CHAPTER 3: EXISTING CONDITIONS IN THE WATERSHEDS

San Diego River System

The San Diego River System is comprised of Murray Reservoir, San Vicente Reservoir, El Capitan Reservoir, Sutherland Reservoir and their respective watersheds. The effective volumes of these reservoirs comprise over half of the emergency water storage requirement for the City of San Diego. The reservoirs and associated facilities are owned and operated by the City of San Diego. The Alvarado Water Treatment Plant, located adjacent to Murray Reservoir, serves as a terminus for this system (Figure 2-3.1).

The management of the water supply system typically attempts to restrict the purchase of imported water and regulates the reservoir levels to maximize the use of local water. Under all conditions, an emergency supply is maintained in the reservoirs, should a failure occur to the imported water supply system.

All of the facilities associated with the conveyance of water from the San Diego River System to the public are mainly natural watercourses which lie in the rural and remote portions of the watershed. These natural conveyances are not likely to fail due to age and deterioration. Some problems may be encountered in the pumping process between the reservoirs and the Alvarado Water Treatment Plant. Since the pumping process is localized, any problems which may occur can be prevented through regular maintenance.

Murray Watershed

Water Sources -

Murray Reservoir is important to the region for its supply from the SDCWA Aqueduct System carrying Colorado River and State Project water to the San Diego area. The primary function of the reservoir is to store imported water and act as the terminal storage reservoir for the water transferred from San Vicente, El Capitan, and Sutherland Reservoirs via the El Monte Pipeline. The Reservoir is surrounded by a "first-flush bypass system" which diverts local runoff from the reservoir except for during large storm events. The reservoir and associated facilities are owned and operated by the City of San Diego.

Raw Water Reservoirs -

Murray Reservoir has the smallest capacity of all the reservoirs in the City system. Murray Dam is a multiple arch, reinforced concrete structure, with a 42-foot-wide un-gated ogee crest spillway. The spillway capacity is 2,025 cubic feet per second (cfs). The dam crest has a length of 870 feet and stands roughly 112 feet above the streambed. The reservoir has a storage capacity of 4,818 acre-feet and a surface area of 172 acres at spillway crest at 536 feet MSL.

Raw Water Intake and Conveyance Facilities -

The reservoir outlet consists of an independent wet tower with eight 30-inch saucer valves for selective level draft control. Water is released from the tower through a 48-inch outlet pipe located at the base of the dam. The water through this outlet pipe is pumped to a bypass structure to the treatment facility. The pipeline has a maximum draft rate of 90 cfs (58 mgd).

Treated Water Facilities -

All treatment facilities and treated water facilities for Murray Reservoir occur at and beyond the Alvarado Water Treatment Plant. The plant is located adjacent to Murray Reservoir and serves the Central area of the City. The Plant treats imported water and local runoff from the San Diego River system. The Alvarado Water Treatment Plant currently has 120 mgd capacity is of conventional design with flocculation, filtration, and disinfection (chloramines). The plant is operated in compliance with California's Chapter 17: Surface Water Filtration and Disinfection Treatment Regulations. Alvarado Water

Treatment Plant is currently undergoing the Phase Two expansion project scheduled for completion in 2006. This project will increase the capacity of the plant to 200 mgd.

San Vicente Watershed

Water Sources -

San Vicente Reservoir is important to the region for its supply from the SDCWA Aqueduct System carrying Colorado River and State Project water to the San Diego area. The primary function of the reservoir is to store imported water, local runoff water from the surrounding 74.5-square-mile watershed, and water transferred from Sutherland Reservoir located in the Hodges Watershed via the Sutherland-San Vicente Pipeline (Figure 2-3.1). The terminus of the Sutherland-San Vicente Pipeline empties into San Vicente Creek at Daney Canyon, two miles north of the reservoir. The reservoir and associated facilities are owned and operated by the City of San Diego. San Vicente Reservoir can also be filled with water transferred from El Capitan Reservoir via the Lakeside Pump Station Complex using the El Capitan - San Vicente pipelines.

Water from San Vicente Reservoir is either transferred to Murray Reservoir or directly to the Alvarado Water Treatment Plant for immediate use, via the Lakeside Pump Station Complex using the San Vicente and El Monte pipelines. In an effort to maximize the use of local water, an agreement between the City and CWA stipulates that water placed in storage at San Vicente by CWA is to be delivered to the City only after local water is used, and that all water owned by CWA is to spill over the dam during a local storm before any water owned by the City.

Raw Water Reservoirs -

San Vicente Reservoir has the second largest capacity of all the reservoirs in the City system. San Vicente Dam is a straight concrete gravity structure with a 275-foot-wide uncontrolled central over pour spillway. The spillway capacity is 50,500 cubic feet per second (cfs). The dam crest has a length of 980 feet and stands roughly 199 feet above the streambed. The reservoir has a storage capacity of 89,312 acre-feet and a surface area of 1,069 acres at spillway crest of 650 feet MSL. San Vicente Reservoir is in phase two of expansion as part of the San Diego County Water Authority Emergency Storage Project. During phase four scheduled for 2008 – 2012, the dam will be raised an additional 160 feet.

Raw Water Intake and Conveyance Facilities -

The reservoir outlet consists of a semi-circular wet tower upstream of the dam face with six 30-inch saucer valves for selective level draft control. Water is released from the tower through three 36-inch cast iron outlet pipes with 30-inch plug valves located at the base of the dam. One of the 36-inch outlet pipes enlarges to 42.5 inches and connects to San Vicente Pipeline No. 1. The other two outlet pipes discharge to San Vicente Pipeline No. 2 (City, 1995(b)). These two pipelines carry water from the reservoir to the Lakeside Pump Station. The San Vicente Pipelines have a maximum combined draft rate of 118 cfs (76 million gallons per day (mgd)). From the Lakeside Pump Station, the El Monte Pipeline carries water to the Alvarado Treatment Plant. The El Monte Pipeline has a maximum draft rate of 156 cfs (100 mgd).

Treated Water Facilities -

All treatment facilities and treated water facilities for San Vicente Reservoir occur at, and beyond, the Alvarado Water Treatment Plant.

El Capitan Watershed

Water Sources -

El Capitan Reservoir serves as San Diego's largest local runoff storage facility. The primary function of the reservoir is to store local runoff water from the surrounding 190-square-mile watershed, and water transferred from Lake

Cuyamaca via Boulder Creek (Figure 2-3.1). The reservoir and associated facilities are owned and operated by the City of San Diego.

El Capitan Reservoir can also be filled with water transferred from San Vicente reservoir via the Lakeside Pump Station Complex, using the El Capitan & San Vicente pipelines. Water from El Capitan Reservoir is either transferred to Murray Reservoir or directly to the Alvarado Treatment Plant for immediate use, via the Lakeside Pump Station Complex using the El Capitan and El Monte pipelines.

The Lake Cuyamaca Dam, Lake Cuyamaca, and its associated facilities are owned and operated by Helix Water District (HWD). Lake Cuyamaca is supplied with local runoff from tributary streams. All water from Lake Cuyamaca in El Capitan Reservoir belongs to HWD. Helix also has the right to 27 cfs of Upper San Diego River runoff, which is separate and exclusive of any water from Lake Cuyamaca. The water in El Capitan Reservoir owned by HWD is transferred to the R.M. Levy Water Treatment Plant via the El Monte Pump Station using the El Capitan Pipeline. The R.M. Levy Water Treatment Plant is owned and operated by HWD. Helix has a right to a minimum flow of 20 mgd (Helix, 1995).

Raw Water Reservoirs -

El Capitan Reservoir has the largest capacity of all the reservoirs in the City system. El Capitan Dam is a hydraulic fill rock embankment, with an impervious clay core and a 510-foot-wide over pour spillway. The spillway capacity is 170,600 cubic feet per second (cfs). The dam crest has a length of 1,170 feet and stands roughly 217 feet above the streambed. The reservoir has a storage capacity of 112,807 acre-feet and a surface area of 1,562 acres at spillway crest at 750 feet MSL.

Lake Cuyamaca maintains a tenth of the capacity of El Capitan Reservoir. Its purpose is to collect runoff from the natural watercourses of its tributary areas. Lake Cuyamaca Dam is an earth-fill embankment with a 30-foot-wide rectangular spillway. The spillway capacity is approximately 4,540 cfs. The dam crest has a length of 665 feet and stands approximately 33 feet above the streambed. The reservoir has a storage capacity of 11,756 acre-feet with a spillway crest at 4,635.6 ft MSL.

Raw Water Intake and Conveyance Facilities **-**

Lake Cuyamaca outlet consists of a 36-inch steel pipeline extending in a tunnel through the dam. Water is released into a concrete channel downstream of the dam. Flowing downstream via Boulder Creek, the water is collected in El Capitan Reservoir.

El Capitan Reservoir outlet consists of an outlet tunnel and a free standing wet tower with six 30-inch saucer valves for selective level draft control. Water is released from the tower through two 42-inch and two 36-inch saucer valves located within the base of the tower. The 48-inch El Capitan Pipeline extends through a tunnel toward the Lakeside Pump Station. The El Capitan Pipeline has a maximum discharge rate of 344 cfs (222 mgd).

From the Lakeside Pump Station, the El Monte Pipeline carries water to the Alvarado Water Treatment Plant. The El Monte Pipeline has a maximum draft rate of 156 cfs (100 mgd).

Treated Water Facilities -

All treatment facilities and treated water facilities for El Capitan Reservoir occur at and beyond the Alvarado Water Treatment Plant or the R.M. Levy Water Treatment Plant (HWD).

Sutherland Watershed

Water Sources -

Sutherland Reservoir is not a practical operational storage site due to its high elevation and distance from the imported water aqueducts. The primary function of the reservoir is to impound local runoff from the surrounding 53-square mile watershed and provide emergency storage for Ramona Municipal Water District (RMWD).The reservoir and associated facilities are owned and operated by the City of San Diego.

Water from Sutherland Reservoir is usually transferred to San Vicente Reservoir in the spring, when the San Vicente streambed is wet, to avoid water losses during transport. Generally, all water above RMWD's contract pool is released, provided storage capacity is available at San Vicente Reservoir. The City has contractual obligations to supply water from Sutherland Reservoir to the Ramona Municipal Water District. Under the terms of this contract, every October, the District reserves water above the gauge height of 65 feet, for the upcoming water year.

During the bass spawning season (February through April), the City schedules water transfers from Sutherland Reservoir to minimize interference with spawning.

Raw Water Reservoir -

The Sutherland Dam is a multiple-arch, reinforced concrete structure with a 168-foot-long uncontrolled over pour spillway. The concrete-lined, Ogee-type un-gated spillway is located on the eastern abutment of the dam and has a design capacity of 41,220 cubic feet per second (cfs). The dam crest has a length of 1,020 feet (1188 including spillway) and stands roughly 158 feet (162 feet including 4-foot parapet) above the streambed. The reservoir has a storage capacity of 29,684 acre-feet and a surface area of 556.8 acres at spillway crest at 2,057 feet MSL.

Raw Water Intake and Conveyance Facilities -

The original Sutherland Dam outlet design consisted of a concrete box at the tenth and eleventh arch, with two 36-inch outlet pipes behind trash racks. Each outlet line was equipped with a 30-inch gate valve. Each outlet and gate valve allowed flow to the 36-inch Sutherland-San Vicente Pipeline. A 24-inch bypass pipeline can be used for a blow off and to control water release into the downstream creek channel below the dam. The bypass has a 20-inch plug valve at the end. In 1983, RMWD modified their 36-inch outlet with a floating flexible line to permit withdrawal from the reservoir at any elevation.

The maximum discharge at Sutherland Reservoir outlet tower is 349 cfs (225 mgd) with blow offs or 101 cfs (65 mgd) without blow offs. The RMWD, through a water use agreement with the City, drafts impounded water from Sutherland Reservoir via a service connection off Sutherland-San Vicente Pipeline.

Treated Water Facilities -

All treatment facilities and treated water facilities for Sutherland Reservoir occur at and beyond the Alvarado Water Treatment Plant or the John C. Bargar Water Treatment Plant (RMWD).

Emergency Plans -

There are no written emergency plans addressing accidental or intentional disposal of contaminants to the raw water supply system for the City. However, the City does have the following two procedures which are understood policies, should an emergency occur relating to water quality:

- If a treatment plant cannot treat the water to an approved health standard level, due to upstream contaminants or treatment plant failures, the treatment

- plant shall be shut down. Treated water shall then be re-directed to the downed service area through the distribution system from other treatment plants.

- If any emergency exists, the City has a chain of communication procedure for notification of City staff.

Natural Settings

Slope -

Slope is recognized as a critical factor in soil slips/landslides. In Southern California a direct relationship exists between frequency of soil slips and slope. USGS estimates that 70% of soil slips originate in slopes between 20° and 36°.These soil slips have the potential to increase sedimentation in streams and reservoirs.

Water falling on steeply-sloped land runs off with greater velocity and infiltrates less than water falling on flat land. This response leads to increased erosion and limits the soils natural ability to absorb contaminants. Information on slope was derived from a digital elevation model provided by San Diego Data Processing Corporation and United States Geological Survey (USGS).

Murray Watershed -

No changes in slope have occurred since 2000 (Figure 2-3.2, Table 2-3.1).

Table 2-3.1
Murray Watershed

Slope	Acres	Percent
0 - 15°	1918.85	83.50
16 - 25°	201.86	8.78
26 - 50°	173.16	7.54
> 50°	4.08	0.18
Total	2297.94	100.00

El Capitan, San Vicente, and Sutherland Watersheds -

No changes in slope have occurred since 2000 (Figure 2-3.3, Table 2-3.2).

Table 2-3.2
El Capitan, San Vicente, and
Sutherland Watersheds Slope

Slope	Acres	Percent
0 - 15°	44965.00	21.54
16 - 25°	111830.83	53.58
26 - 50°	29260.65	14.02
> 50°	22662.03	10.86
Total	208718.51	100.00

Soils

Most of the soils within the watershed are susceptible to erosion. The erosion of these soils is mitigated through the anchoring affect of natural vegetation (see Vegetation). Impacts to vegetation through fire, development, or other means could cause increased erosion and impact surface water quality (see Fires, Land Use, Rainfall and Runoff).

Murray Watershed -

The dominant soil types are Diablo-Urban land complex and Redding-Urban land complex (Figure 2-3.4).

San Vicente and El Capitan Watersheds -

Due to the Cedar fire of 2003 the surface soils in the El Capitan and San Vicente Watersheds became temporarily hydrophobic. This condition, combined with the loss of natural vegetation, can cause increased erosion. Soils within the San Vicente Watershed are predominantly well drained, sandy loams (Figure 2-3.5). Cieneba coarse sandy loam is the most commonly occurring soil type. Several soil types occur within the El Capitan Watershed. The most widespread include Sheephead rocky fine loam, Holland fine sandy loam, Cieneba-Fallbrook rocky sandy loam, Cieneba course sandy loam and Boomer loam (Figure 2-3.5).

Sutherland Watershed -

Soils within the Sutherland Watershed are predominantly well drained, sandy loams (Figure 2-3.5). The two most widespread soil types are Crouch sandy loam and Holland fine sandy loam.

Vegetation

Vegetation cover provides several ecological services pertinent to water quality. The root systems of plants anchor soil that could otherwise erode into streams and reservoirs (see Soils). Wetlands and other riparian plant communities act as natural filters, removing suspended sediments and contaminants. Sediments are trapped by densely growing wetland plants, and many contaminants are absorbed or chemically altered by the vegetation.

The description of the different plant communities found in the watershed (Sawer and Keeler-Wolf classification, 1995) and their respective response to fire is from the 2003 Southern California Fires Burned Area Emergency Stabilization and Rehabilitation Plan prepared by: Interagency Burned Area Emergency Response Team November, 2003. The maps of vegetation communities (Figures 2-3.6, 2-3.7, 2-3.8, Tables 2-3.3, 2-3.4, 2-3.5) have been updated using current SanGIS data.

Oak Woodlands

Vegetation Types:

Oak woodlands typically occur in the foothills and transition into mixed conifer/oak woodlands at higher elevations. Each community type can vary from open savannas in broad valleys and rolling hills, to dense woodlands in canyons and along streams. Oak woodlands are dominated by live oak trees species that include Black Oak, Coast Live Oak, Engelmann Oak, and Canyon Live Oak.

Response to Fire:

Oak woodlands have evolved with fire. Dense woodlands typically experience low frequency stand destroying fires. Oak trees that experience some canopy fire often survive unless the ground fire temperature is extreme enough to kill the root system. The complex of species associated with dense oak woodlands will either re-sprout or germinate from seed. Frequent or hot fires can affect the seed bank and the root system of Oak Woodland species, resulting in degraded habitat that is susceptible to habitat conversion.

Eucalyptus Woodland

Vegetation Types:

Eucalyptus Woodland is a non-native closed canopy community. This community is typically a monotypic stand of Eucalyptus trees with a thick mulch of Eucalyptus tree leaves.

Response to Fire:

Eucalyptus stands can be fire retardant to low intensity fires. Low intensity fires will consume the leaf litter and can be carried into the canopy where leaves are singed or tops are burned. High intensity fires are typically stand destroying.

Forests

Vegetation Types:

Coniferous forests occur in the lower to upper montane zone in the Peninsula Ranges. The lower montane forests typically include the Southern Interior Cypress Forest, which is intermixed with oak woodlands and chaparral. Upper montane forests include Coulter Pine Forest, Jeffery Pine Forest, and mixed Sierran Forest. They range from pure stands of a single species, to mixed conifer forests intermixed with oak woodlands and chaparral.

Response to Fire:

Montane forests are typically surrounded by chaparral or adjacent to forests subject to fire, and are therefore susceptible to fire. When fires occur more frequently than twenty-five years, Coulter pine habitat conversion to chaparral may result. Jeffery Pine Forests and Mixed Coniferous Forests historically experience periodic low-to-moderate intensity fires in the understory. Fuel buildup due to fire suppression can increase the risk of stand replacing crown fires.

Chaparral

Vegetation Types:

Chaparral occurs throughout the coastal lowlands, foothills, and montane region. This community typically forms a dense, almost impenetrable shrub community with no herbaceous layer. Chaparral is a highly variable plant community that includes; Chamise Chaparral, Coastal Sage-Chaparral Scrub, Mixed Chaparral, Montane Chaparral, Semi-desert Chaparral, and Scrub Oak Chaparral.

Response to Fire*:*

Chaparral is a fire adapted community, that stump sprouts or germinates from seed after a low-to–moderate intensity burn. Large fires often result in homogenous stands of chaparral. Frequent fires and hot fires can burn the root system and surface seed bank, resulting in a loss of diversity and low-density vegetative communities. For a few years after a fire, annual forbes germinate and establish on site, until the woody shrubs mature.

Coastal Sage Scrub

Vegetation Types:

Locally, Coastal Sage Scrub consists of low, woody soft-shrubs and is classified as Diegan Coastal Sage Scrub (DCSS). DCSS is dominated by California sagebrush and/or flat-topped buckwheat and often intergrades with Chaparral communities.

Response to Fire:

DCSS species are fire adapted and quickly regenerate from seed after a fire. However, frequent fires in an area can reduce the seed bank for native shrub species and increase the presence of non-native grasses and forbs resulting in degraded habitat. Once this habitat conversion occurs, DCSS species typically do not re-colonize the area due to competition from dense populations of invasive grasses that increase the fire frequency. Areas with moderate to highly degraded DCSS may convert to non-native grasslands due to the 2003 fires.

Big Sagebrush Scrub

Vegetation Types:

Locally, big sagebrush is dominated by; flat-topped buckwheat, broom snakeweed, deerweed, sawtoothed goldenbrush, and includes a variety of DCSS species.

Response to Fire:

The fire ecology of Big Sagebrush Scrub in eastern San Diego County is not well documented. Many of the associates in this community occur in DCSS and are fire adapted. Frequent fire in the vegetative community will result in habitat conversion to non-native grasslands.

Grasslands

Vegetation Types:

Perennial Grasslands vary among Valley Needlegrass and Valley Sacaton grasslands. Valley Needle Grassland is dominated by the tussock forming purple needlegrass, with a variety of native forbs including colar lupin, rancher’s fireweed, and adobe popcorn-flower; and the native bunchgrasses, foothill needle grass, and coast range melic. The species composition can vary as it transitions into the foothills and montane zone. Valley Sacaton Grassland is dominated by sacton or salt grass. This community typically occurs in the areas with a high seasonal water table and is often associated with Alkali Seeps and Alkali Meadows. Non-native grasslands are dominated by Red brome, Ripgut brome, and Softchess brome. Non native grasslands often intergrade with open oak woodlands and disturbed DCSS communities.

Response to Fire:

Grassland communities in San Diego County have evolved with, and are typically maintained by fire. Fire in non-native grasslands maintains dominance by invasive grasses and prevents establishment by native shrub species.

Meadows

Vegetation Types:

Montane Meadows occur in the montane zone and are dense growth of sedges and perennial herbs that experience wet cold winters. Montane Meadows are typically interspersed with montane forests. Wildflower Field is an amorphous community of herbaceous plant species where dominance varies from site to site and year to year, depending on climatic factors. Wildflower Field is typically associated with grasslands and oak woodlands in the valleys and foothills.

Response to Fire:

Wet meadows typically do not burn since the moisture content in the plants and soils retard fire advance. During drought times and in dry meadows fire will quickly burn through these communities. Fall fires typically have little impact on local meadows since most plants are dry and have dispersed their seed.

Riparian

Vegetation Types:

Riparian communities vary depending on the aquatic system they are associated with and can have seral stages of community succession. Mulefat Scrub and Southern Willow Scrub are typically early seral stages for Southern Cottonwood-Willow Riparian Forest, which develops into Southern Coast Live Oak Riparian Forest. In steep drainages, Mulefat Scrub and Southern Willow Scrub may be early stages for Southern Sycamore-Alder Riparian Forest or White Alder Riparian Forest.

Response to Fire:

Riparian communities often resist fire since riparian species do not experience drought. During drought, riparian species become more susceptible to fire. Stand destroying fires can assimilate flooding events in that they set communities back to early seral stages. Stump sprouting species can reestablish in the early successional communities. Most mature trees that experience high intensity fires will die.

Wetlands

Vegetation Types:

Wetland communities are highly variable. Riparian and Wet Meadows are communities that can establish in areas with sufficient hydrology to be considered wetlands. In addition, emergent wetlands occur along seeps and as emergent wetlands in shallow water. These wetlands include Alkali Seep, Freshwater Seep, and Freshwater Marsh.

Response to fire:

Historically, fire impacts to wetlands in San Diego County are not documented. Wetlands typically do not experience fire. Many wetland species are rhizomous and will likely survive fires. Woody species in scrub and forested wetlands may recover from fire by epicormic sprouting from stems or basal sprouting from roots.

Murray Watershed -

Native vegetation identified within the Murray Watershed includes scrub and chaparral, and grasslands (Figure 2-3.6, Table 2-3.3). The remainder of the watershed is developed for urban uses, which could negatively impact water quality (see Land Use, Rainfall and Runoff). Riparian and wetland habitats identified within the Murray Watershed include a small Freshwater Marsh at the northern edge of Murray Reservoir, and Willow Scrub east of the reservoir.

Table 2-3.3 Vegetation in the Murray Watershed		
Vegetation Type	**Acres**	**% of Watershed**
Wetlands	2	0
Forest	0	0
Grasslands, Vernal Pools, Meadows, other Herb Communities	23	1
Non-Native Vegetation, Developed or Un-vegetated Habitat	1902	83
Riparian	4	0
Scrub and Chaparral	366	16
Woodland	0	0
Total	2297	100.0

San Vicente Watershed -

Vegetation within the San Vicente Watershed is dominated by native scrub and chaparral (Figure 2-3.7, Table 2-3.4). Oak woodland is also a native community that is well represented within the watershed. In addition, patches of grasslands exist throughout the watershed. In several areas, native vegetation has been altered due to agriculture and urban development (see Land Use, Rainfall and Runoff). These areas possess the potential to negatively impact water quality. Several riparian and wetland habitats exist in the San Vicente watershed. They occur primarily around the perimeter of San Vicente Reservoir, and in canyons and drainages. These communities include Lakeshore Fringe, Freshwater Seep, Willow Scrub, Southern Coast Live Oak Riparian Forest and Southern Cottonwood Willow-Riparian Forest.

El Capitan Watershed -

Numerous vegetation communities exist within the El Capitan Watershed (Figure 2-3.7, Table 2-3.4). Scrub and chaparral, oak woodland, and Mixed Coniferous Forest are native communities that account for a large portion of the watershed. In addition, areas of grasslands are scattered throughout the watershed. Notably, the developed area south of El Capitan Reservoir has the potential to negatively impact water quality (see Land Use, Rainfall and Runoff). Riparian and wetland communities found within El Capitan Watershed include Willow Scrub, Southern Riparian Forest, Southern Coast Live Oak Riparian Forest, Wet Montane Meadow, seeps, and Vernal Pools.

These communities are found mostly around the edge of the lake and in canyons and drainages. Vernal pools exist near the eastern border of the watershed, near Cuyamaca Reservoir.

Table 2-3.4 Vegetation in the San Vicente & El Capitan Watersheds		
Vegetation Type	**Acres**	**% of Watershed**
Wetlands	726	0
Forest	16434	10
Grasslands, Vernal Pools, Meadows, other Herb Communities	8128	5
Non-Native Vegetation, Developed or Un-vegetated Habitat	13751	8
Riparian	4390	3
Scrub and Chaparral	109764	64
Woodland	19216	11
Total	172409	100.0

Sutherland Watershed –

Several vegetation communities exist within the Sutherland Watershed (Figure 2-3.8, Table 2-3.5). The most common native communities include scrub and chaparral, oak woodlands, grasslands, and coniferous forest. Areas of non-native vegetation also occur throughout the watershed. Several riparian and wetland habitats exist in the Sutherland watershed. These communities include Wet Montane Meadow, Freshwater Seeps, emergent wetland, Southern Coast Live Oak Riparian Forest, Southern Riparian Forest and Willow Scrub.

Table 2-3.5 Vegetation in the Sutherland Watershed		
Vegetation Type	**Acres**	**% of Watershed**
Wetlands	404	1
Forest	3840	11
Grasslands, Vernal Pools, Meadows, other Herb Communities	6011	17
Non-Native Vegetation, Developed or Un-vegetated Habitat	1249	4
Riparian	701	2
Scrub and Chaparral	10064	29
Woodland	12256	35
Total	34525	100.0

Rainfall and Runoff

The climate of San Diego County is classified as a Mediterranean dry summer type, where 90% of the annual rainfall occurs between the months of November and April. Annual precipitation varies from 9 inches at the coast to 25 inches near the mountains. Storm water runoff occurs when water from rain or snowmelt flows over the ground. Impervious surfaces like driveways, sidewalks, streets and parking lots prevent the runoff from naturally soaking into the ground. Storm water runoff can collect debris, sediment, nutrients, bacteria, pathogens, chemicals and deposit them directly into a lake, stream, river, wetland, or coastal water.

Rainfall and Runoff information in this section was supplied by the City of San Diego Water Department, Hydrography Section. Rainfall data is collected at each reservoir by a weather station. Runoff data is estimated monthly by measuring the following: amount of rainfall, rain amount on surface of lake, other inputs, evaporation, draft, leaks, and change in lake level.

San Diego River System Watersheds -

Table 2-3.6 shows annual rainfall and runoff at each of the reservoirs within the San Diego river watershed. Rainfall totals for years 2001-2003 were average or below average. The winter of 2004-2005 was the third wettest on record.

Table 2-3.6 Rainfall and Estimated Runoff for San Diego River System Reservoirs			
Reservoir	**Year**	**Rainfall (in.)**	**Runoff Entering Reservoirs (M.G.)**
El Capitan	2001	14.83	1254.2
	2002	9.5	38.9
	2003	14.35	1356.28
	2004	20.33	2875.07
	2005	16.05	15595.92
San Vicente	2001	15.18	53.73
	2002	8.91	278.31
	2003	14.22	586.12
	2004	18.17	1996.37
	2005	17.5	6051.19
Sutherland	2001	20.65	225.47
	2002	12.61	19.91
	2003	21.65	219.52
	2004	24.73	107.72
	2005	24.82	6379.79
Murray	2001	10.92	0
	2002	9.38	0
	2003	11.48	69.92
	2004	14.82	0
	2005	15.48	0

Fires

The California Department of Forestry (CDF) addresses all large brush fires within the watershed. The local fire districts handle structural fires only. CDF has an extensive fire prevention plan which includes three fire safe guidelines: residential, railway, and electrical power lines. CDF also provides an evaluation of burned sites and a re-growth plan to prevent erosion immediately following a fire.

Fire can indiscriminately devastate certain vegetation and wildlife communities, but is very important to the sage scrub and chaparral communities. Many taxa of coastal sage scrub plants are adapted to fire by stump sprouting or high seed production (Skinner et al., 1994). Similarly, many chaparral plants are adapted to frequent fires either through resprouting or seed carry-over (see Vegetation). While these communities are adapted to fire and usually recover in three to five years following such an event, the soils are subject to increased erosion immediately following a burn (see Soils).

Sediment from the burned areas can impact streams and the aquatic organisms within those streams, ultimately feeding into reservoirs where sediment loads may affect treatment procedures. Control of large fires is important from both a preservation perspective as well as a watershed management perspective.

The fire and water districts in the watershed do not measure the water quality impacts of the runoff from burned areas (Calhoun, Justice, Bratton, 1995). In most cases the County Office of Emergency Response or the local Fire Department contacts the RWQCB to visit the site after the fire is contained. The RWQCB participates in assessing the impact of the fire on the surface water quality, and will determine if monitoring is necessary.

Fire information in this report is supplied by the California Department of Forestry. The current data available from CDF is through December 31, 2004.

San Diego River System Watersheds -

Since 2000, there have been three fires in the San Diego River System Watersheds (Table 2-3.7). The Peak and Pines fires were relatively small and located in the outermost regions of the watershed; no effect on the water quality was observed. On October 25, 2003 the Cedar fire (Figure2-3.9) started and by the time it was contained it had burned 270,685 acres, which is the largest fire in the history of California. The fire burned 98% of the San Vicente Watershed and 94% of the El Capitan Watershed. The fire destroyed 2,232 residential structures, as well as another 588 outbuildings and other structures. The staff of the City of San Diego Water Department, which monitories the water quality of El Capitan, San Vicente and Sutherland Watersheds, observed significant sedimentation in these Watersheds from the burn areas (City Staff, personal communication). These effects were especially evident during the winter of 2004-2005 when San Diego County experienced near record rainfall. Murray Watershed had no fires since 2000.

Table 2-3.7 San Vicente, El Capitan, and Sutherland Watershed Fires		
Name	Alarm Date	Acres Burned
Cedar	10/25/2003	160,906
Peak	8/9/2002	245
Pines	7/29/2002	616

SUMMARY OF POTENTIAL CONTAMINANT SOURCES

Land Use -

The section on land use includes; land ownership, category of land use, and population density.

Land Ownership

The land ownership information discussed in this section is primarily derived from SanGIS data. SanGIS maintains a database of land ownership information, by parcel, for San Diego County.

Murray Watershed:

The pattern of land ownership in the Murray Watershed has not changed in the last five years (Figure 2-3.10, Table 2-3.8). Approximately 44% of the watershed is privately owned and urbanized.

Table 2-3.8 Land Ownership in Murray Watershed		
Ownership Category	**Area (acres)**	**% of Watershed**
Indian Reservation	0	0.0
Publicly Owned		
Local	1251	54.4
State	31	1.3
Federal	1	0.0
Subtotal Publicly owned	1283	55.8
Private	1015	44.2
Total	2298	100

San Vicente Watershed:

Approximately 27% of San Vicente Watershed is currently in public ownership (Figure 2-3.11, Table 2-3.9). Indian Reservation landownership accounts for 13.5% of the watershed. The San Diego Water Department owns 6.8% of the land within the watershed.

Table 2-3.9 Land Ownership in San Vicente Watershed		
Ownership Category	**Area (acres)**	**% of Watershed**
Indian Reservation	6420	13.5
Publicly Owned		
Local	6187	13.0
State	1422	3.0
Federal	5435	11.4
Subtotal Publicly owned	13044	27.4
Private	28077	59.1
Total	47541	100

El Capitan Watershed:

Approximately 52% of El Capitan Watershed is currently in public ownership (Figure 2-3.11, Table 2-3.10). Indian Reservation landownership accounts for 13.6% of the watershed. The San Diego Water Department owns 3.3% of the land within the watershed.

Table 2-3.10 Land Ownership in El Capitan Watershed		
Ownership Category	**Area (acres)**	**% of Watershed**
Indian Reservation	16462	13.6
Publicly Owned		
Local	8166	6.8
State	9157	7.6
Federal	46362	38.4
Subtotal Publicly owned	63685	52.7
Private	40629	33.6
Total	120776	100

Sutherland Watershed:

Private land and Indian Reservations continue to be the dominate type of land ownership in the Sutherland Watershed (Figure 2-3.12, Table 2-3.11). The San Diego Water Department owns 5.7% of the watershed land.

Table 2-3.11 Land Ownership in Sutherland Watershed		
Ownership Category	**Area (acres)**	**% of Watershed**
Indian Reservation	8050	23.2
Publicly Owned		
Local	8130	23.4
State	121	0.3
Federal	497	1.4
Subtotal Publicly owned	8748	25.2
Private	17887	51.6
Total	34685	100

Existing Land Use

The information discussed in this section is based on SanGIS data. It is important to note that some areas reported in the 1996-2000 Watershed Sanitary Survey (WSS) as vacant and undeveloped land use have been updated by SanGIS to reflect its correct land use type, parks and open space preserves.

Murray Watershed:

Land use in the Murray Watershed has experienced little change since 2000 (Figure 2-3.13, Table 2-3.12). Murray Watershed is highly urbanized with approximately 29% of its land use type fitting into the categories of parks and open space and water. Approximately 41% of the watershed consists of residential developments, while commercial, institutional and other types of urban development comprise an additional 30% (see Rainfall and Runoff). No commercial agriculture occurs in the Murray Watershed.

Table 2-3.12 Existing Land Use in the Murray Watershed

Land Use Category	Area (acres)	% of Watershed
Commercial Recreation	146.02	6.35
Commercial	42.68	1.86
Parks	498.19	21.68
Schools, Hospitals, Public & Private Institutions	105.95	4.61
Multi Family Residential	81.41	3.54
Single Family Residential	854.95	37.21
Transportation, Communication & Utilities	391.15	17.02
Water	177.17	7.71
Subtotal	2297.52	99.98
Vacant & Undeveloped	0.42	0.02
Total	2297.94	100.00

San Vicente Watershed:

Land use in the San Vicente Watershed has experienced little change since 2000 (Figure 2-3.14, Table 2-3.13). San Vicente Watershed is relatively undeveloped with 84% of its land use type fitting into the following categories: vacant and undeveloped (60%), parks and open space preserves (22%), and water (2%). Approximately 10% of the watershed is devoted to residential and urban uses, which is a 1% increase since 2000. These areas include residential, commercial, and industrial developments in Ramona and San Diego Country Estates subdivision (see Rainfall and Runoff). Agriculture accounts for approximately 4% of the land area in the San Vicente Watershed.

Table 2-3.13 Existing Land Use in the San Vicente Watershed		
Land Use Category	**Area (acres)**	**% of Watershed**
Agriculture	2012.00	4.23
Commercial Recreation	641.42	1.35
Commercial	3.93	0.01
Industrial	7.15	0.02
Junkyard, Dump, Landfill	11.12	0.02
Parks	10430.35	21.94
Schools, Hospitals, Public & Private Institutions	31.96	0.07
Mobile Home Park	6.52	0.01
Multi Family Residential	36.54	0.08
Single Family Residential	1627.65	3.42
Spaced Rural Residential	2313.57	4.87
Under Construction	6.03	0.01
Transportation, Communication & Utilities	679.11	1.43
Water	1066.10	2.24
Subtotal	18873.45	39.70
Vacant & Undeveloped	28669.52	60.30
Total	47542.97	100.00

El Capitan Watershed:

Since 2000, land use in El Capitan Watershed has not changed extensively (Figure 2-3.14, Table 2-3.13). El Capitan Watershed is relatively undeveloped with 91% of its land use fitting into the following categories: vacant and undeveloped land (77%), parks and open spaced preserves (12%), and water (2%).

Approximately 6% of the total watershed is occupied by urban and suburban types of developments, such as residential and commercial land uses in the rural towns of Julian, Alpine, and Descanso (see Rainfall and Runoff). Agriculture accounts for approximately 2% of the land area in the El Capitan Watershed.

Table 2-3.14 Existing Land Use in the El Capitan Watershed		
Land Use Category	**Area (acres)**	**% of Watershed**
Agriculture	2139.45	1.77
Commercial Recreation	314.54	0.26
Commercial	99.01	0.08
Industrial	57.76	0.05
Junkyard, Dump, Landfill	0.57	0.00
Parks	14680.33	12.16
Schools, Hospitals, Public & Private Institutions	99.60	0.08
Group Quarters Residential	113.11	0.09
Mobile Home Park	29.39	0.02
Multi Family Residential	83.98	0.07
Single Family Residential	608.76	0.50
Spaced Rural Residential	6248.76	5.17
Transportation, Communication & Utilities	1118.91	0.93
Water	2270.82	1.88
Subtotal	27864.99	23.07
Vacant & Undeveloped	92909.71	76.93
Total	120774.70	100.00

Sutherland Watershed:

Since 2000, land use has changed little in Sutherland Watershed (Figure 2-3.15, Table 2-3.15). Sutherland Watershed is relatively undeveloped with 79% of its land use fitting into the following categories: vacant and undeveloped (59%), parks and open spaced preserves (17.5%) and water (1.5%).

Less than 2% of the watershed is devoted to residential and urban types of development, which is centered mainly on the small community of Santa Ysabel (see Rainfall and Runoff). Agriculture accounts for more than 19% of the land area, which is a 2% decline since 2000.

Table 2-3.15 Existing Land Use in the Sutherland Watershed		
Land Use Category	**Area (acres)**	**% of Watershed**
Agriculture	6778.15	19.63
Commercial Recreation	178.67	0.52
Commercial	13.00	0.04
Parks	6064.47	17.57
Single Family Residential	11.63	0.03
Spaced Rural Residential	271.96	0.79
Transportation, Communication & Utilities	172.76	0.50
Water	549.01	1.59
Subtotal	14039.65	40.67
Vacant & Undeveloped	20485.48	59.33
Total	34525.13	100.00

Agriculture -

Agricultural practices can be a significant source of non-point source contaminants. Contaminants that are often found in typical agricultural surface runoff include sediment, nutrients, pesticides and bacteria. Increases in salinity may also pose a significant water quality problem in the future. The United States Environmental Protection Agency (USEPA) has estimated that about 75% of the sediment, 52% of the nitrogen loading, and 70% of the phosphorus loading that enters waterways of the 48 contiguous states originates in agricultural settings. Most contaminants are transported to the water supply through either surface runoff or irrigation return flows.

Agricultural practices consist of field crops, orchards and vineyards, and intensive agriculture. Home gardens and hobby farms are not included in this report.

Field crops include; grain, alfalfa and sod. Due to the minimal use of pesticides and other chemicals, this agricultural practice is considered to have the lowest potential of impacting water quality.

Orchards and Vineyards include; apples, avocados, citrus, grapes and other non-evergreen fruit, while intensive farm plots include; row crops such as herbs, vegetables, poultry ranches, and dairy farms. Due to their reliance on pesticides and other chemicals, these practices are considered to have a greater potential of impacting water quality.

Poultry ranches are regulated by the San Diego County Department of Environmental Health for fly breeding and facilities are inspected yearly. Poultry Farms do not discharge a significant amount of wastewater, but impact to water quality is possible during periods of rain when runoff could carry manure into nearby drainages. Manure management methods include frequent cleaning, drying and coning. Manure is generally spread on the ground to dry, pushed into windrows and then removed from the ranch.

Dairy farms are permitted by the Regional Water Quality Control Board (RWQCB) and facilities are inspected quarterly. The RWQCB issues orders specific to individual dairies. These orders contain facility designs, operation specifications and discharge specifications, along with other guidelines for complying with the Watershed Basin Plan. Dairy farms are then required to submit quarterly reports to the RWQCB that describe herd size, manure disposal, groundwater monitoring results including nitrates and dissolved solids. Milk cows, corrals and barns are generally washed daily. Dairies typically have retention ponds for wastewater discharge which, during periods of rain, could overflow and impact the water quality of nearby streams.

The information discussed in this section is based on SanGIS data and two layers created by RECON Environmental Consultants using information from the San Diego County Department of Environmental Health and RWQC.

Murray Watershed:

Agricultural practices in the Murray Watershed consist only of home gardens and hobby farms which are not included in this report. No permitted poultry ranches or dairy farms exist in the Murray Watershed.

San Vicente Watershed:

Since 2000, there has been a slight decrease (278 acres) in lands used for agriculture within the San Vicente Watershed (Figure 2-3.14, Table 2-3.16). No permitted poultry ranches or dairy farms exist within the San Vicente Watershed. However, The John Van Tol Dairy straddles the Hodges and San Vicente Watershed boundary.

Table 2-3.16 Agriculture in the San Vicente Watershed		
Type of Agriculture	**Acres**	**% of Watershed**
Orchard	238	0.5%
Intensive	287	0.6%
Field Crops	1486	3%
Total	**2011**	**4.1%**

El Capitan Watershed:

Since 2000, there has been a slight decrease (37 acres) in lands used for agriculture within the El Capitan Watershed (Figure 2-3.14, Table 2-3.17). There are no permitted poultry ranches or dairy farms within the El Capitan Watershed.

Table 2-3.17 Agriculture in the El Capitan Watershed		
Type of Agriculture	**Acres**	**% of Watershed**
Orchard	600	0.5%
Intensive	43	0.1%
Field Crops	1495	1.2%
Total	**2138**	**1.8%**

Sutherland Watershed:

Since 2000, there has been a moderate decrease (810 acres) in lands used for agriculture within the Sutherland Watershed (Figure 2-3.15, Table 2-3.18).

No permitted poultry ranches exist in the Sutherland Watershed. Since 2000, both the Mesa Chiquita Ranch Dairy and the Santa Ysabel Ranch Dairy have closed. No permitted dairy farms exist within the Sutherland Watershed.

Table 2-3.18 Agriculture in the Sutherland Watershed

Type of Agriculture	**Acres**	**% of Watershed**
Orchard	33	0.1%
Intensive	0	0%
Field Crops	6744	19.5%
Total	**6777**	**19.6%**

Grazing -

The animal grazing data presented derives from the United States Forest Service (USFS). Although grazing on private land occurs in this watershed, no spatial data was available for such areas, and grazing on these lands is not included in this report. The USFS allows an average density of one animal per 160 acres; therefore, the risk of water contamination from manure is low. However, loss of vegetation cover associated with grazing may increase soil erosion and sedimentation of streams and reservoirs (see Vegetation, Rainfall and Runoff).

Murray Watershed:

No land is permitted for grazing in the Murray Watershed.

San Vicente Watershed:

No land is permitted for grazing in the San Vicente Watershed.

El Capitan Watershed:

Within the El Capitan Watershed, grazing is permitted on 6,779 acres of Cleveland National Forest (Figure 2-3.1, Table 2-3.19). Since 2000, all permits have been placed in nonuse status and the Sill Hill (2137 acres) rangeland permit was closed. Tule Spring (1441 acres) rangeland permit will be closed shortly (Personnel Communication, USFS Staff).

Table 2-3.19 Grazing in the El Capitan Watershed

Range Name	Number of Head	Acres in Watershed	Ownership	Permit Status
Santa Ysabel	686	NA	USFS	Nonuse
Tule Springs	1441	21	USFS	Nonuse-Will be closed
King Creek	4215	16	USFS	Nonuse
El Capitan	437	NA	USFS	Nonuse-Since Cedar Fire

Sutherland Watershed:

No land is permitted for grazing in the Sutherland Watershed.

Population Density -

Population density is a good indicator of the level of urbanization within an area. Land areas with small population densities are usually rural areas with natural landscapes that trap rainwater and allow it to filter slowly into the ground (see Rainfall and Runoff). In contrast, large population densities are associated with urbanized areas. These areas contain impervious surfaces that prevent rain from infiltrating into the ground, which increases the amount and velocity of runoff. Urbanization increases the variety and amount of pollutants carried into streams, rivers, and lakes. These pollutants can harm fish and wildlife populations, kill native vegetation, foul drinking water supplies, and make recreational areas unsafe and unpleasant. The population data presented was derived form SANDAG's 2000 Census.

San Diego River System Watersheds:

The estimated 2005 population of the San Diego River System Watersheds are outlined in Table 2-3.20 and Figures 2-3.16, 2-3.17. In the past five years the population estimates have increased by 6% in the San Vicente Watershed, over 48% in the El Capitan Watershed, and decreased by 1% in the Murray watershed and 73% within the Sutherland Watershed.

Table 2-3.20 Population San Diego River System Watersheds

Watershed	Population	Density (Persons/Acre)
Murray	23,272	10.1
San Vicente	14,793	0.31
El Capitan	29,967	0.24
Sutherland	879	0.03
Total	68,911	0.34

Mines -

San Diego River System Watersheds:

The mine data presented was obtained from USGS and SWRCB. The SWRCB and the RWQCB are given authority over mines. The most common environmental hazard is: heavy metals associated with acid-rock drainage; methyl mercury from mercury-contaminated sediments; arsenic; asbestos and chromium.

In the 1996-2000 Watershed Sanitary Survey there were eleven mines listed by the State Water Resources Control Board (SWRCB). Currently there are no active mines listed within the San Diego River System Watershed.

Hazardous Material / Waste -

The data presented in this section was obtained from the San Diego County Health Department, RWQCB, and the Solid Waste Assessment Test Program. The hazardous materials were put into three categories: Liquid

Hazardous Waste, Solid Hazardous Waste and Liquid Hazardous Storage (capacity). The majority of liquid waste is stored in 55 gallon drums and hauled away by licensed waste haulers. Automotive and Tractor fuels make up the majority of permitted liquid hazardous storage. These fuels are stored in underground fiberglass-reinforced plastic, cathodically protected steel, or steel clad with fiberglass-reinforced plastic. These tanks are installed with a leak interception and detection system.

The State Resources Control Board affected changes to the underground storage tank regulations on October 13, 2005. These changes can be found in Title 23, California Code of Regulations, Chapter 16.

San Diego River System Watersheds:
Hazardous Materials/Waste amounts and locations for the San Diego River Watersheds are illustrated in Figure 2-3.1, Table 2-3.21.

Table 2-3.21 Summary of Permitted Hazardous Material			
Watershed	**Liquid Waste (gals)***	**Solid Waste (lbs)***	**Liquid Storage (gals)***
Murray	48,851	63,265	611,070
San Vicente	510	415	6,500
El Capitan	72,852	57,046	523,580
Sutherland	0	0	45,700
Total	122,213	120,726	1,186,850

*Figures are maximum capacities

Recreation -

Murray Reservoir:
The primary purpose of Murray Reservoir is for domestic water supply, while recreation is a secondary use of the reservoir. The reservoir is open to the

public for boating use three days a week. December through September, and to all other recreational activities seven days a week year around. Recreational activities include; boating, fishing, jogging, biking, and picnicking. Water contact activities are not permitted at the reservoir (Table 2-3.22)

Table 2-3.22 Murray Reservoir Number of Permits Sold				
Year	Fishing	Launch	Rentals:	
			Motor	Row
2001	15,772	1,816	NA	2,635
2002	16,365	2,222	NA	2,835
2003	16,197	2,542	NA	3,747
2004	18,954	2,630	1,165	2,530
2005	Figures not reconciled			

The facilities consist of concession, launch, rental boats, trash receptacles, portable toilets and a comfort station. These facilities are owned and operated by the City of San Diego. There are no boat-holding tank pump-out stations, marinas, or berths available at the reservoirs. Trash cans and portable toilets are placed above current water levels. Murray Reservoir has a restricted access area encompassing the outlet tower. This area is demarcated by a floating barrier to prevent direct recreational contact to the water immediately available to the Alvarado Water Treatment Plant.

The potential sources of contamination associated with the recreational activities include; erosion, trash, microorganisms associated with humans and animals, spillage of petroleum products, and production of combustion byproducts. Title 22 contaminates are monitored quarterly and nutrients monthly (Figure 2-3.1). Microorganisms including Total Coliforms, E. coli, and Enterococcus are monitored weekly.

San Vicente Reservoir:

The primary purpose of San Vicente Reservoir is for domestic water supply, while recreation is a secondary use of the reservoir.

San Vicente Reservoir is open to the public for recreational use including water contact activities, four days a week, year around. Recreational activities include; boating, fishing, waterskiing, picnicking and hiking (Table 2-3.24).

Table 2-3.24 San Vicente Reservoir Number of Permits Sold

Year	Fishing	Launch	Body Contact	Rentals	
				Motor	Row
2001	27,619	24,303	48,250	NA	2,062
2002	28,615	25,347	46,485	NA	1,855
2003	27,121	24,440	47,615	NA	1,914
2004	24,658	23,499	50,438	1,230	829
2005	Figures not reconciled				

The facilities consist of concession, launch, rental boats, trash receptacles, portable toilets, two floating restroom facilities, and a comfort station. These facilities are owned and operated by the City of San Diego. San Vicente Reservoir is in phase two of expansion as part of the San Diego County Water Authority Emergency Storage Project. During phase four scheduled for 2008 – 2012, the reservoir will be closed to recreation.

Currently, there are no boat-holding tank pump-out stations, marinas, or berths available at the reservoirs. Trash cans and portable toilets are placed above current water levels. San Vicente Reservoir has a restricted access area encompassing the outlet tower. This area is demarcated by a floating barrier to prevent direct recreational contact to the water immediately available to the Alvarado Water Treatment Plant. The potential sources of contamination associated with the recreational activities include; erosion, trash, microorganisms associated with humans and animals, spillage of petroleum products, and production of combustion byproducts.

Title 22 contaminates are monitored quarterly and nutrients monthly (Figure 2-3.1). Microorganisms including Total Coliforms, E. coli, and Enterococcus are monitored weekly.

El Capitan Reservoir:

The primary purpose of El Capitan Reservoir is for domestic water supply, while recreation is a secondary use of the reservoir. El Capitan Reservoir is open to the public for recreational use, including water contact activities use, three days a week, February through October. Recreational activities include; boating, fishing, waterskiing, picnicking and hiking (Table 2-3.25).

Table 2-3.25 El Capitan Reservoir Number of Permits Sold

Year	Fishing	Launch	Body Contact	Rentals	
				Motor	Row
2001	18,595	12,206	6,768	NA	1,555
2002	12,179	7,936	8,538	NA	885
2003	12,048	8,115	5,038	NA	691
2004	12,447	8,271	5,888	719	362
2005	Figures not reconciled				

The facilities consist of launch, rental boats, trash receptacles, pre-fabricated restroom facility, portable toilets, floating restroom facility, and a comfort station. These facilities are owned and operated by the City of San Diego. There are no boat-holding tank pump-out stations, marinas, or berths available at the reservoirs. Trash cans and portable toilets are placed above current water levels. El Capitan Reservoir has a restricted access area encompassing the outlet tower. This area is demarcated by a floating barrier to prevent direct recreational contact to the water immediately available to the

Alvarado Water Treatment Plant.

The potential sources of contamination associated with the recreational activities include; erosion, trash, microorganisms associated with humans and animals, spillage of petroleum products, and production of combustion byproducts.

Title 22 contaminates are monitored quarterly and nutrients monthly (Figure 2-3.1). Microorganisms including Total Coliforms, E. coli, and Enterococcus are monitored weekly.

Sutherland Reservoir:
The primary purpose of Sutherland Reservoir is for domestic water supply, while recreation is a secondary use of the reservoir. Sutherland Reservoir is open to the public for recreational use three days a week, March through September, and two days a week, October through January. Recreational activities include; boating, fishing, hunting, picnicking and hiking (Table 2-3.26).

Table 2-3.26 Sutherland Reservoir Number of Permits Sold

Year	Fishing	Hunting	Launch	Camp Hope Body Contact	Rentals	
					Motor	Row
2001	7,161	222	1,727	NA	NA	646
2002	6,381	195	1,370	NA	NA	641
2003	4,260	191	694	125*	NA	411
2004	3,731	185	476	125*	198	163
2005	Figures not reconciled			75*	Figures not reconciled	

* Figures are estimates provided by the City of San Diego

The facilities consist of concession, launch, rental boats, trash receptacles, portable toilets, floating restroom facility, and a comfort station. These facilities are owned and operated by the City of San Diego. There are no boat-holding tank pump-out stations, marinas, or berths available at the reservoirs. Trash cans and portable toilets are placed above current water levels. The potential sources of contamination associated with the recreational activities include; erosion, trash, microorganisms associated with humans and animals, spillage of petroleum products, and production of combustion byproducts. Title 22 contaminates are monitored quarterly (Figure 2-3.1). Microorganisms including Total Coliforms, E. Coli, and Enterococcus are monitored monthly.

In 2003 the Camp Hope Program was initiated. This program allows water contact activities five days a week June through September (Table 2-3.26). During this period, Title 22 contaminates are monitored quarterly. Microorganisms including Total Coliforms, E. coli, and Enterococcus are monitored weekly while Cryptosproidim and Giardia are monitored monthly.

Wastewater / Reclaimed water -

The Wastewater / Reclaimed water treatment facilities permitted by the RWQCB in the San Diego River System Watersheds are identified in Figure 2-3.1 and Table 2-3.27.

Table 2-3.27 Wastewater/ Reclaimed Water Facilities

Watershed	RCQCB Facility I.D.	Facility Name	Address	Highest level of Treatment	Discharge To:	Land Disposal Order #
San Vicente	9000000076	San Vicente WRP	2278 San Vicente Rd	Tertiary	Recycled Water Use, Spray Field	93-003
El Capitan	9000000109	Julian WPCF	2936 State Rte 79	Un-disinfected Secondary	Percolation Ponds	83-009
El Capitan	9000000122	Heise Park Campground	4945 Heise Park Rd	Un-disinfected Secondary	Percolation Ponds	93-009
El Capitan	NA	Lake Cuyamaca Public Rec Area	15027 State Rte 79	Septic Tank Effluent	Leach Field	R9-2004-0015
San Vicente	NA	Barona WWTP	1932 Wildcat Canyon Rd	Tertiary	Spray Field	NA

San Vicente Watershed

San Vicente Water Reclamation Plant (WRP):

The Ramona Municipal Water District (RMWD) is the agency responsible for this facility. RWQCB Order No. 93-003 establishes the discharge specifications for the San Vicente WRP (Table 2-3.28).

The treatment system is comprised of; headwork's facility, two oxidation basins, four clarifiers, return activated biosolids pump station, reverse osmosis facility, and a chlorine contact chamber. The plant effluent is discharged to reclaimed water holding ponds located at the facility. The RWQCB requirements (Order No. 93-03, Addendum No. 2) certify an average daily design flow of up to 0.75 mgd. The Design Certification Report prepared for the RMWD in 2005 indicates that the San Vicente facilities are designed to provide preliminary, secondary, and tertiary treatment for an ultimate annual average flow of 0.80 mgd

The recipients of reclaimed water from the San Vicente Water Reclamation Facility are the Spangler Peak Ranch and the San Vicente Golf Course. The Spangler Peak Ranch is located at the end of Creelman Lane, and uses an average 14.5 million gallons per month, with higher usage during summer months and lower during winter months. The San Vicente Golf Course is located on San Vicente Road and uses on average 4.5 million gallons per month with a similar seasonal demand.

Biosolids Disposal Practices:

Biosolids from the San Vicente WRF is dewatered in drying beds at the plant site. The waste is routinely hauled to a landfill for final disposal.

Table 2-3.28 San Vicente Water Reclamation Facility Effluent Discharge Limitations, Order # 93-003, Addendum 2

Constituent	Unit	Daily Maximum[1]	30-day Average[2]	12-Month Average[3]
Biochemical Oxygen Demand (BOD_5 @ 20^0C)	mg/L	45	30	-
Total Suspended Solids	mg/L	45	30	-
pH	Within the limits of 6.0 to 9.0 at all times			
Total Dissolved Solids	mg/L	650	-	600
Chloride	mg/L	275	-	250
Manganese	mg/L	0.06	-	0.05
Iron	mg/L	0.4	-	0.3
Boron	mg/L	0.6	-	0.5
Coliform	MPN/100ml	*	*	-
Turbidity	NTU	*	*	-

1. The daily maximum effluent limitations shall apply to the results of a single composite or grab sample
2. The 30 day average effluent limitation shall apply to the arithmetic mean of the results of all samples collected during any 30 day consecutive calendar day period.
3. The 12 month average effluent limitation shall apply to the arithmetic mean of the results of all samples collected during the previous 12 months.

* Effluent used for irrigation purposes shall conform to all applicable provisions of California Code of Regulations, Title 22, Division 4, Chapter 3 (Reclamation Criteria) in its present form or as it may be amended.

Barona Wastewater Treatment Plant (WWTP):

The Barona WWTP is lacking documentation due to the fact that this facility is located on an Indian Reservation and does not require approval from the California RWQCB. The facility has therefore been in operation without any permits from the RWQCB or any other agencies. Information about the treatment and disposal system is from a newspaper article and from City of San Diego (City) staff.

The Barona WWTP serves the Barona Casino facilities located on the Barona Indian Reservation. The compact package treatment plant is capable of tertiary treatment. The plant effluent is currently stored in 50,000 and 25,000 gallon tanks and disposed of on spray fields located on the Reservation.

El Capitan Watershed

Julian Water Pollution Control Facility (WPCF):

The County of San Diego is the agency responsible for this facility. RWQCB Order No. 83-009 establishes the discharge specifications for the Julian WPCF (Table 2-3.29). The treatment and disposal system is comprised of; two 80,000 gallon oxidation basins and a 225,000-cubic-foot storage/settling basin. The RWQCB requirements certify the maximum discharge of 0.040 mgd by spray disposal.

The treated effluent is disposed on a 14 acre field where a grass crop is grown and harvested for cattle feed. During wet weather periods when irrigation cannot be successfully practiced, an interceptor ditch, underground drainage system, and storage reservoir with a 24 day capacity prevents effluent runoff from the irrigation area.

Table 2-3.29 Julian Sanitation District Effluent Discharge Limitations, Order # 83-09, Addendum 1

Constituent	Unit	Daily Maximum[1]	12-Month Average[2]
Biochemical Oxygen Demand (BOD_5 @ 20^0C)	mg/L	50	40
Total Suspended Solids	mg/L	110	95
pH	Within the limits of 6.0 to 9.0 at all times		
Total Dissolved Solids	mg/L	-	550
Chloride	mg/L	-	120
Sulfate	mg/L	-	80

1. The daily maximum effluent limitations shall apply to the results of a single composite sample collected over a period of 24 hours, or grab sample.
2. The 12 month average shall be the arithmetic mean, using the result of analysis of all samples collected during any 12 consecutive calendar month period.

Biosolids Disposal Practices:

The facility has a complete oxidation process. There is no solid waste generated from the treatment process at this facility. In the event of biosolids generation, the biosolids will be dried in adjacent containment beds, stored in covered containment structures, and disposed of after testing in a sanitary landfill.

Heise Park Campground

The County of San Diego is the agency responsible for this facility. RWQCB Order No. 93-009 establishes the discharge specifications for Heise Park Campground (Table 2-3.30).

The treatment and disposal system is comprised of; package type modified activated sludge plant, storage pond, and percolation pond. The RWQCB requirements certify a maximum discharge of 18,000 gpd. The requirements certify disposal by spray irrigation on approximately two acres of park property.

Table 2-3.30 Heise Park Campground Effluent Discharge Limitations, Order # 93-09

Constituent	Unit	Daily Maximum[1]	30-day Average[2]
Biochemical Oxygen Demand (BOD @ 20^0C)	mg/L	45	30
Total Suspended Solids	mg/L	45	30
pH	Within the limits of 6.0 to 9.0 at all times		
Total Dissolved Solids	mg/L	700	-
Chloride	mg/L	90	-

Biosolids Disposal Practices:

Biosolids are dried in adjacent containment beds, stored in covered containment structures, and disposed of after testing in a sanitary landfill.

Lake Cuyamaca Public Recreation Area

The Lake Cuyamaca Recreation and Park District is the agency responsible for this facility. RWQCB Order No. R9-2004-0015 establishes the discharge specifications for the Lake Cuyamaca Public Recreation Area (Table 2-3.31).

The treatment and disposal system is comprised of; multiple chambered septic/holding tanks, 8,000 gallon surge tank, 8,000 gallon septic tank, and a rotating subsurface disposal leach field infiltration system. The RWQCB requirements certify a maximum daily discharge of 8,000 gpd. The dispersal field is 37.47 acres of land located at the north end of Lake Cuyamaca.

Table 2-3.31 Lake Cuyamaca Recreation and Park District, Lake Cuyamaca Public Recreation Area Effluent Discharge Limitations, Order # R9-2004-0015

Constituent	Unit	Daily Maximum[1]	12-Month Average[2]
Total Dissolved Solids (TDS)	mg/L	625	310
Nitrate (as NO_3)	mg/L	9.0	4.5
Boron	mg/L	1.4	0.70
Chloride	mg/L	105	55
Sulfate	mg/L	107	54
Manganese	mg/L	0.09	0.045
Fluoride	mg/L	1.8	0.90
Methylene Blue Active Substances (MBAS)	mg/L	1.0	0.45
Iron (Fe)	mg/L	0.55	0.30

1. The daily maximum effluent limitation shall apply to the results of a single composite or grab sample.
2. The 12 month average effluent limitation shall apply to the arithmetic mean of the results of all samples collected during any 12 consecutive calendar month period.

Biosolids Disposal Practices:

All biosolids must be disposed of in a municipal solid waste landfill, reused by land application, or disposed of in a sludge-only landfill.

Septic Systems

San Diego River System Watershed -

The primary goal in this section is to identify areas where septic systems may pose a threat to water quality. Septic systems treat and disperse relatively small volumes of wastewater from individual or small numbers of homes and commercial buildings. Poorly managed systems have been named as a concern by nearly every federal and state program that deals with water resource issues.

San Diego County's Department of Environmental Health maintains records of septic tank permits at their San Marcos and El Cajon offices. Prior to 2002 no electronic database existed to query the location, type, etc. of these permits. There are an estimated 90,000-100,000 homes county-wide on septic systems.

Estimates of septic system density for the 1996-2000 WSS were calculated by using the 1990 census tract data to determine population density with in each watershed. Next, a data layer of sewered and un-sewered areas was created from the City data base and from SanGIS community plan data. The sewered areas layer was overlaid with population density to create a new data layer. This data layer was queried to pull out polygons that were un-sewered with a population density greater than zero. Graduated color was applied to the septic density field to enable visual assessment of high potential concentrations of septic tanks.

In 2002 the County of San Diego Department of Environmental Health initiated an electronic database to track septic system permits issued throughout the County. The database does not contain historical permits issued before 2002, so an exact number of permits in a given community cannot be determined. However, the database indicates where new permits are being issued and if these permits are for new construction, repair, fire rebuild, etc. In addition, the permit records the hydrologic sub area where the septic system is located.

A data layer of the hydrologic sub areas of San Diego County was obtained from SanGIS. Numbers of permits issued in each hydrologic sub area was determined from the Counties database. Graduated colors were applied to the hydrologic sub area within each watershed to enable visual assessment of high issuant of septic system permits (Figure 2-3.18).Table 2-3.32 lists the communities within the watershed along with the number and type of septic system permits issued since 2002.. No septic systems are in the Murray Watershed, a fully developed sewer system serves this area.

Table 2-3.32 Number and Type of Septic System Permits in the El Capitan, San Vicente and Sutherland Watershed				
	Type of System			
Community	**New**	**Repair or Modified**	**Fire Rebuild**	**Other**
Alpine	74	54	4	2
Ramona/Fernbrook	63	33	10	0
Julian	52	47	16	0
Descanso	9	2	0	0
Lakeside	8	8	4	1
El Cajon	3	0	0	0
Harrison Park	1	2	1	0

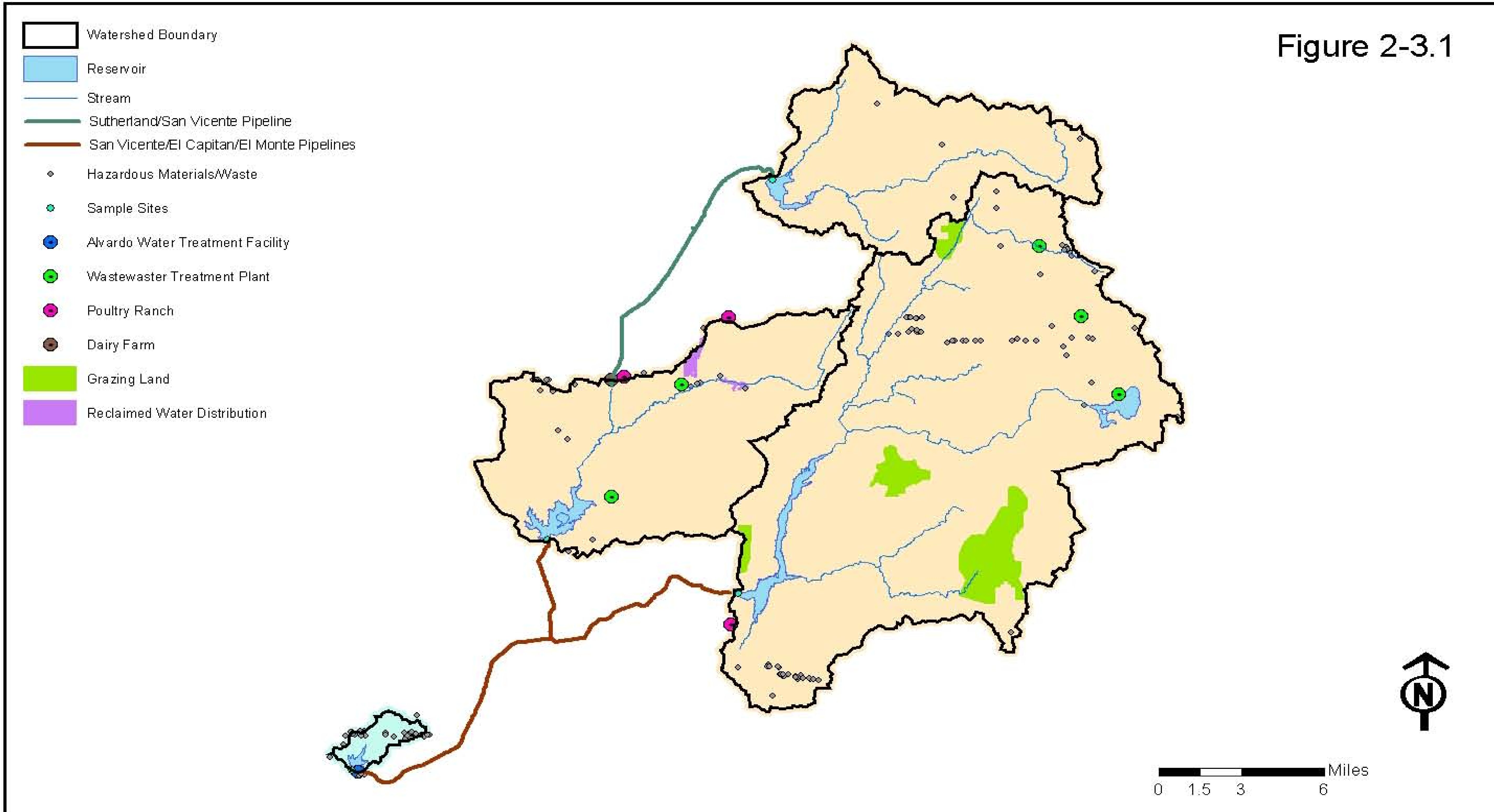
Sanitary Sewer Overflows

San Diego River System Watersheds -

The San Diego River System includes four watersheds; Murray, San Vicente, El Capitan, and Sutherland. There were 12 sanitary sewer overflows in the San Diego River Watershed reported to the Regional Water Quality Control Board (RWQCB) from 2001 through 2004 (Table 2-3.33). The current data available from the RWQCB is through June 30, 2004. Detailed information regarding sanitary sewer overflows is available at the Regional Water Quality Control Board website (www.swrcb.ca.gov/rwqcb9).

Table 2-3.33 San Diego River Watershed Sanitary Sewer Overflows 2001 - 2004						
Watershed	Year	RWCQB Tracking No.	Total Overflow Volume (Gallons)	Overflow Volume Released to Environmen t (Gallons)	Reach Surface Waters other than Storm Drain?	Receiving Waters
Murray	2001	166409	75	75	N	
Murray	2001	171258	65	65	N	
Murray	2001	229768	1060	1060	N	
Murray	2002	279704	1815	0	Y	Alvarado Creek
Murray	2002	317754	910	150	Y	None
Murray	2003	342003	225	225	Y	Lake Murray Diversion Ditch
San Vicente	2001	012001	1000	1000	N	
San Vicente	2001	012003	150	140	N	
San Vicente	2003	023001	50	50	N	
San Vicente	2003	023003	500	500	N	
San Vicente	2004	034004	?	?	Y	Klondike Creek
El Capitan	2002	023004	12108	11000	N	

San Diego River System GENERAL SETTING



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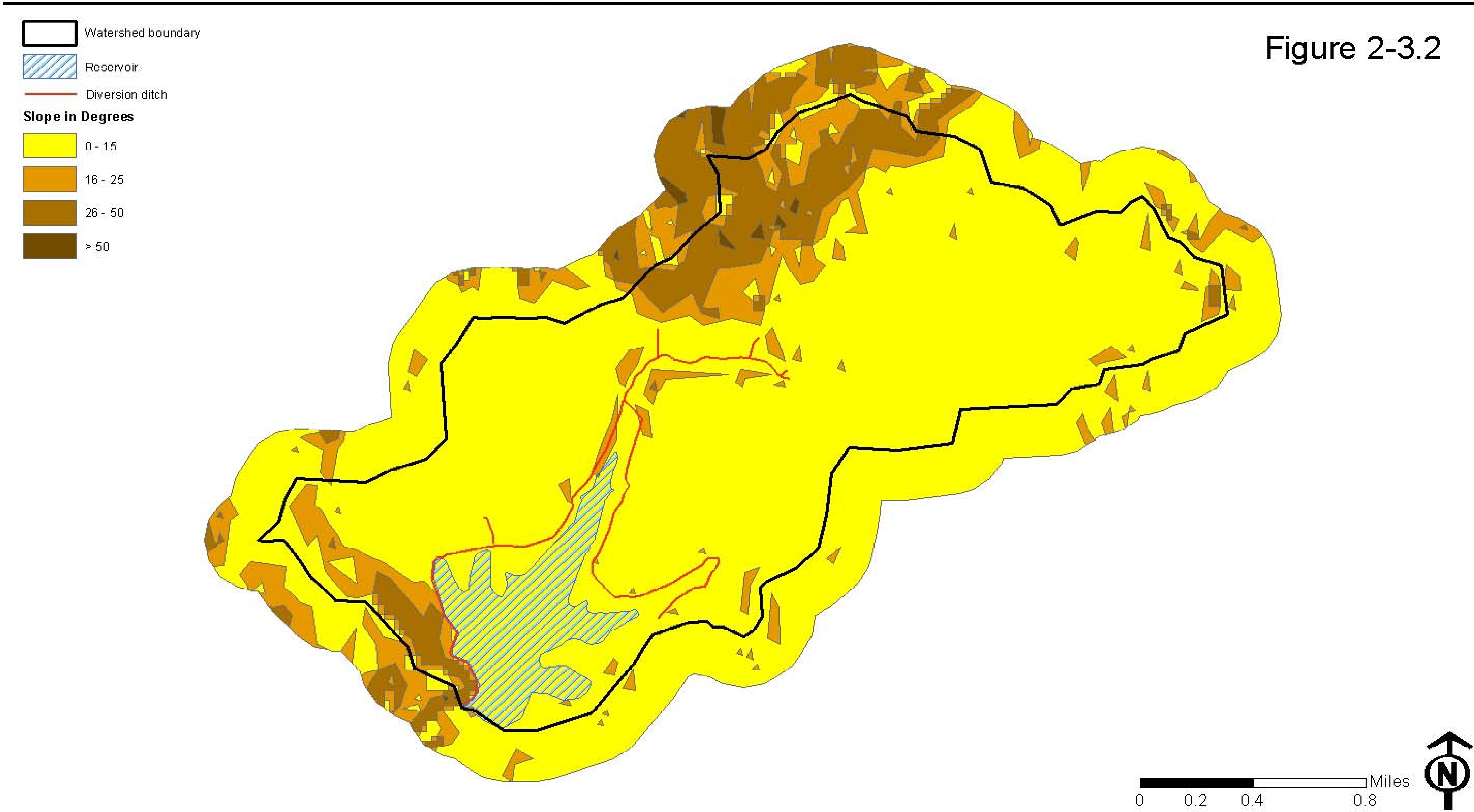
Created By: Dennis Brown
Date: 30 November 2005

Murray Watershed SLOPE



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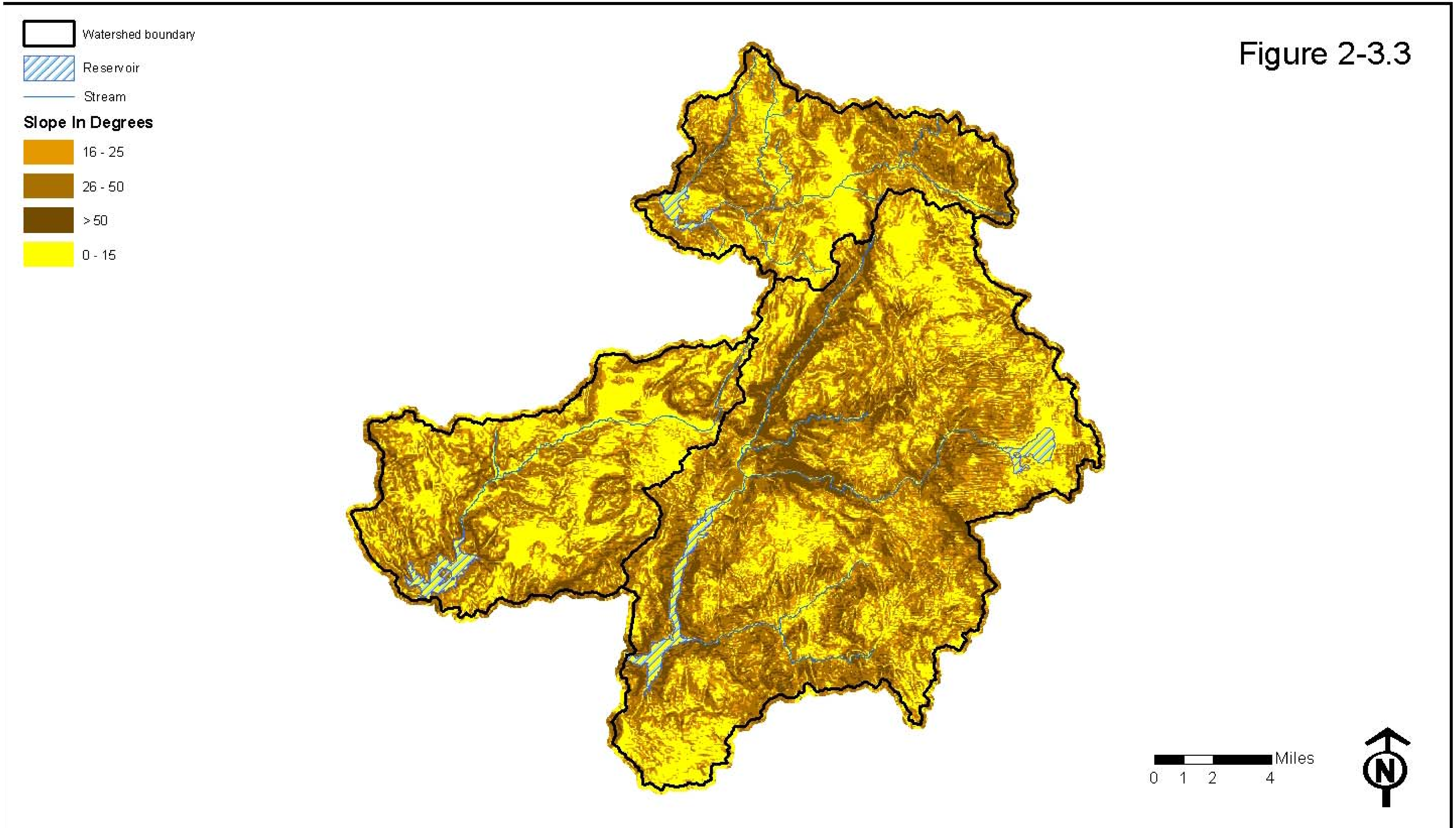
Created By: Dan Daft
Date: 8/2/05

San Vicente, El Capitan & Sutherland Watersheds SLOPE



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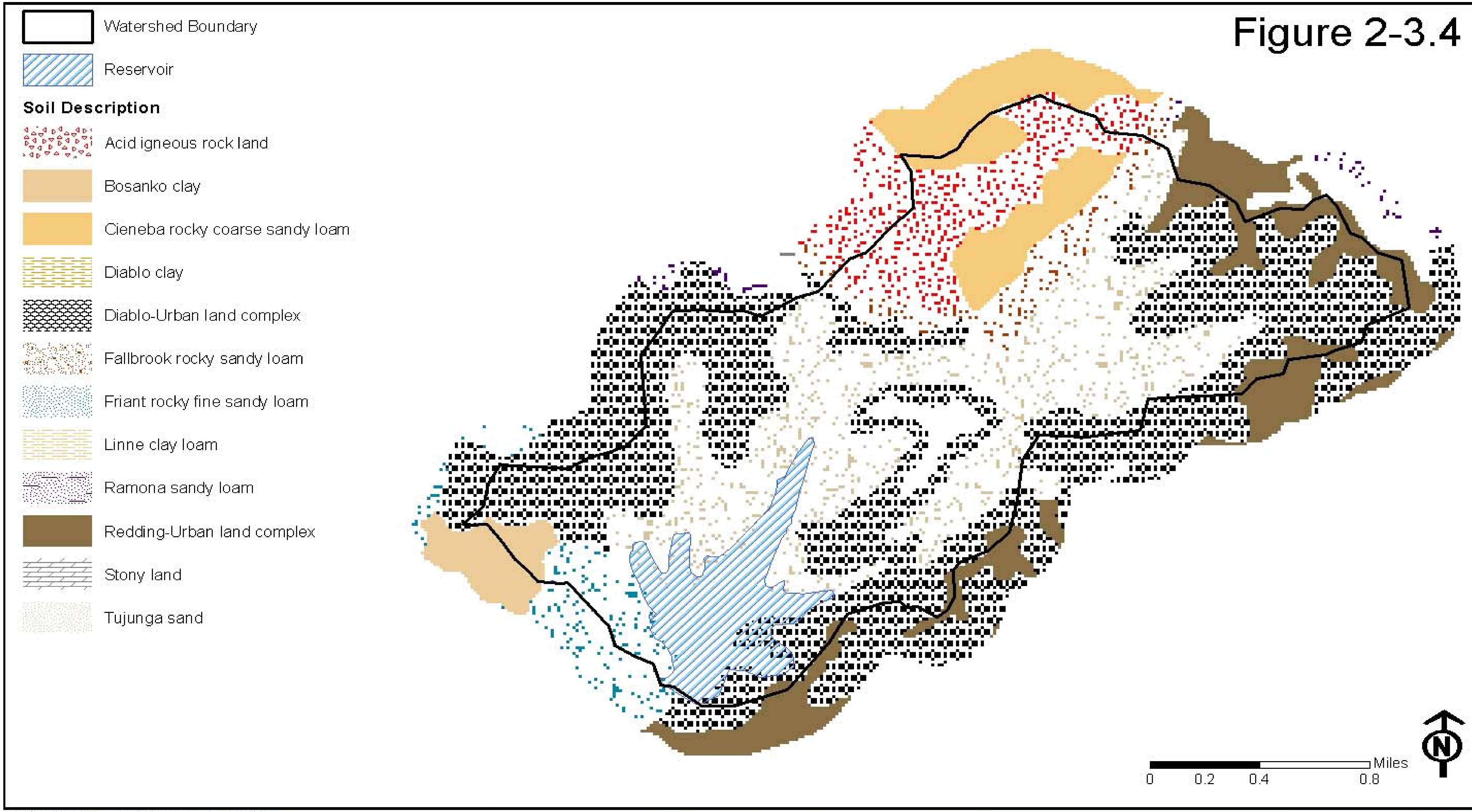
Created By: Dan Daft

Murray Watershed SOILS



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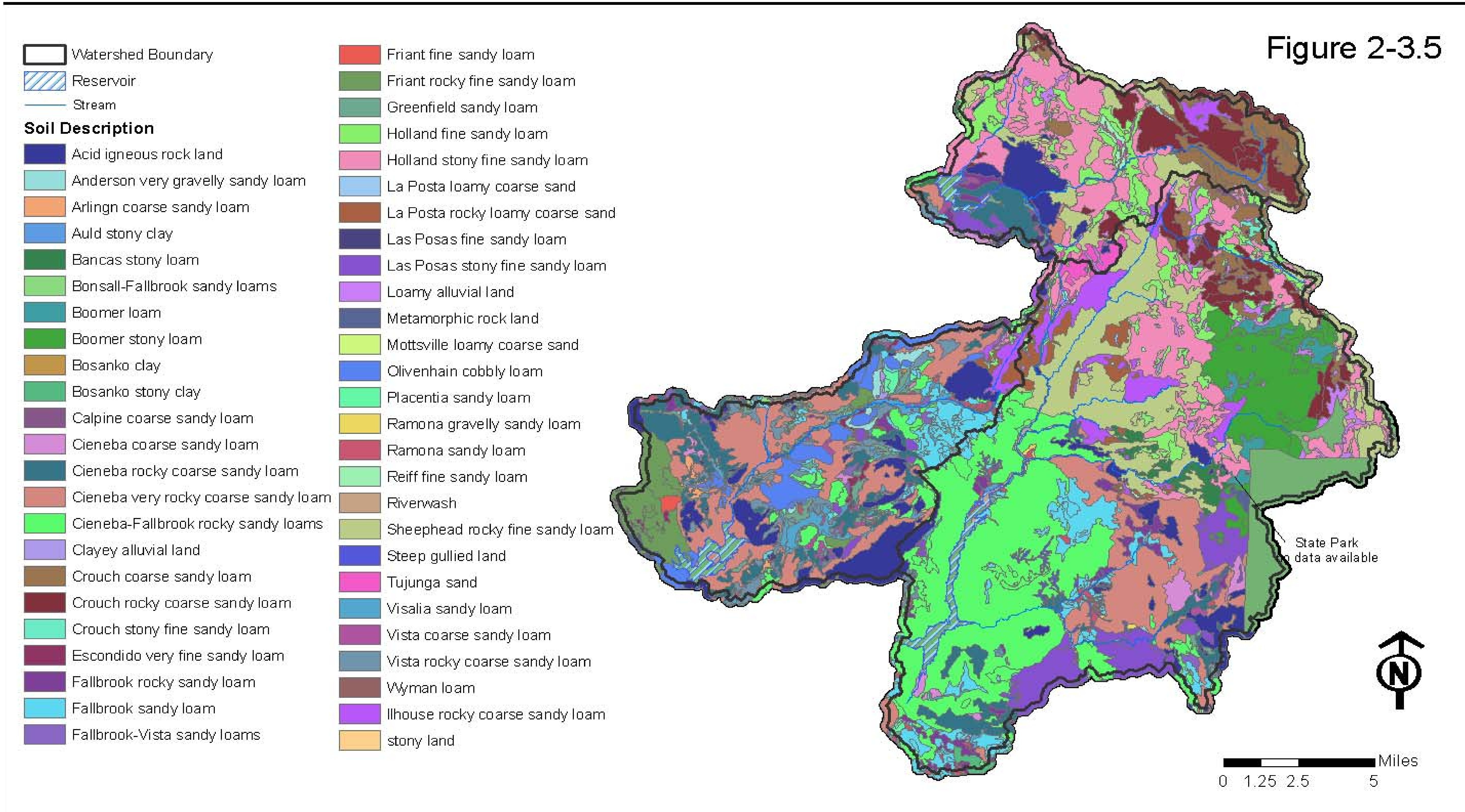
Date: 8/9/05

SanGIS

San Vicente, El Capitan & Sutherland Watersheds SOILS



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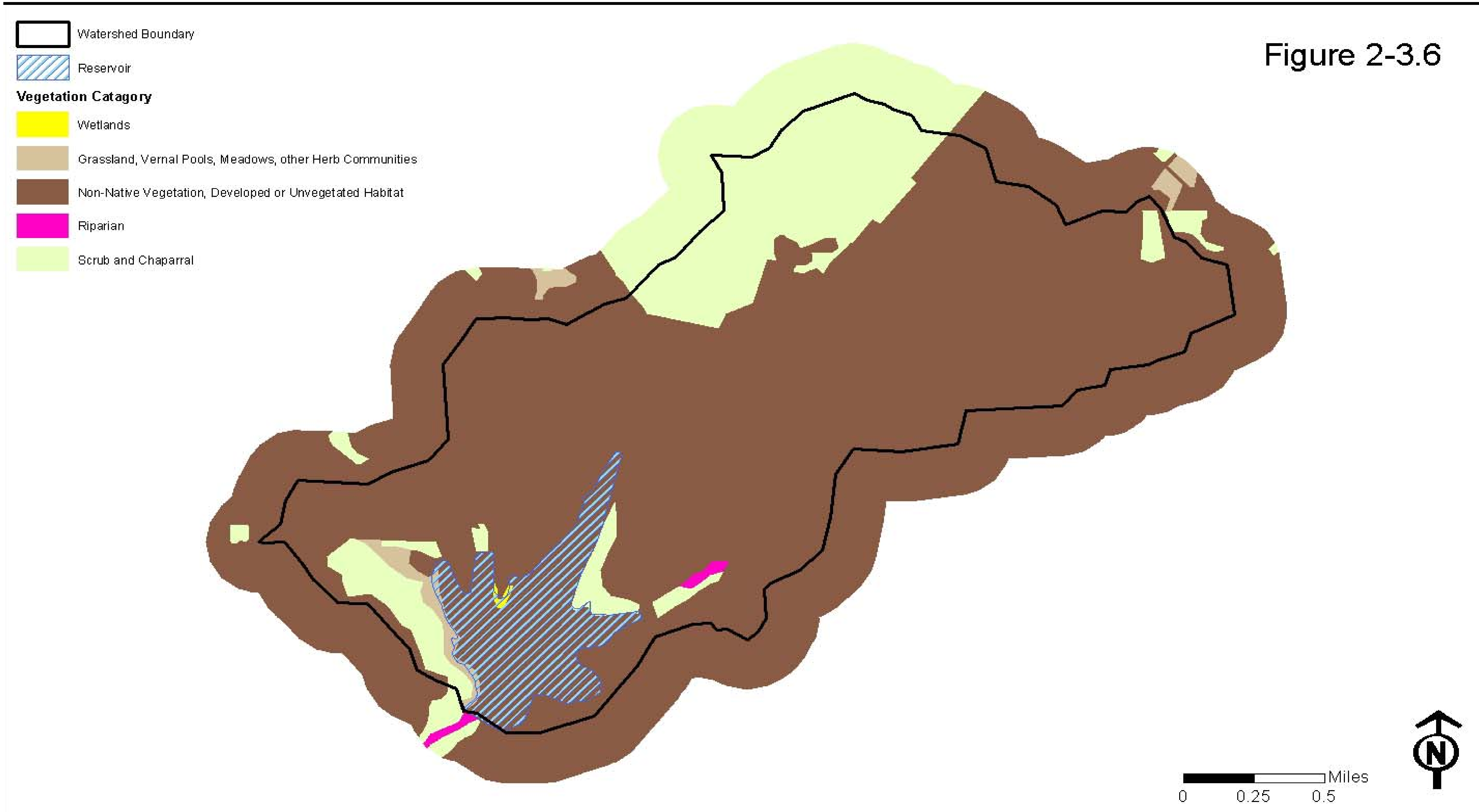
Created By: Dennis Brown
Date: 25 August 2005

Murray Watershed VEGETATION

Figure 2-3.6



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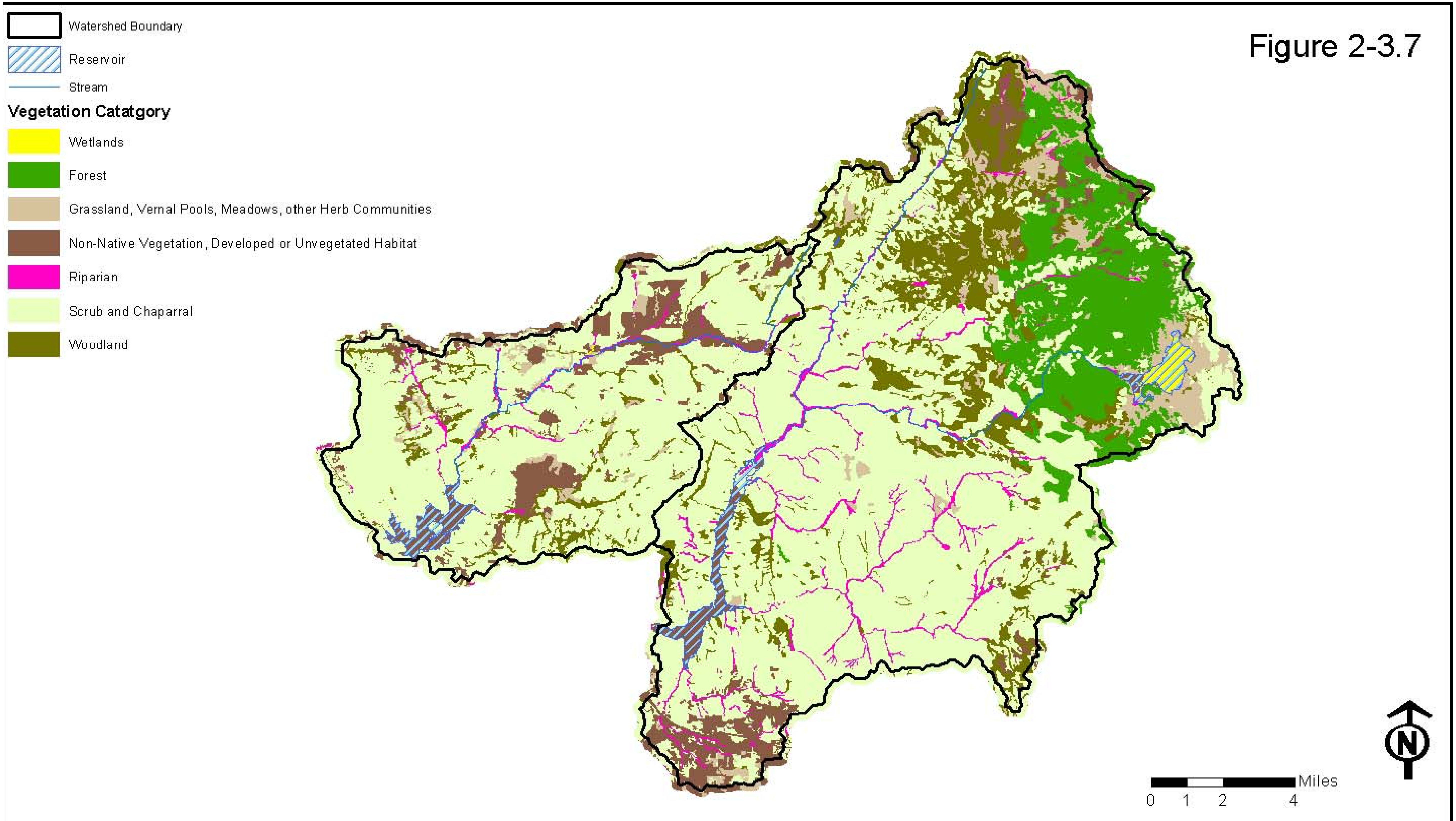
Created By: V.Chancer
Date: 08/15/05

91

San Vicente & El Capitan Watersheds VEGETATION



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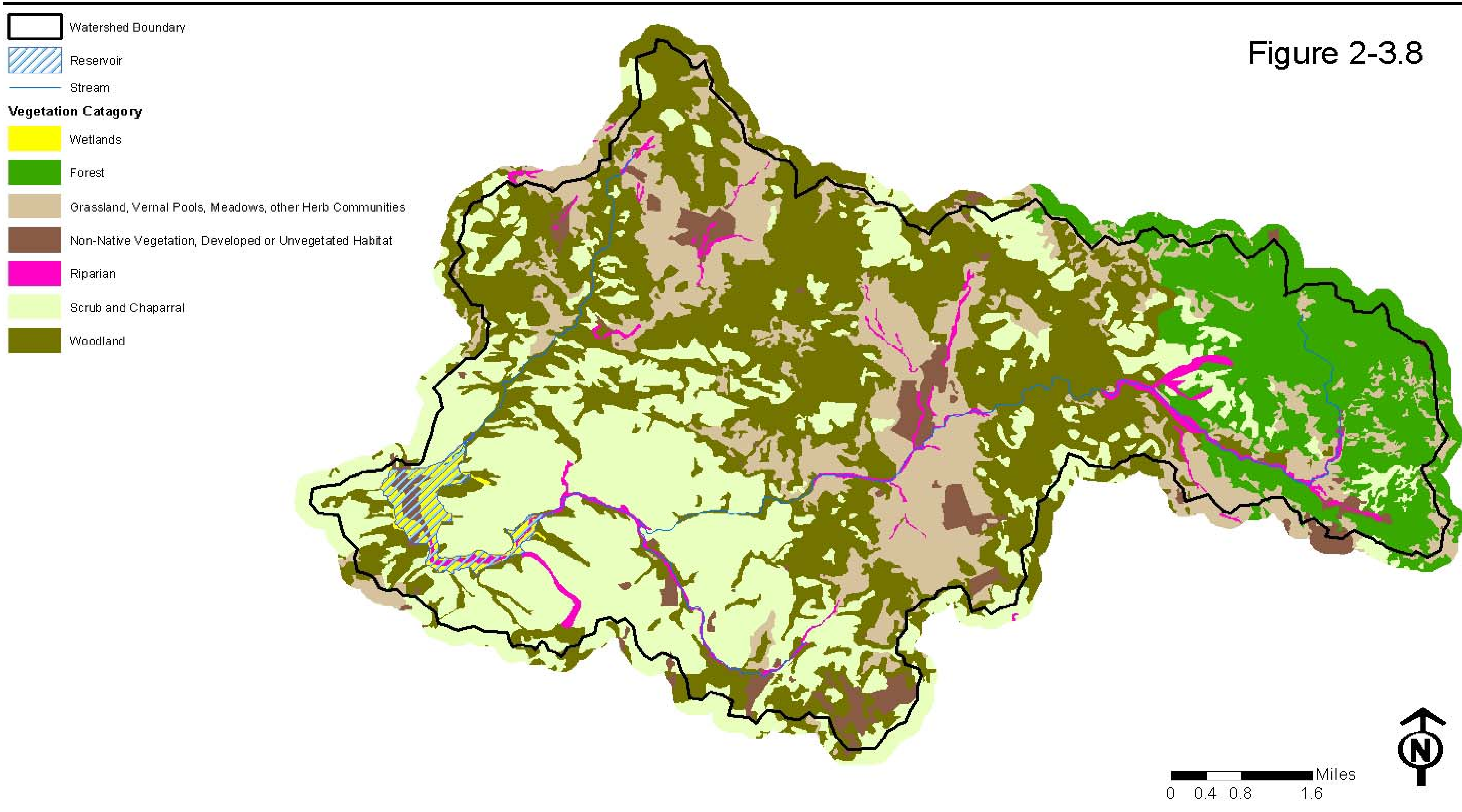
Sutherland Watershed VEGETATION



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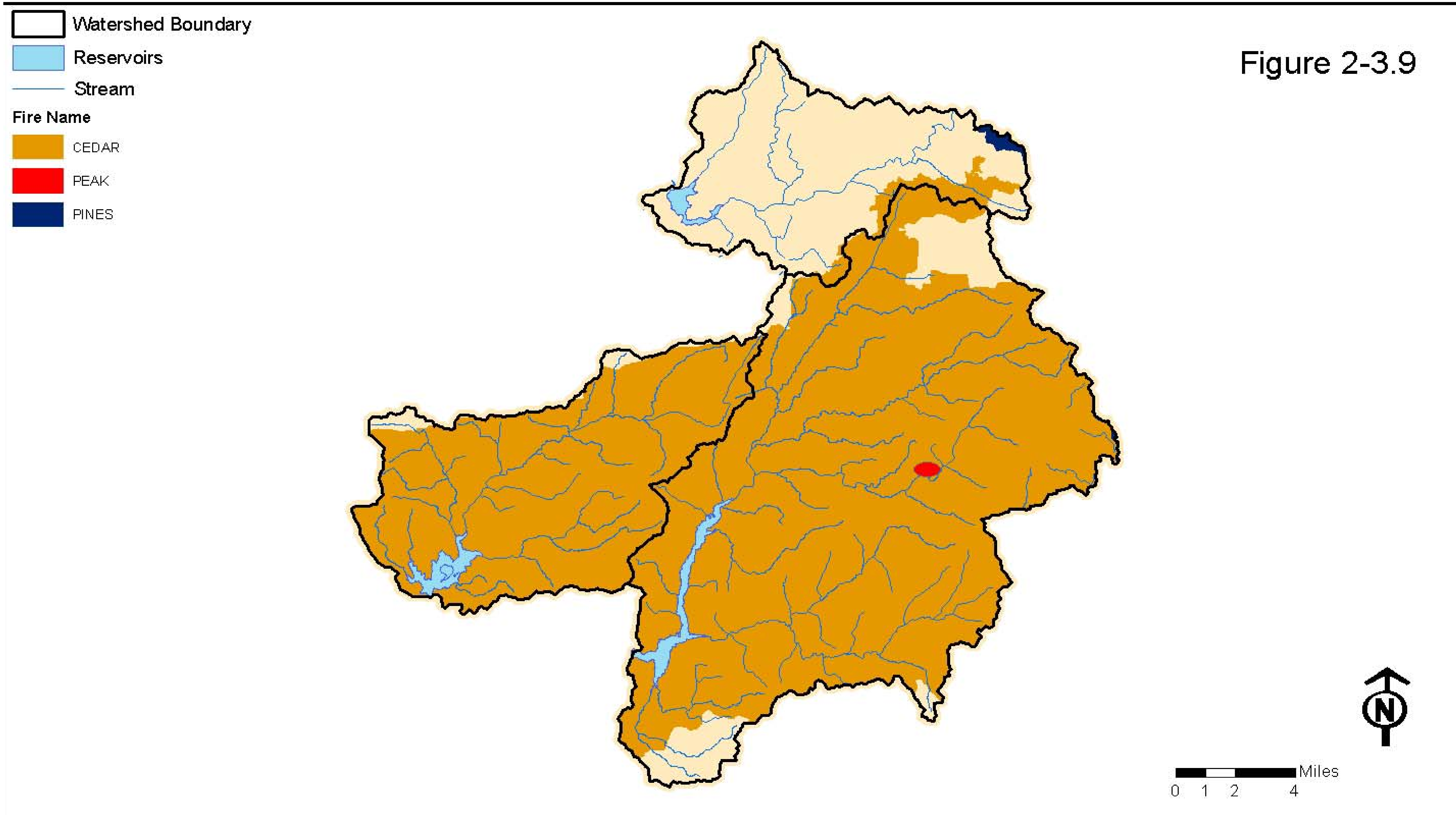
Fire Perimeters for the San Vicente, El Capitan and Sutherland Watersheds



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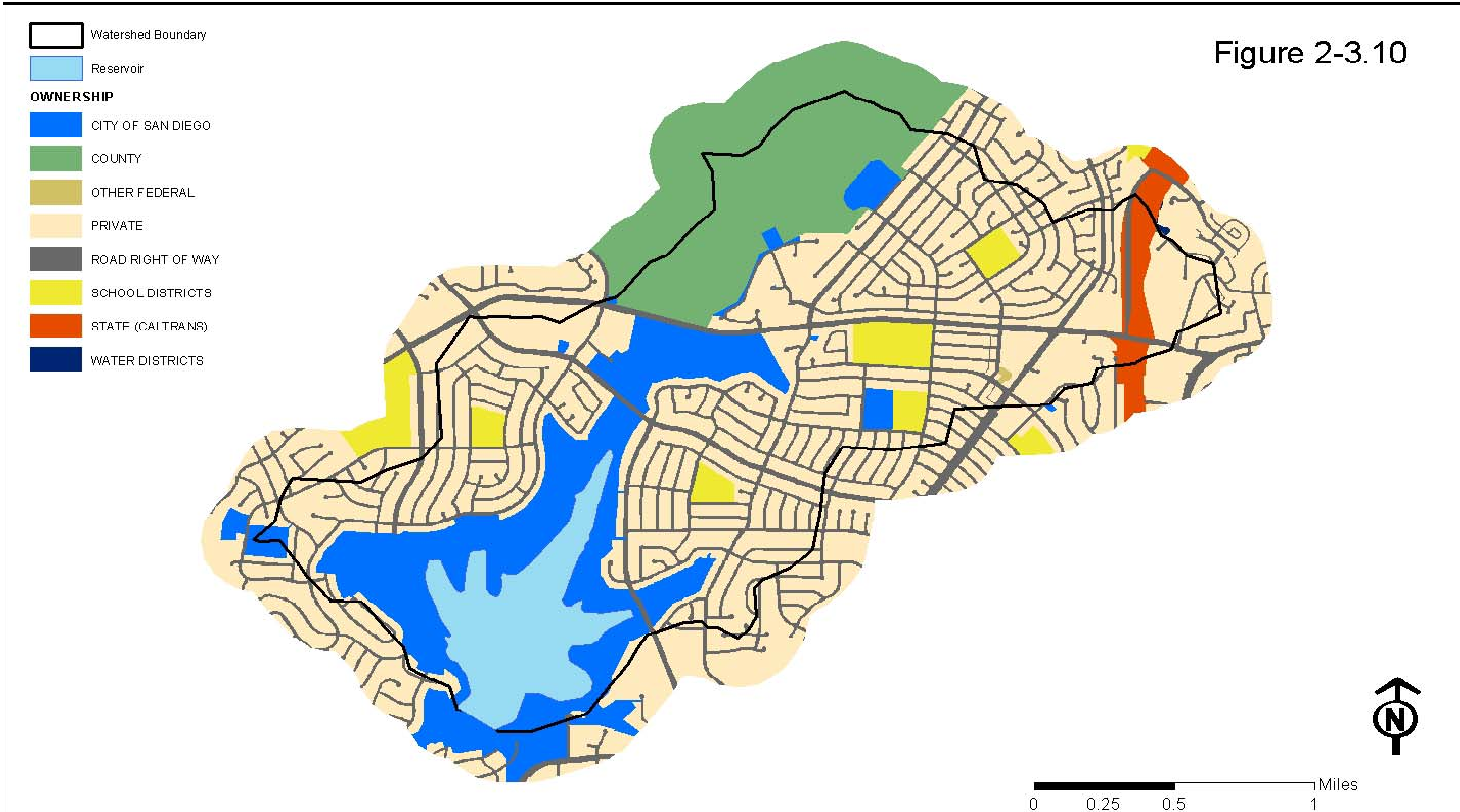
Date: 11/28/05

Murray Watershed LAND OWNERSHIP



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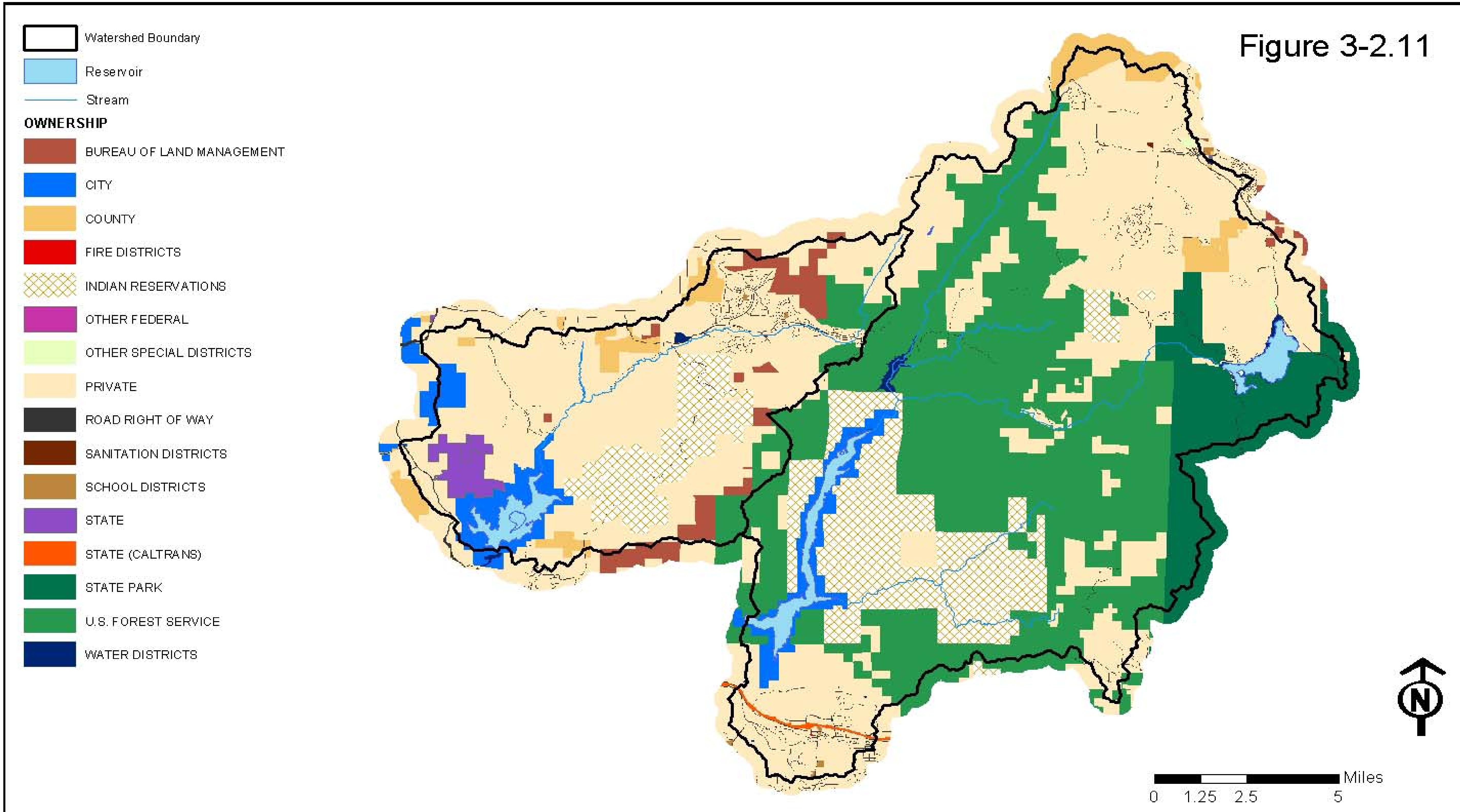
Date: 4 January 06

San Vicente & El Capitan Watersheds LAND OWNERSHIP



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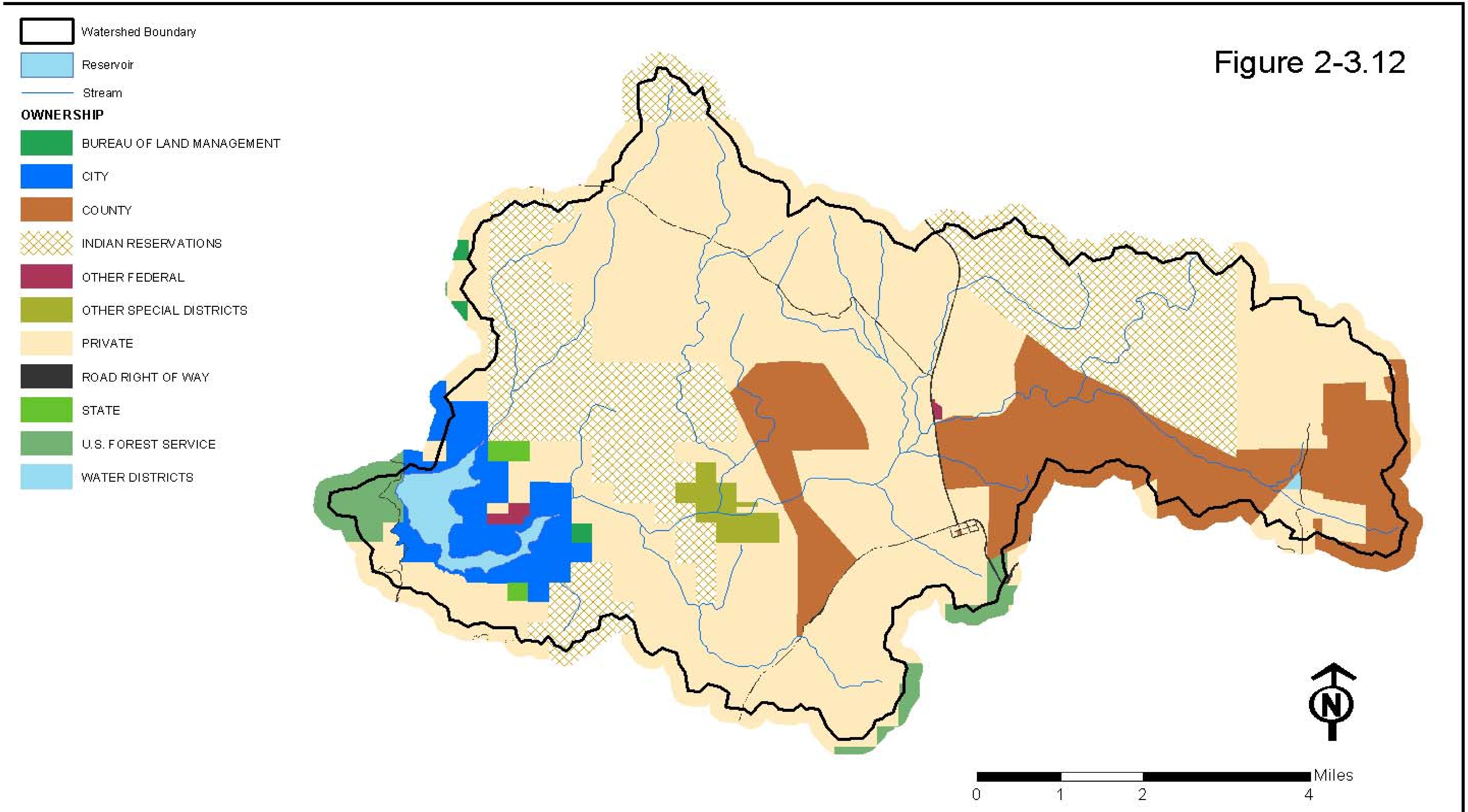

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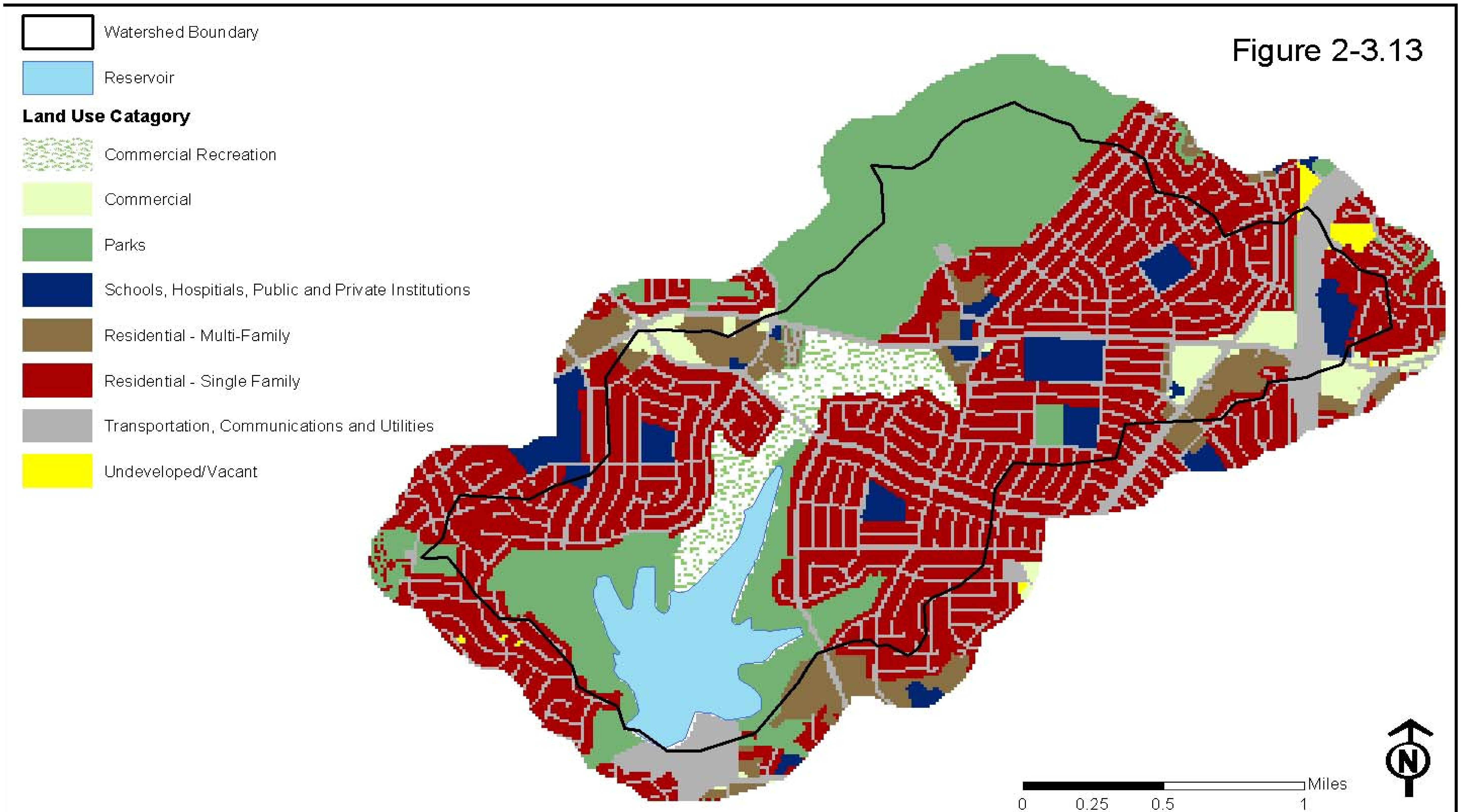
Date: January 9, 2006

Murray Watershed LANDUSE



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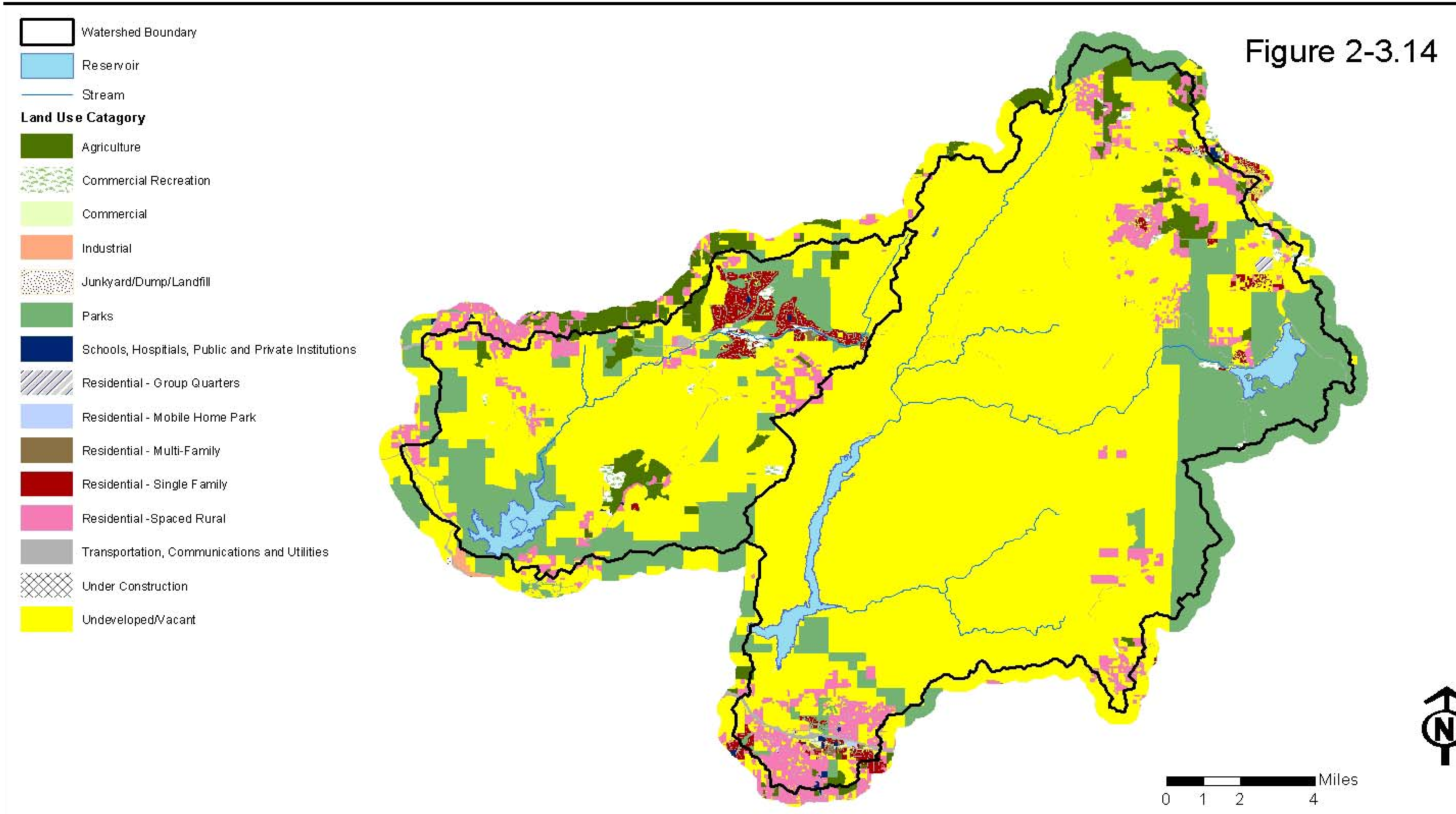
San Vicente & El Capitan Watersheds LANDUSE



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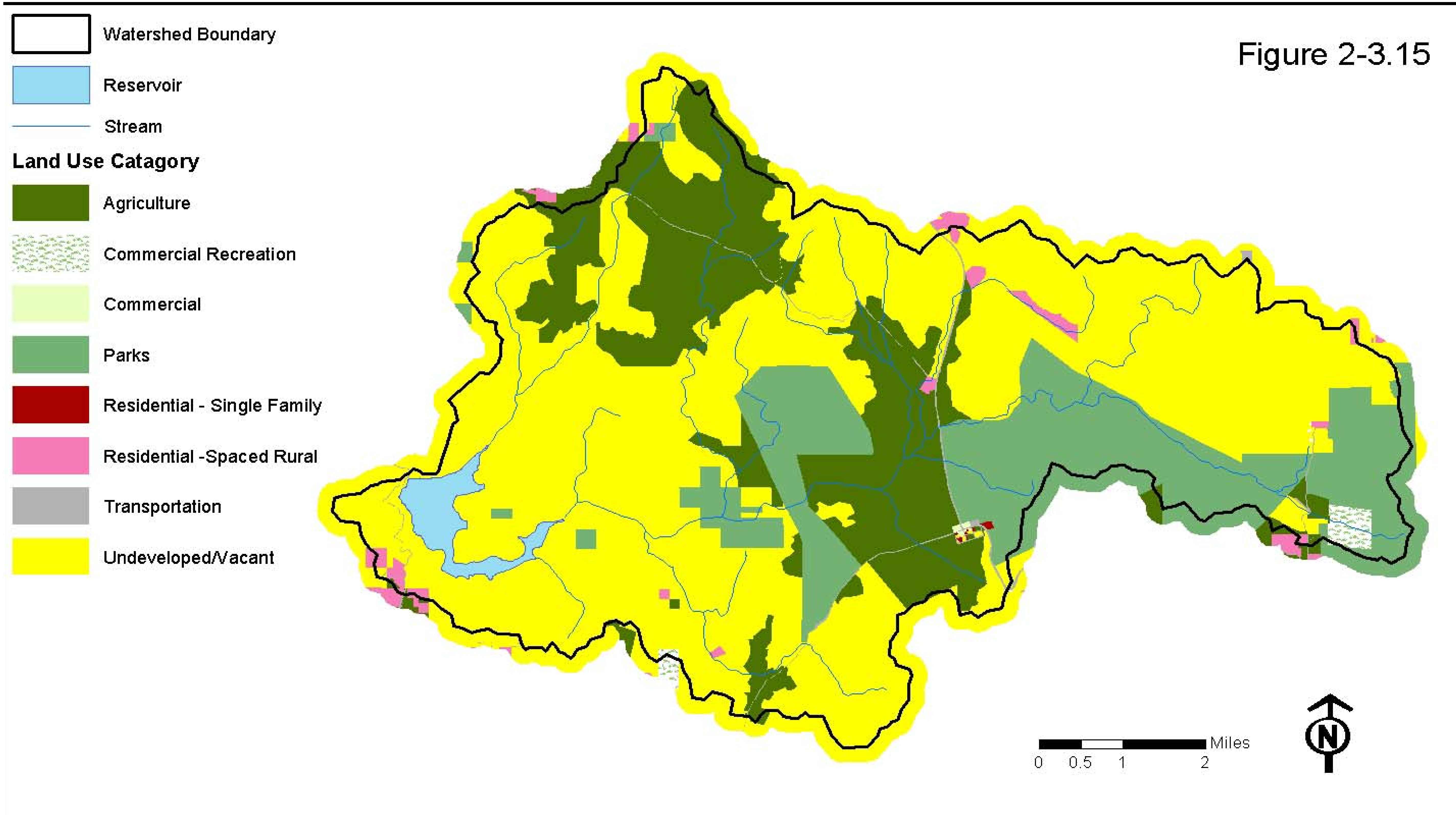
Sutherland Watershed LANDUSE



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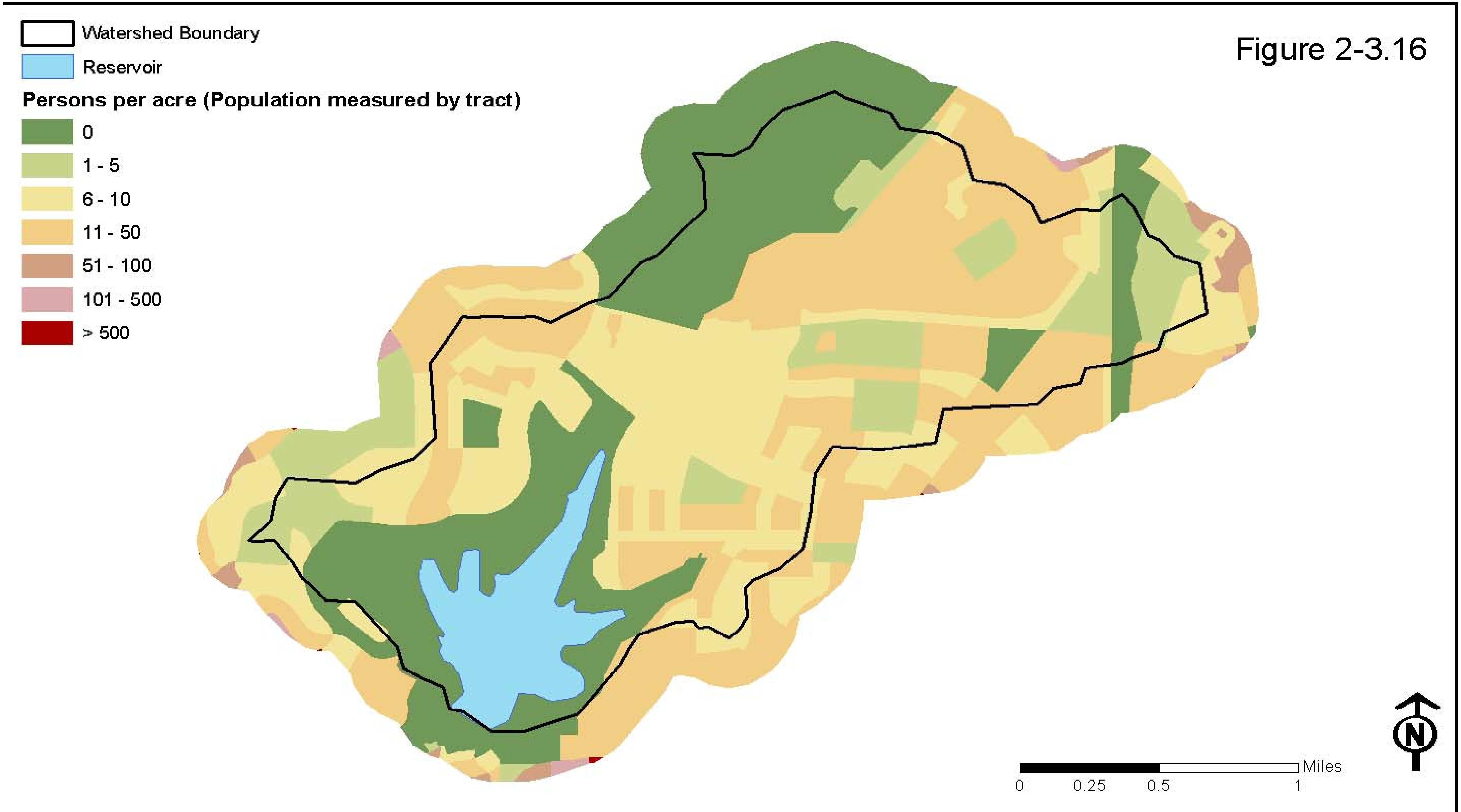
Murray Watershed POPULATION DENSITY



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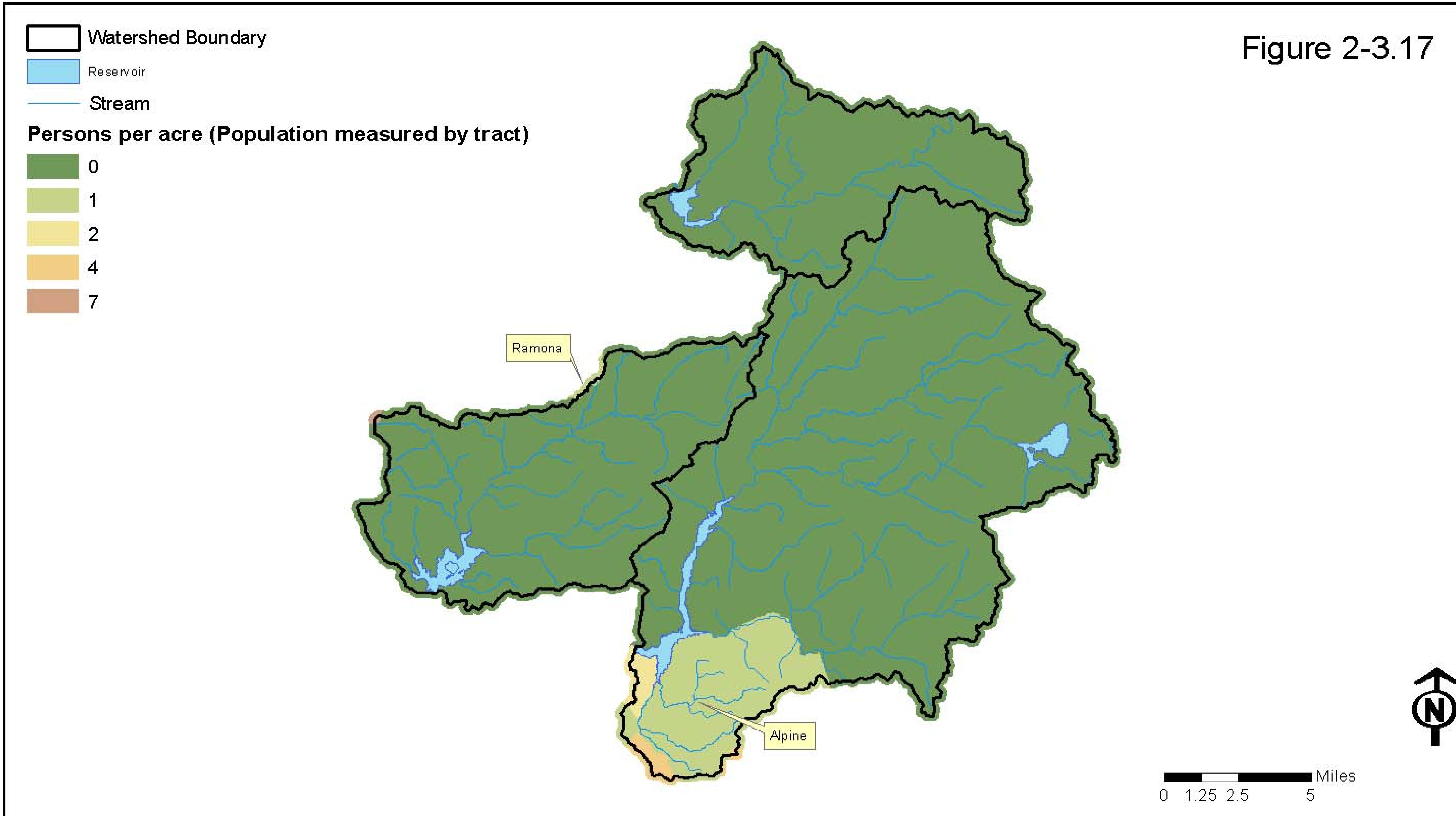
San Diego River Watershed POPULATION DENSITY



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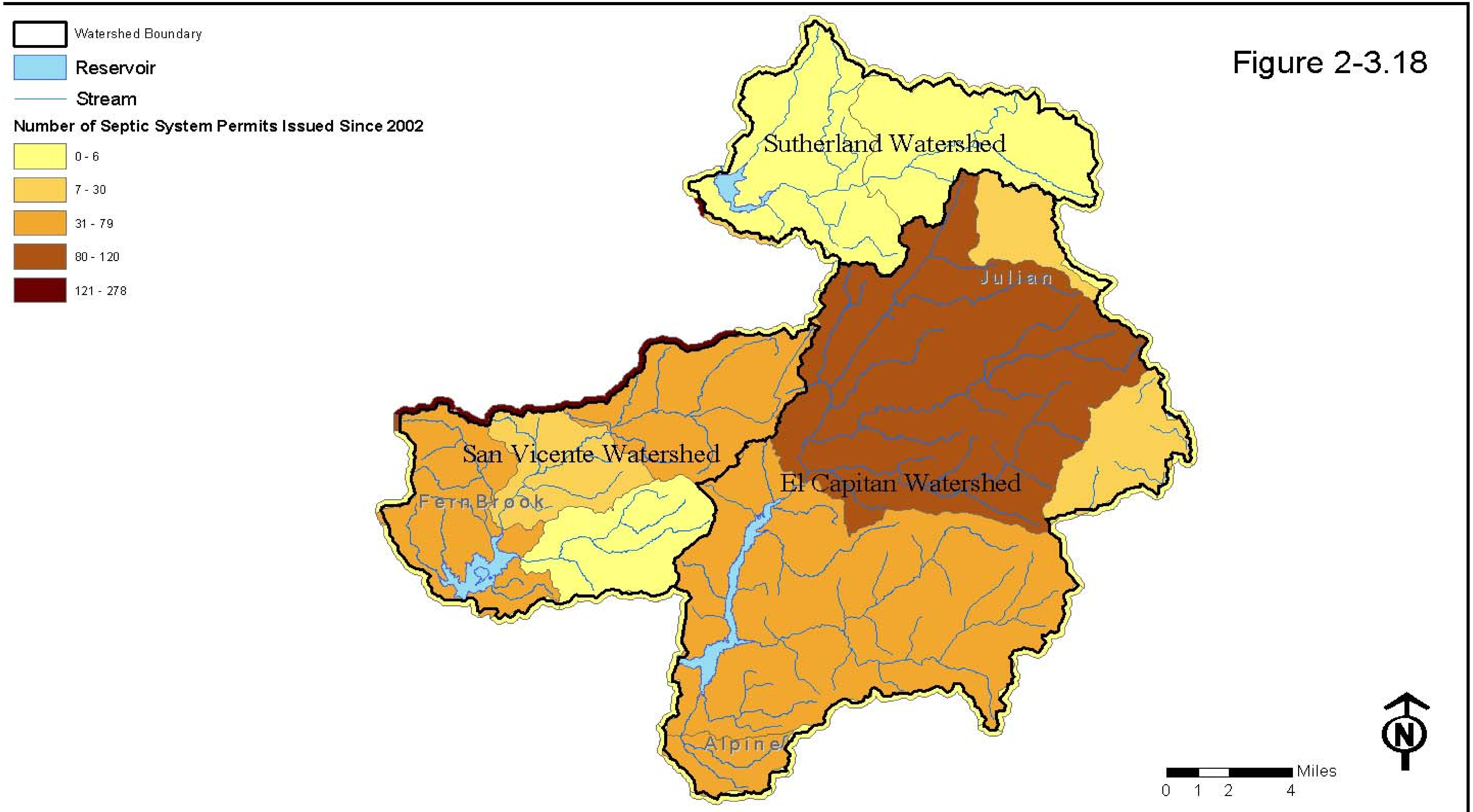
Septic System Permits Issued in the San Vicente, El Capitan & Sutherland Watersheds Since 2002



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