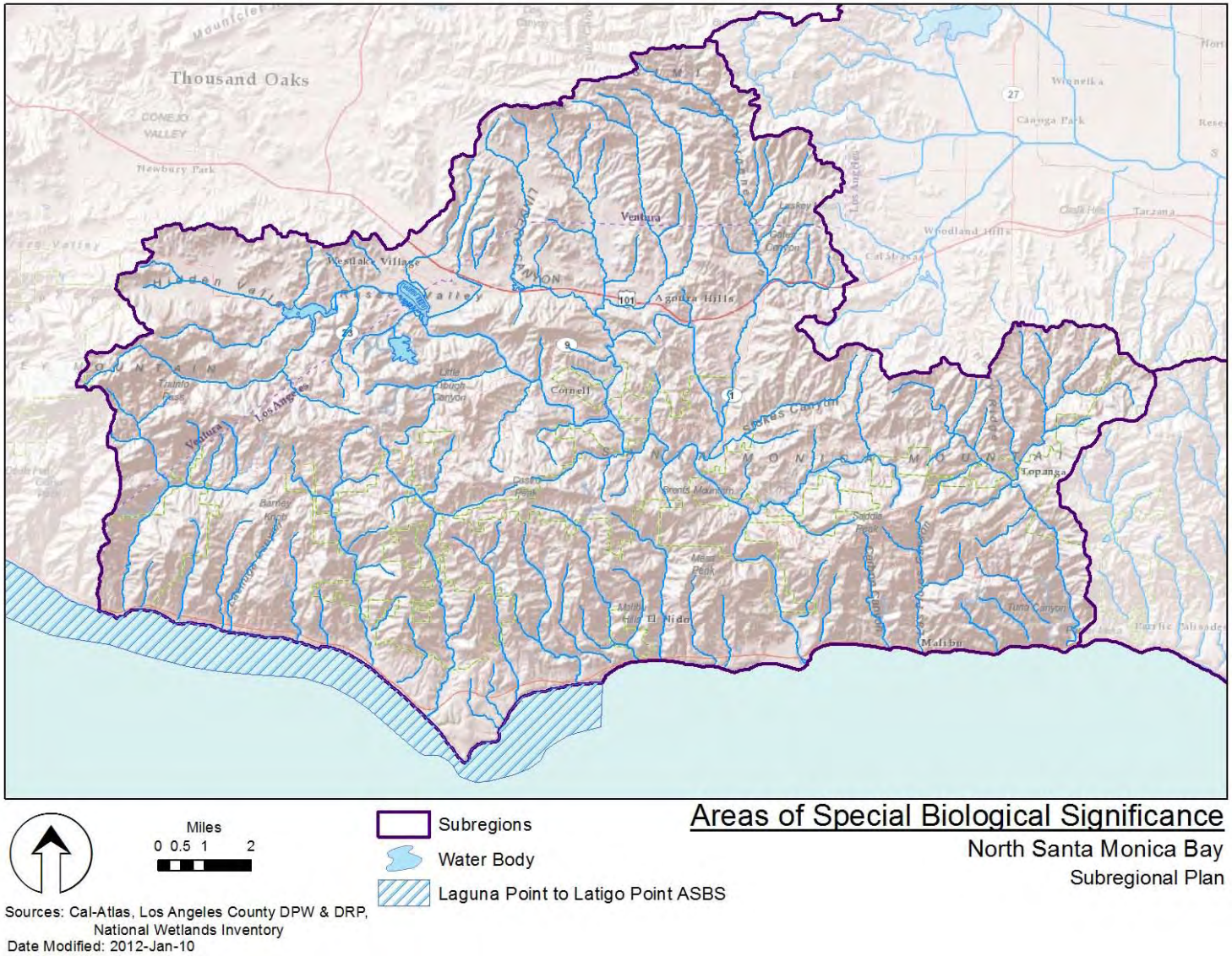


Figure 12: Areas of Special Biological Significance



2.7.7 Marine Habitat

The marine environment of Santa Monica Bay includes a variety of habitats which provide food and shelter for thousands of species of marine life. Multiple non-profits and various programs are underway to protect and sustain marine ecosystems and biodiversity.

Heal the Bay

Heal the Bay is a major non-profit organization whose mission is to protect Santa Monica Bay's beaches and ocean, and in particular the water quality of the coastal area. To do this, Heal the Bay supports efforts to preserve and protect coastal watersheds, as well as conduct public outreach programs.

Santa Monica Bay Restoration Commission's Marine Program

The Santa Monica Bay Restoration Commission (SMBRC) Marine Program works to conserve and rehabilitate natural resources in the marine environment and improve the beneficial uses of the Bay. To do this, the Marine Program assesses the status of marine habitats in the Bay, restores degraded habitats, monitors the recovery of restored habitats, and participates in the development of policies that protect marine resources.

The highly contentious Marine Life Protection Act (MLPA) process that the State carried out in Southern California was a major focus for Marine Program over the last two years. The MLPA, signed into law in 1999, directed the state to redesign California's system of Marine Protected Areas (MPAs) to increase the effectiveness of protecting and sustaining the state's marine ecosystems. The SMBRC recently initiated work with local commercial fishermen to transition their fisheries from high-volume, low-value fisheries to higher-value, lower-volume fisheries. More information on the MPAs and the Subregion is below in the "Marine Protected Areas" section.

The Santa Monica Baykeeper has partnered with the SMBRC to establish the Kelp Restoration and Monitoring Project. It is a community-based effort to restore kelp in areas that have been denuded by intensive sea urchin grazing. Restoration work at Escondido Beach in Malibu was initiated in 2000 and completed in 2004.

Marine Protected Areas

The California Fish and Game Commission adopted regulations in December of 2010 to create MPAs in Southern California. The South Coast network was formally expanded as of January 1, 2012. The network includes Point Dume State Marine Conservation Area and the Point Dume State Marine Reserve located off Zuma Beach. This action is the culmination of two years of intense negotiation, on the heels of nearly ten years of political wrangling to get the MLPA planning process underway.

The MPAs are named, discrete geographic marine or estuarine areas designated to protect or conserve marine life and habitat. The South Coast network includes 37 new or modified (MPAs) and two special closures that allow limited recreation and commercial take. The MLPA, signed into law in 1999, directed the state to redesign California's system of MPAs to increase the effectiveness of protecting and sustaining the state's marine ecosystems. The State will monitor and adaptively manage the MPA network. A monitoring program will gather data on kelp forests, rocky intertidal habitats, sandy beaches, subtidal sandy habitats, pelagic systems, and the human activities that take place in these areas.

The Point Dume State Marine Conservation Area (SMCA) was established in 2010 stretches along the coast from Point Dume to El Matador. The SMCA designation prohibits recreational and commercial take. The recent South Coast network expansion specifically allows the following exceptions: the recreational take of pelagic finfish including Pacific bonito, and white seabass by spear fishing, the commercial take of coastal pelagic species by round haul net and swordfish by harpoon, and take pursuant to beach nourishment and other sediment management activities.

The Point Dume State Marine Reserve (SMR) is located south of the Point Dume SMCA and was established in 2010, and stretches Point Dume to Paradise Cove. In this SMR, the recreational or commercial take of all living marine resources is prohibited. There are 11 preexisting SMRs around the northern Channel Islands located due west of the Subregion.

2.7.8 Ecological Processes

The Santa Monica Mountains comprise a large and complex Mediterranean ecosystem of coastal sage scrub, chaparral, oak woodlands, and associated riparian areas. Connecting habitats within this ecosystem has been a top conservation priority. Integrity and connectivity is evidenced, albeit limited, by the presence of the mountain lion, cougar, bobcat, gray fox, badger, mule deer, and Steelhead trout.

Fire

The Santa Monica Mountains are a fire-fed ecosystem in which fires naturally occur. 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 Santa Monica Mountains vulnerable to wildland fire disasters. Fires in the last two decades have included the Old Topanga (16,562 acres burned in 1993), Calabasas (12,502 acres burned in 1996), and other Malibu fires in 1996, 2003, and 2007. Development in the Santa Monica 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.

Fire frequency has increased due to human ignition with increasing populations and expanded human activity. In some areas, fire frequency has exceeded beyond the ability of native vegetation to successfully recover, threatening the long-term persistence of native shrub lands. 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. (NPS, 2007)

Invasive Species

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

In addition, there are a number of invasive and non-native aquatic species in the Subregion. The New Zealand mud snail (Potamopyrcus antipodarum) is one example of a species which has infested the watersheds of the area. Another example is the crayfish (Procambarus clarkia) which has invaded creeks and streams.

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 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

Unlike other Subregions, the North Santa Monica Bay Subregion has no area-wide flood control system of concrete channels that carries off storm runoff and debris. Natural drainage patterns lead to high water

levels during storm events. Exposure to flood hazards are minimized by slope modifications, setbacks, on-site water retention and percolation, and runoff controls. Potential flood hazards are generally limited to canyon and valley bottoms. There are existing storm drains and flood control facilities throughout the Subregion that generally have sufficient capacity to adequately protect the area.

2.7.9 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 are 7,630 acres of designated critical habitat defined for the Brauton's milk-vetch, California red-legged frog, and Lyon's pentachaeta, as shown in Figure 14. Not shown in Figure 14 are watersheds that have been designated critical habitat for the southern steelhead trout: Arroyo Sequit, Malibu Creek, Las Flores Canyon, and Topanga Canyon watersheds (NOAA, 2012).

2.8 Open Space and Recreation

A wide range of open space areas and recreation opportunities exist in the Subregion. Open space and recreation lands may include developed urban park and recreation areas, riparian/upland/wetland areas, beaches/estuaries, national forest lands, greenways, and a number of miscellaneous lands. A majority of these lands fall under the open space category as there are national, state and municipal parks. A map of open space and recreation areas is shown in Figure 13. However, only approximately 50 percent of land within the Santa Monica Mountains National Recreation Area is currently protected through ownership by federal, state and local park agencies. In addition, coastal areas provide the benefit of beaches and habitat, as discussed previously.

2.9 Land Use

The North Santa Monica Bay Subregion is characterized by a balance between natural and man-made environments. A majority land use is other open space (conservancy lands, nature preserves, undeveloped lands, wildlife habitats, water bodies, and mountain lands).

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 North Santa Monica Bay Subregion is depicted Table 5, and shown in Figure 15.

Table 5: Land Use in the North Santa Monica Bay Subregion

Land Use Type	Acres	Percentage
Vacant	194,070	89%
Residential	14,363	7%
Commercial	1,941	1%
Industrial	237	<1%
Transportation, Utilities	1,146	1%
Open Space / Recreation	2,072	1%
Agriculture	2,017	1%
Mixed Urban	438	<1%
Water	476	<1%
No Data	951	<1%
Total	**217,710**	**100%**

Figure 13: Parks and Protected Open Space Areas

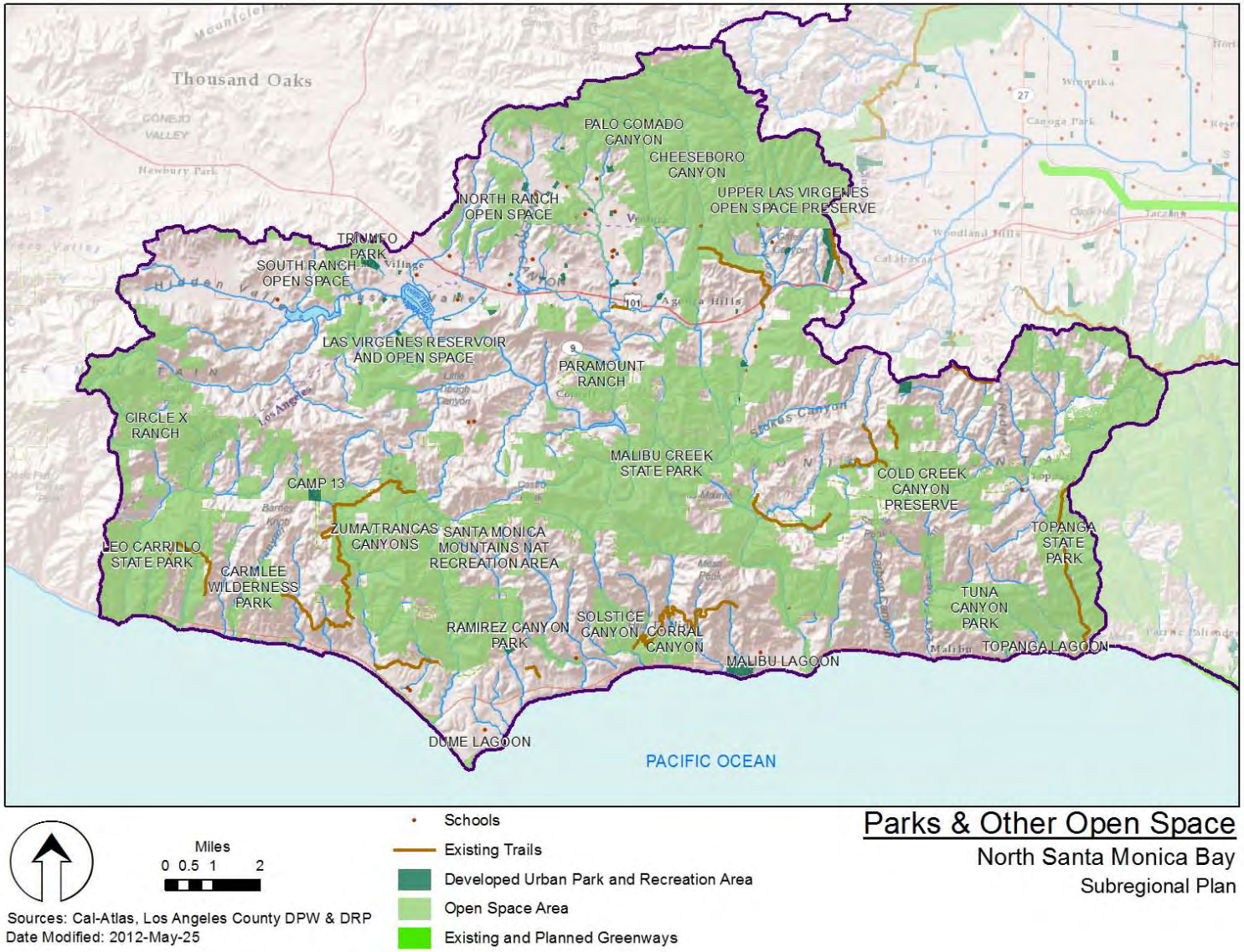


Figure 14: Critical Habitat

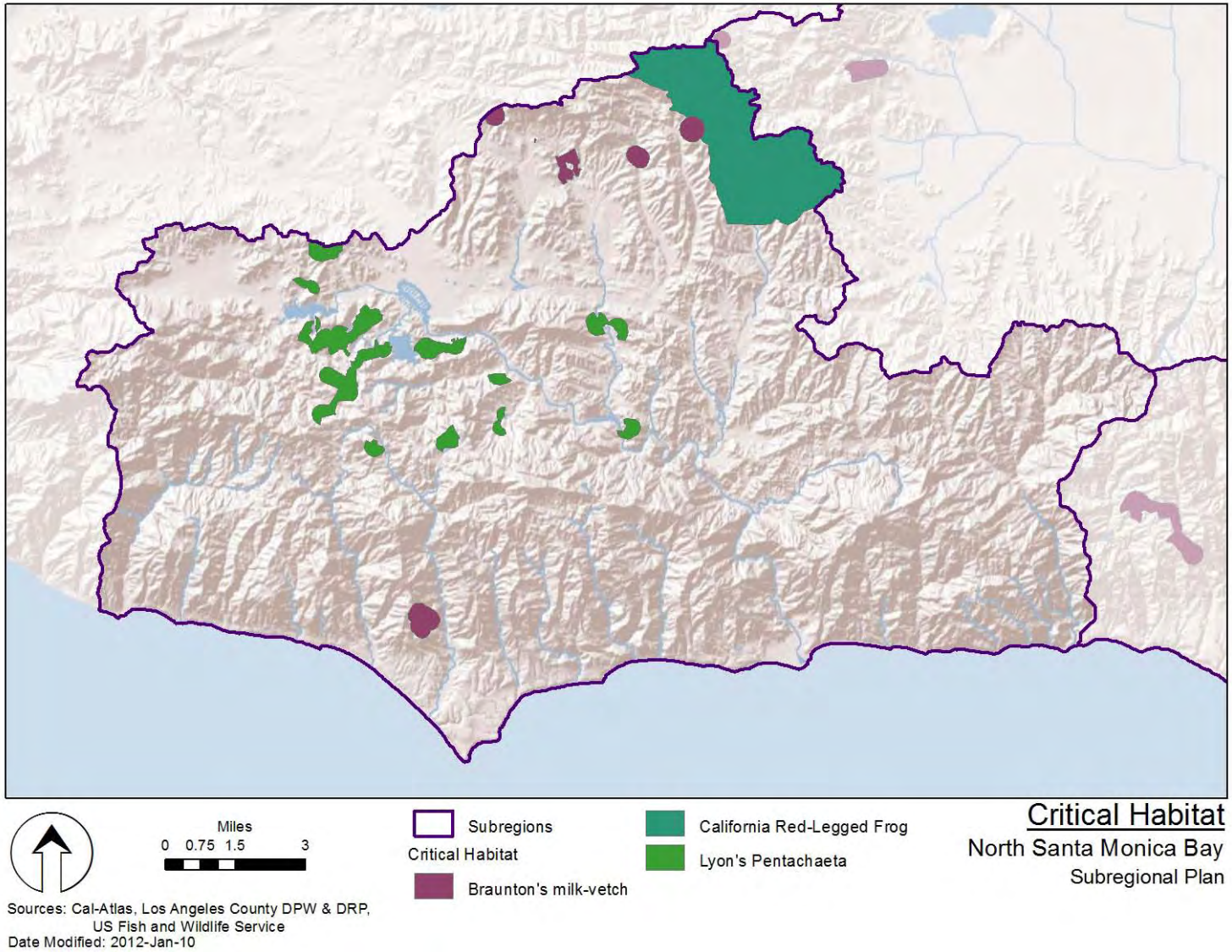
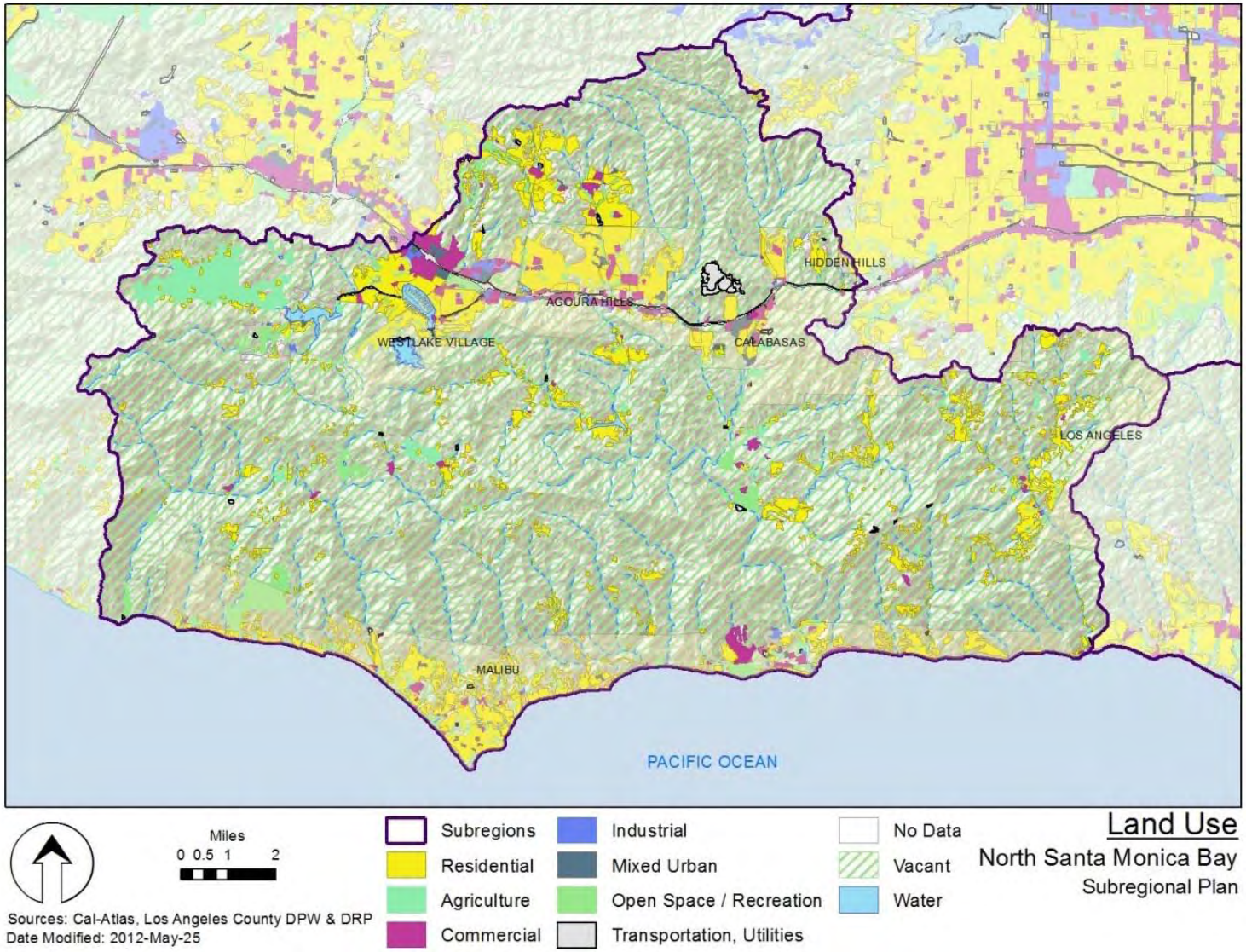


Figure 15: Land Use



3 Subregional Objectives and Targets

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

3.1 Objective and Target Development

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

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

3.2 Water Supply Objective and Targets

Optimizing local water supply resources is vital for the Subregion to reduce its reliance on imported water and improve reliability of local water supplies should imported water supplies be reduced or interrupted due to environmental and/or political reasons. The Subregion plans on achieving this objective by conserving water through water use efficiency measures, increasing the non-potable reuse of recycled water, and increasing the capture and use of stormwater. In total, water supply targets will yield an additional 11,000 AFY of local supply for direct use.

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

3.3 Water Quality Objective and Targets

Improving the quality of urban and stormwater runoff will reduce or eliminate impairment of rivers, beaches, and other water bodies within and downstream of the Subregion. Additionally, the Subregion will continue to 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 4,200 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 2,760 acres of local unmet drainage needs, and removing 0.23 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 6: 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 6,000 AFY of water by 2035 through water use efficiency and conservation measures.
	Ground Water	No target to increase groundwater pumping.
	Recycled Water	No target to increase indirect potable reuse of recycled water. Increase non-potable reuse of recycled water by 4,000 AFY.
	Ocean Desalination	No target to increase ocean desalination.
	Stormwater	Increase capture and use of stormwater runoff by 1,000 AFY that is currently lost to the ocean. No target to increase stormwater infiltration.
Improve Water Quality		
Improve water quality of receiving water through enhanced stormwater capture.	Runoff (Wet Weather Flows)	Develop[1] 4,200 AF of new stormwater capture capacity (or equivalent) spatially dispersed to reduce region-wide pollutant loads, emphasizing higher priority areas[2].
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 2,760 acres of flood prone areas by either increasing protection or decreasing needs using integrated flood management approaches. Remove 0.23 million cubic yards of sediment from debris basins and reservoirs.

[1] 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).

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

4 Partnership and Multi-benefit Opportunities

Implementation of projects is the vehicle to attaining the objectives and planning targets discussed in Section 3. Integration and collaboration can help these projects achieve synergies and, 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 stormwater capture projects are often too costly for a water supply agency to construct on their own for water supply purposes only. The near-term unit cost can be well in excess of the cost of imported water. However, partnerships often help to share the costs, thus providing opportunities for more complex, multi-benefit projects (such as water quality improvement) that otherwise might not be accomplished.
- **Improving Stormwater Quality:** In preparing this update of the IRWM Plan, a methodology to identify priority drainage areas based on their ability to improve water quality for the coastal and terrestrial waters was developed. Integrated projects that can provide water quality improvements can be cited relative to that prioritization to achieve the highest benefits.
- **Integrated Flood Management:** Earlier studies, such as the Sun Valley Watershed Management Plan (2004), demonstrated the potential for similar cost-effective synergies between flood control, stormwater quality management, water supply, parks creation and habitat opportunities. Flood control benefits usually achieved through significant traditional construction projects can sometimes be accomplished with alternative multi-benefit projects.
- **Open Space for Habitat and Recreation:** When habitat is targeted for restoration, there are often opportunities for cost-effective implementation of flood control, stormwater management and passive recreation (such as walking and biking trails) as well.

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

4.1 GLAC IRWMP Integration Process and Tools

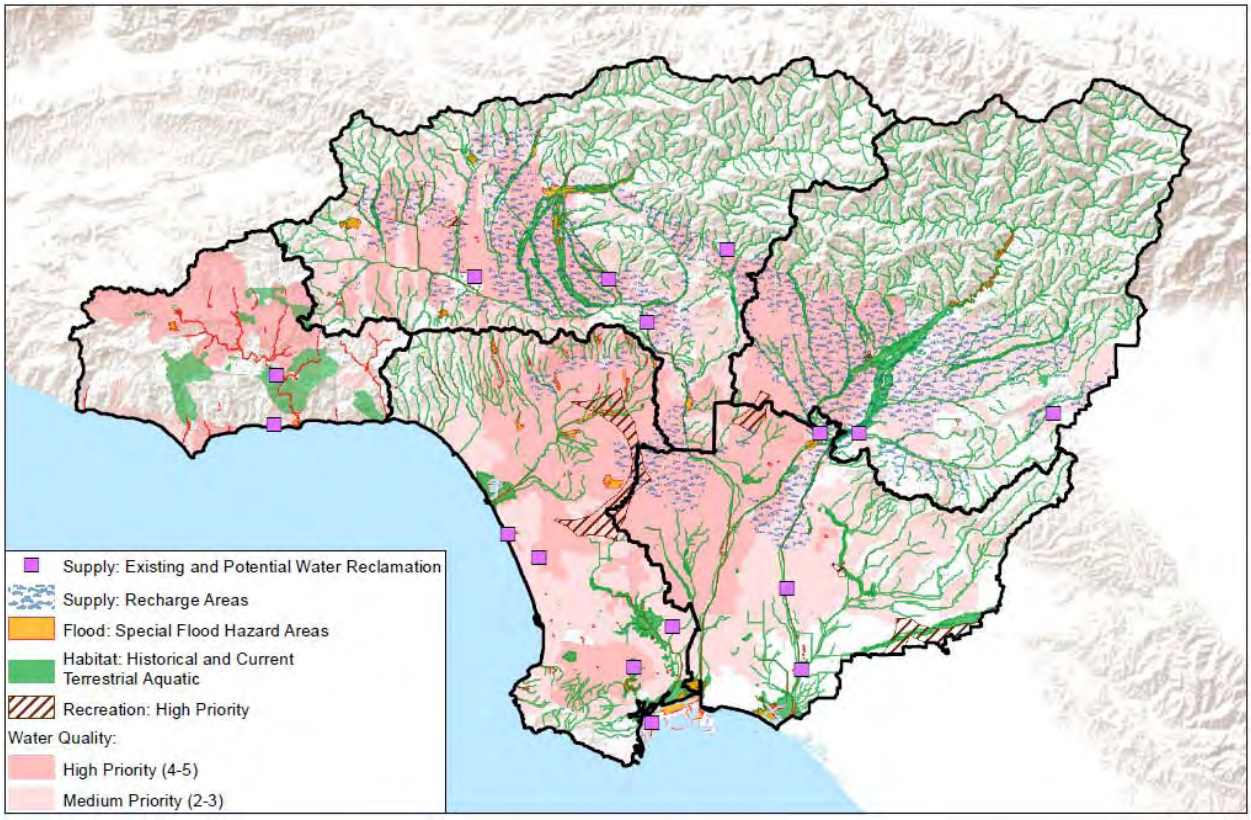
As part of the objectives and targets update process, the GLAC Region compiled and developed several geo-referenced data layers to assist in spatially identifying priorities and potential opportunities to achieve water supply, water quality, habitat, recreation and flood management benefits. These data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

Potential Benefits Geodatabase

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

provide an analysis of potential integration and partnership opportunities for the 2013 GLAC IRWM Plan, current data layers were overlaid and analyzed. The key layers used are shown in Figure 16 and described in Table 7. 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 Geodatabase 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 16: 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 7: Potential Benefit Geodatabase Layers

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

[1] Created using Los Angeles County's groundwater basins shapefile overlaid with soils and known forebays shapefiles
[2] Created by RMC Water and Environment for the Los Angeles Department of Water and Power's Recycled Water Master Planning program to show sources of wastewater that could be made available for recycled water use.
[3] Created by Federal Emergency Management Agency to define areas at high risk for flooding (subject to inundation by the 1% annual chance flood event) and where national floodplain management regulations must be enforced
[4] From *Regional restoration goals for wetland resources in the Greater Los Angeles Drainage Area: A landscape-level comparison of recent historic and current conditions using GIS* (C. Rairdan, 1998) and additional current terrestrial aquatic habitat is based on the extent of current habitat derived from the National Wetlands Inventory.
[5] Significant Ecological Areas are those areas defined by Los Angeles County as having ecologically important land and water systems that support valuable habitat for plants and animals.
[6] Created for the *GLAC IRWM Open Space for Habitat and Recreation Plan (2012)*, and shows where there is less than one acre of park or recreation area per one thousand residents.
[7] Created for the *GLAC IRWM Surface Water Quality Targets TM (2012)*, which ranked catchments based on TMDLs, 303(d) listings and catchments that drain into Areas of Special Biological Significance (ASBS).

4.1 Integration Opportunities in North Santa Monica Bay

Based upon Figure 17, the North Santa Monica Bay Subregion is notable relative to other subregions in a few ways:

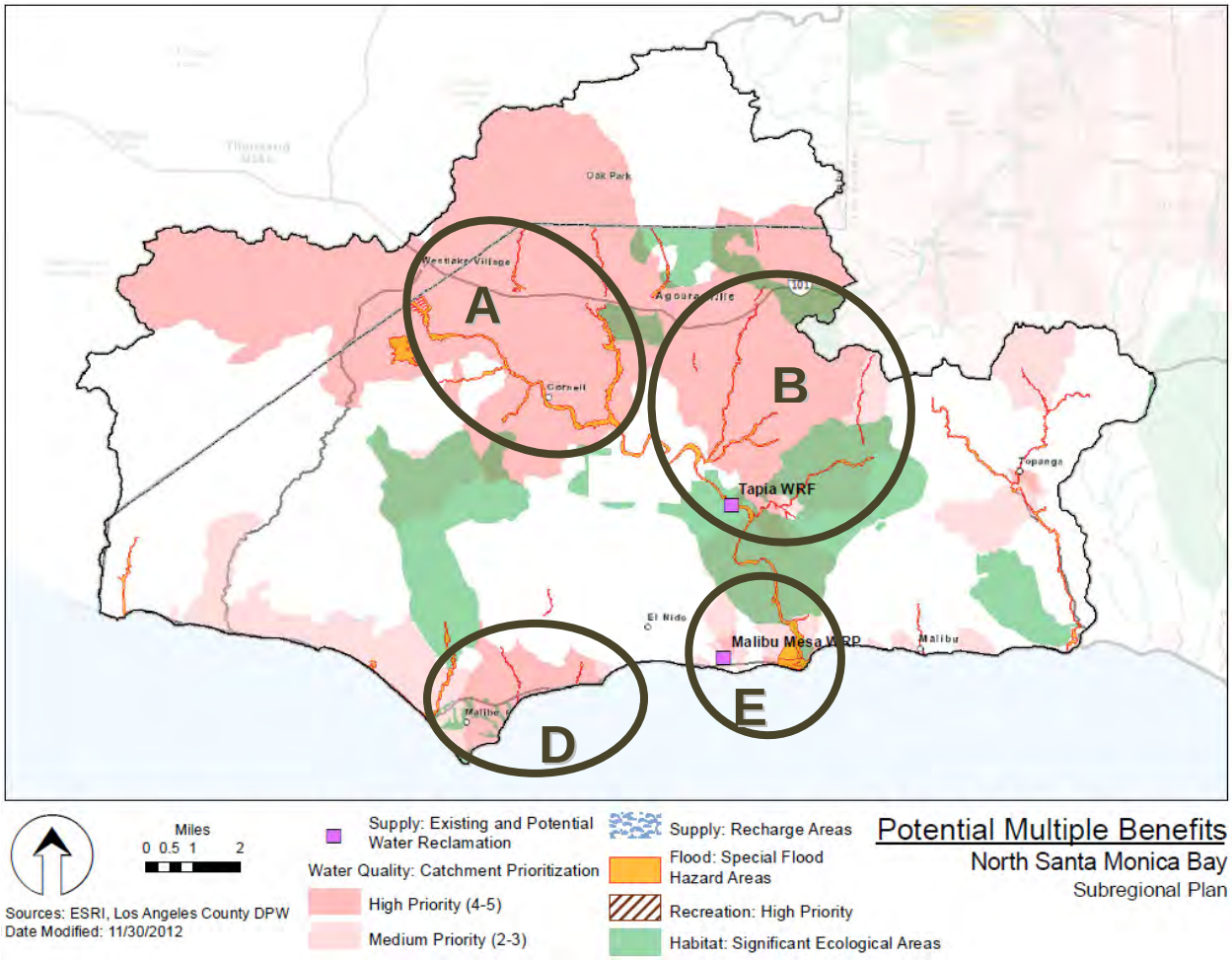
- There is the least need for recreation and open space.
- There are urbanized upstream areas with stormwater quality and potential flood impacts on downstream urban areas and sensitive offshore habitat areas.

- There are less concrete streambeds than other subregions and the potential to more easily return channelized streambeds to natural streambeds and habitat areas.

What is not seen in the map, but is true of the North Santa Monica Bay Subregion, is that relative to other subregions, the North Santa Monica Bay is heavily dependent upon imported water supplies given limited groundwater recharge potential. Therefore local supply development anywhere within the Subregion would be considered to provide great benefits.

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

Figure 17: GLAC Region Potential Benefits Geodatabase Layers



A: West Lake Village an Agoura Hills Integrated Flood Management and Water Quality

This area is a priority area for water quality issues as well as flood issues. Additionally, capturing stormwater for onsite use has the potential to reduce reliance on imported water supplies. There could also be opportunities to return channelized streams to more natural systems with habitat restoration as an added benefit. Projects could provide multiple benefits when coupled with water quality improvement components and flood management. Removal of non-native species in the upper watershed is also an opportunity for this area.

There is the potential for partnerships between LACFCD, Santa Monica Mountains Conservancy, State Parks, and the cities of Westlake Village and Agoura Hills.

B. City of Calabasas Supply, Water Quality and Flood Management

The City of Calabasas is on the border between the Upper Los Angeles River Watershed and the North Santa Monica Bay Subregion, and therefore provides an opportunity for collaboration between these two subregions. This area is also a priority area for water quality improvements and integrated flood management that could further enhance habitat benefits for the Region by returning channelized streams to more natural systems. The proximity to a reclaimed water source could also incorporate a water supply benefit into projects developed in this area. Partnerships between the City of Calabasas, LACFCD and local watershed groups could generate the multiple benefit projects.

D. Point Dume and South East Coastal Watershed Protection of ASBS

This coastal area is adjacent to an offshore significant habitat area and designated area of special biological significance (ASBS), and has special need for water quality best management practices (BMPs) to protect the ASBS. This area is also provides good opportunities for habitat restoration and partnerships between the City of Malibu and LACFCD.

E. Malibu Creek Habitat and Water Quality and Supply

This coastal area near and including Malibu Lagoon has great potential for habitat restoration, water quality protection and flood protection. Encouraging above ground collection of rain water in nearby residential and retail communities can also help reduce dependence on imported water while removing some potential for flooding and stormwater quality impacts. Partnerships between the City of Malibu, the Santa Monica Bay Restoration Commission, and LACFCD could result in integrated projects for the Subregion.

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Appendix A - Regional Imported Water Information

State Water Project

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

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

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