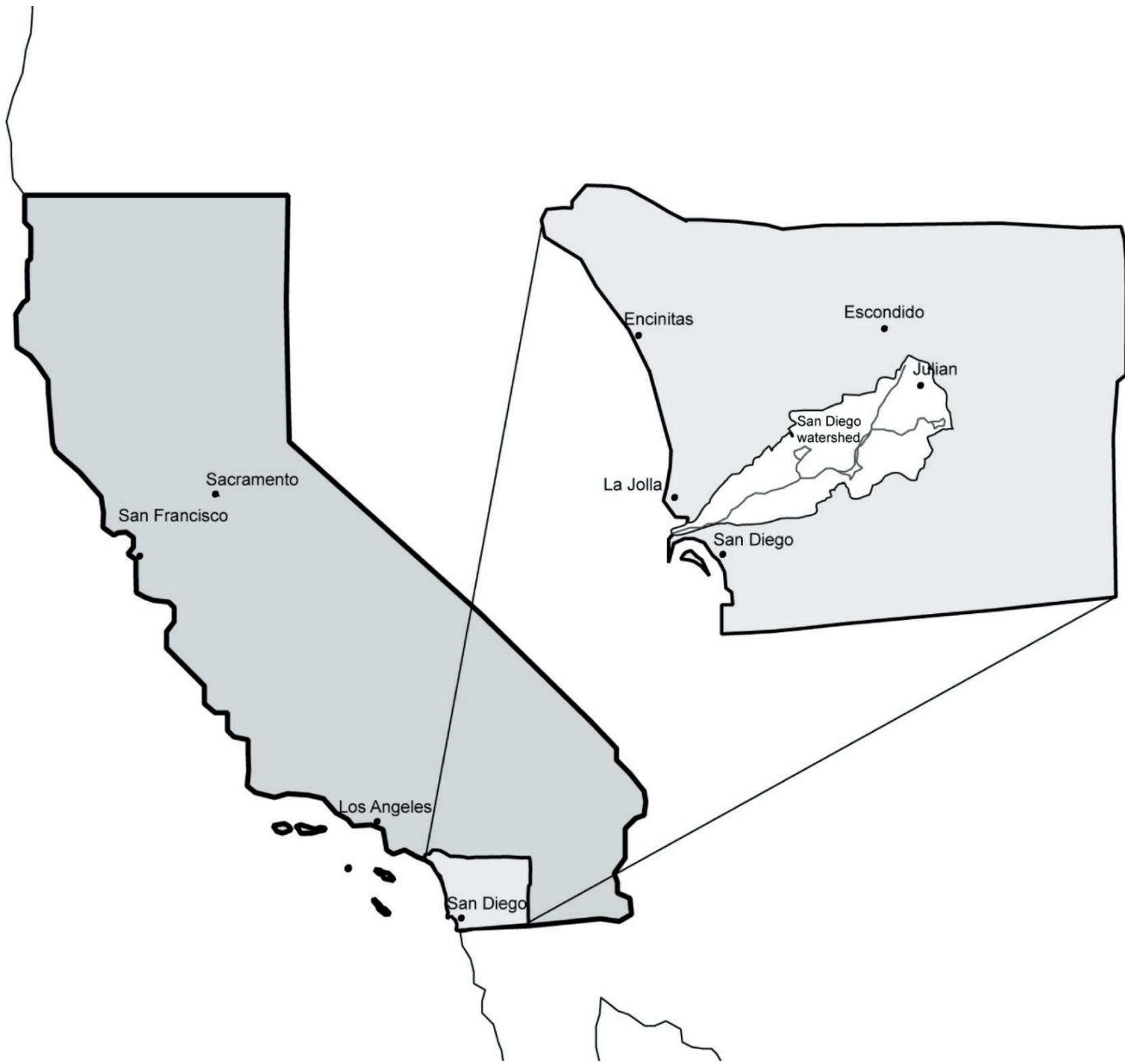




San Diego River Context



The San Diego River is located in San Diego County, California



The San Diego River watershed

SETTING

The San Diego River and its watershed are located in the southern California county of San Diego.

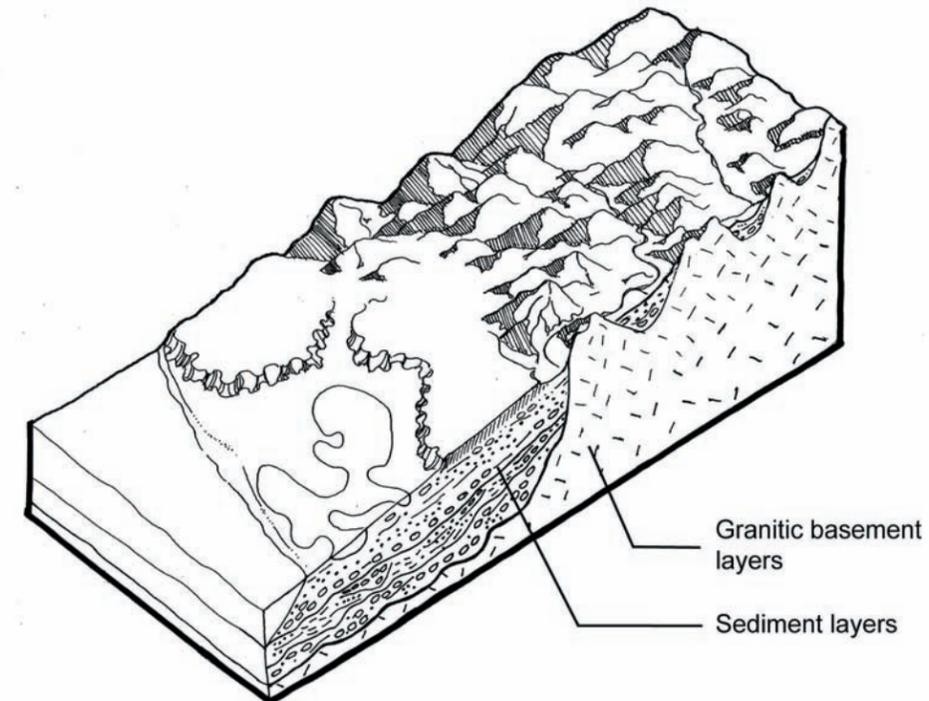
San Diego River Watershed

Overview

The San Diego River flows approximately 52 miles from its headwaters located near the towns of Julian and Santa Ysabel in the Volcan mountains through unincorporated San Diego County, the city of Santee, and the city of San Diego to reach the Pacific Ocean at its mouth

adjacent to Mission Bay. This study focuses on the San Diego River watershed, including all areas that drain into the river or its tributaries, which covers an area of approximately 440 square miles. Major tributaries to the San Diego River include Boulder Creek, joining the San Diego River in the headwaters above El Capitan Reservoir, San Vicente Creek, joining the river in Lakeside, and numerous smaller tributaries including Cedar Creek in the headwaters, Forester Creek and Sycamore Creek in Santee, Oak Creek in Mission Trails Regional Park, as

well as Alvarado Creek, Murphy Creek and Murray Creek in Mission Valley. The watershed covers areas in the jurisdictions of San Diego County and the cities of San Diego, Santee, El Cajon, La Mesa and Poway. Much of the river's mountainous headwaters east of El Capitan Reservoir are located within Cleveland National Forest and other public and private land holdings. The proposed San Diego River Park will follow the river from the western end of El Capitan Reservoir, all the way to the ocean.



Geological profile of the San Diego River Basin

Climate

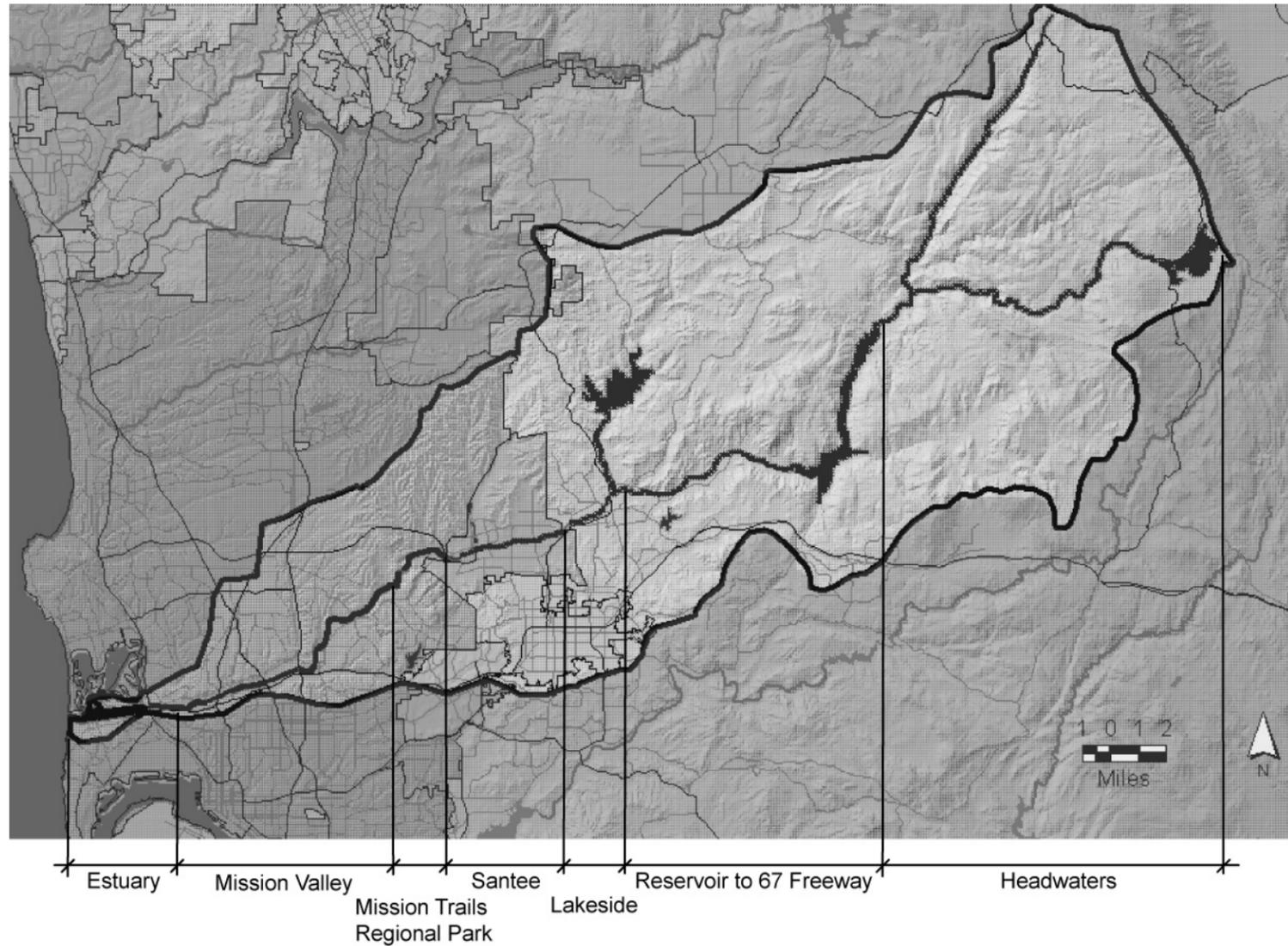
The San Diego region is naturally arid. The attractive Mediterranean-type climate is ideal for year round outdoor lifestyles with warm temperatures and little rain. County wide, monthly mean temperatures range from a low of 66 degrees in January to a high of 78 degrees fahrenheit in August. Coastal areas are generally cooler and low fog is common, while inland areas enjoy more temperate weather and higher temperatures. Rainfall is highly variable in the city of San Diego from year to year, but averages 9.9 inches per year, concentrated in the months from November through March. The inland mountains receive more rain and snow during winter months; the city of Julian, in the San Diego River headwaters, receives an average of 25.9 inches per year. During the dry months of summer to early fall, Santa Ana wind conditions

may prevail across the region when hot dry winds blow in from the Mojave desert to the east. During these periods, temperatures can climb to the mid nineties and low hundreds, and humidity is extremely low.

Geology

The San Diego area formed as ancient seas and rivers located on granitic base rocks deposited layers of sediment. As the base rocks were pushed upwards millions of years ago, many peaks were formed on the eastern edge of the watershed, such as Cuyamaca Peak (6,512'), and Volcan Peak (5,719'), in the headwaters of the San Diego River. In the western portion of the watershed, ancient seas were receding leaving marine terraces (mesas) upwards of 300 feet above sea level. Stream cutting created the

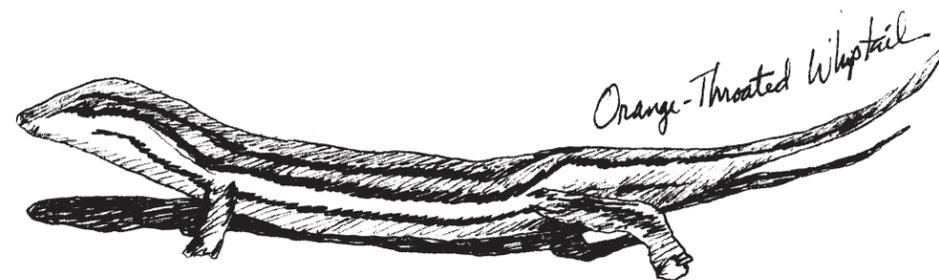
canyon systems in the mesas which can be seen today. One of the most prominent canyons is Mission Valley cutting through the Linda Vista Terrace. As sediment eroded from the eastern mountains and the Pacific Ocean ebbed and flowed through the San Diego River corridor, the valleys were filled with deep layers of sand and gravel. More specifically, the soils in these valleys are made up of sandy loams, clay loams, and clays. Some of the best soils in the region are located in the coastal floodplain making it ideal for agriculture. The communities in the eastern floodplain, such as Lakeside, are very fertile areas comprised of sandy loams and silt loams. Further up in the mountains near Julian, areas of sandy loams on granite bedrock exist in small valleys, but for the most part slopes are steep and consist of rocky outcroppings.

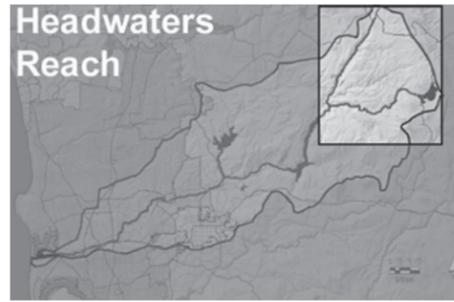


The seven project reaches of the San Diego River

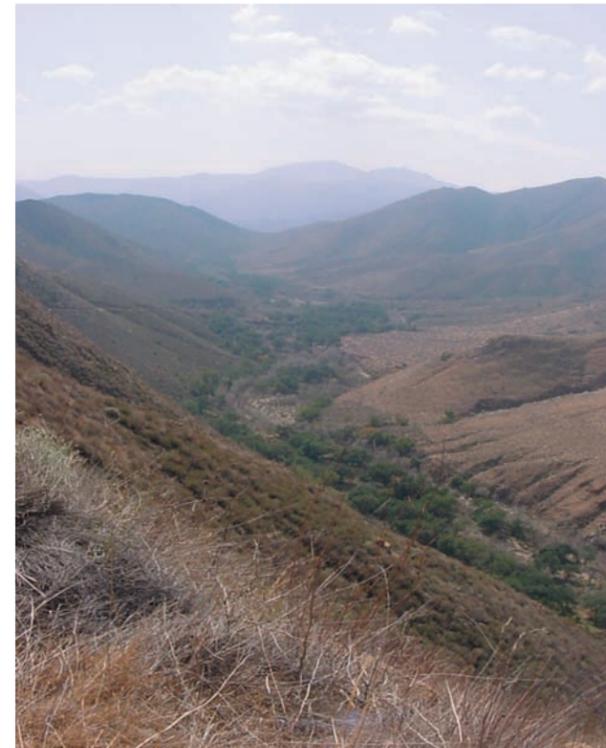
San Diego River Reaches

For the purposes of this study, the river has been divided into seven conceptual reaches based largely on jurisdictional boundaries, land use and topography. These reaches are: headwaters, reservoir to 67 Freeway, Lakeside, Santee, Mission Trails Regional Park, Mission Valley and estuary. Each reach has unique characteristics, and it is the combination of these characteristics that makes the San Diego River unique.





Rock outcrops and native scrub



Long view down the river's corridor



Day hiking in the Cleveland National Forest

Headwaters

The headwaters, where the San Diego River originates as a small trickle running through a steep boulder-filled valley, remains a largely unspoiled habitat. Much of the headwaters are part of the Cleveland National Forest and other federal land holdings. 23,369 acres of roadless areas in the Cleveland National Forest is proposed for wilderness designation, representing a large portion of the upper watershed that would offer recreational opportunities but be off limits to roads, permanent structures and any mechanized equipment including bicycles or anything motorized. Nine miles of the river itself in this area is proposed for Wild and Scenic River designation, meaning the river would be preserved in its free flowing condition and that the river and its surrounding environment would be protected for the benefit and enjoyment of present and future generations.

This reach is characterized by a sense of spaciousness and airiness because of the long views through the steep river corridor. The soft edges of the native landscape are punctuated with areas of rock outcrops and strata revealed through natural erosion. The scale is dramatic and a person feels small and insignificant in this large, mountainous portion of the river corridor.

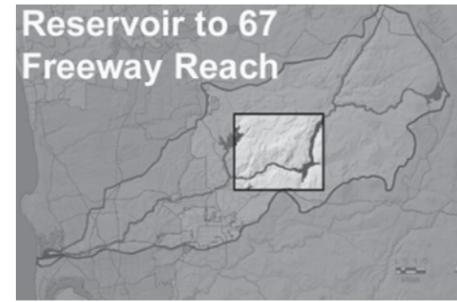
Reservoir to 67 Freeway

The reservoir to 67 Freeway reach, where the narrow river valley widens into a broad plain with rich alluvial soils, is composed primarily of agricultural land, and the river corridor provides recreational opportunities. Many equestrians enjoy the river along river bottom horse trails, and a golf course, with design techniques certified by the Audubon Society, is under construction along the river just south of the reservoir.

The reach can be characterized similar to the headwaters until El Monte Valley, where the river corridor becomes a cradled valley floor. The vegetation grows more vibrant with a fusion of native vegetation and agricultural fields.



The expansive floodplain of alluvial soils



Agriculture remains as the primary land use



El Cajon Mountain above El Monte Valley



Lakeside Reach



Sand mining reclamation ponds

Lakeside
The rural community of Lakeside in unincorporated San Diego County was built first around agriculture and then the sand and gravel industry. As sand mining operations are coming to an end along the river, light industry and residential neighborhoods are rapidly expanding. To prevent local flooding, the river channel, largely disrupted by mining operations, has been recreated and reinforced by riprap channel walls covered over by native soils and replanted with native vegetation. Native habitat is beginning to return and thrive in these areas.



Much of Lakeside's lanscape is barren

The character of this reach is open and unobstructed because of the expansive horizontal plain which the eye follows until it reaches the edges of the distant, rolling hillsides. These hillsides are dotted with large, smooth rock outcrops jutting out from the pinkish earth.



Riparian habitat

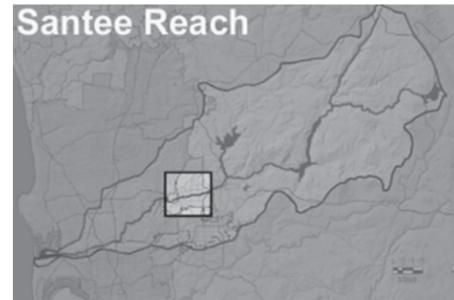
Santee

The city of Santee takes great pride in the San Diego River which flows through the center of town. Suburban and urban growth surrounds a corridor of natural and urban parks all along the river. There is an increased presence of water in the river here because of the former mining pits that have been remade into the river's bed. When Santee's San Diego River Park Plan is completed in 2010, 320 acres along the river will be in public access parkland with six miles of public trails.

Santee's character is dominated by a wide-open valley floor surrounded by low, boulder-strewn hills. The widened river channel increases the sense of openness. The development in the valley along the river is constricting yet pronounces the vastness of the plain.



Suburbs are a close neighbor to the river



Trails in Mast Park



Businesses along the river in Mission Creek



Mission Trails Regional Park
In Mission Trails Regional Park, the river carves through rugged hills and valleys. The park is one of the largest urban parks in the nation with nearly 5,800 acres of natural and developed recreational acres. Historically used by Native Americans and Spanish Missionaries, it is the site of the Old Mission Dam, built in 1809 to store water for the Mission San Diego de Alcalá. The two growing urban areas of Santee and Mission Valley surround this heavily used natural park.

The Mission Dam is a relic of how settlers managed the river



The river's natural meander is evident as it flows from the Mission gorge



The visitor's center features the park's natural and cultural history

Mission Valley

Mission Valley is a densely developed urban area with offices, malls, apartments, hotels, and Qualcomm Stadium. The river, surrounded by development, occupies a narrow corridor through the center of the valley. Water quality issues and flooding from the river are ongoing and frequent problems for this area. Engineering projects, including channelization, were constructed in some areas to decrease flooding potential, and habitat restoration and river trails have accompanied these projects.

Here, the area seems enclosed and tight. The scale of elements in this reach is oversized, from the large mesa walls, to the oversized structures such as Qualcomm Stadium and Fashion Valley Mall, to the multiple freeways that loom in the air and on the ground. The adjacent plateau walls that were historically carved out by the river rise almost straight up to hold the river valley in a long corridor. Smooth surfaces such as rock walls, sand and asphalt, dominate the ground plain, and there is a lack of boulders in the landscape, as if they lodged in the gorge at Mission Trails Regional Park. There is a historical character to Mission Valley because of the original and replicated Mission architecture.



Oversized structures loom above the skyline



Many people commute beside the river,



Water flowing through the heart of the valley



The estuary is rich with bird life



Freeway bridges span the river



The mouth of the river at Dog Beach

Estuary
Where the San Diego River meets the Pacific Ocean at the estuary, the river is channelized, with a levee separating it from the adjacent Mission Bay to the north. Water quality is a significant issue here due to urban runoff and sewage spills occurring throughout the watershed and concentrated here at the river's mouth. To the south of the river lies a very popular recreational area know as Dog Beach where people and dogs come to enjoy both the waters of the river and the ocean. Where the ocean tides and the river waters mingle and salt grasses grow, an incredibly rich and abundant bird habitat exists.

This reach is characterized by openness because of the long horizon of the Pacific Ocean. The reach has a strong coastal feeling, with of ocean breezes and beach lifestyle. The alluvial flows are expressed in the habitat and water paths within the river channel.

CULTURAL CONTEXT

Watershed Changes Through Time

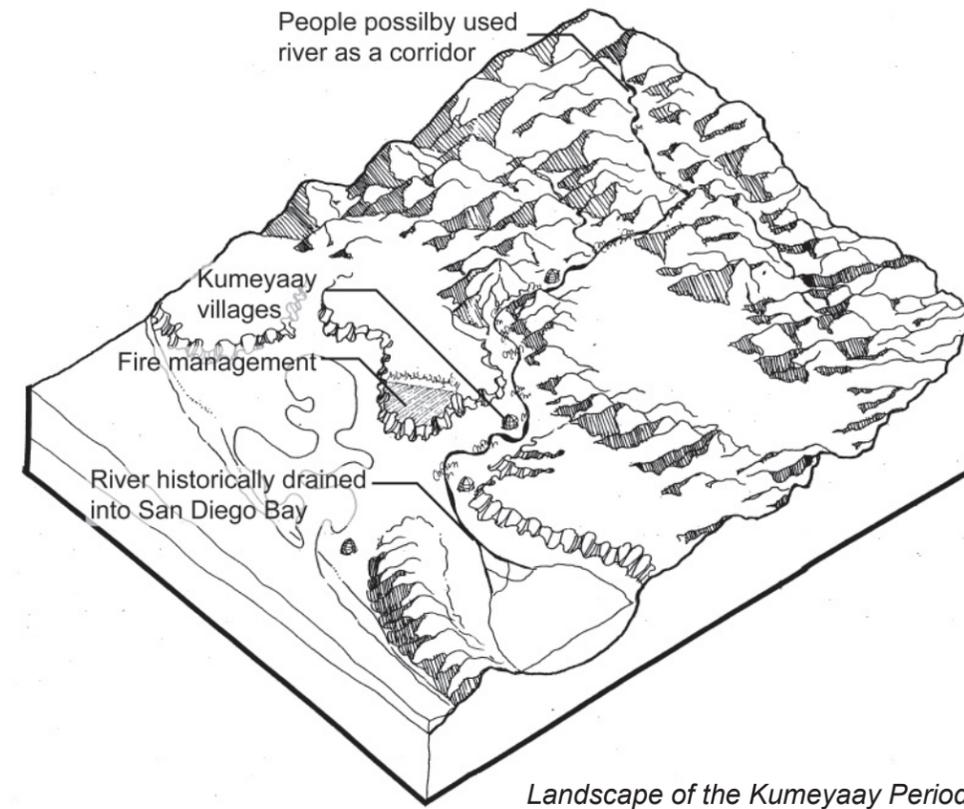
The events and settlement patterns along the San Diego River represent the shift in needs and attitudes about the river through history. The Kumeyaay Native Americans, depended on the river and its resources for their livelihood. The arrival of the Spanish introduced agriculture and grazing while the Mexicans began parceling the land for private ownership. The San Diego region underwent population growth, as California became a major destination for people from the east and Midwest. As people settled, growth spread into areas along the river that were historically set aside for purposes suited for the river's flood plains.

Developments along the river are evidence of the river's role as a water supplier for agriculture and domestic uses and a producer of building materials. As the region modernized the need for the river's natural processes became less a commodity because resources could be imported, and rather the river was often viewed as a destructive nuisance.

Portions of the river have been channelized to varying degrees, allowing for development to exist along the river's edge. Long-term impacts are evident in the degradation of the water quality, loss of habitat connectivity and health as well as a loss of understanding about the river by the people who reside with it. There is a growing movement underway for the awareness of the river's value as a natural system and the multiple benefits that a healthy river system has on the larger environment.



Mission San Diego de Alcalá



Kumeyaay Period
 (at least 8000 BCE – 1769 CE)
 The Kumeyaay lived in temporary settlements dispersed along the San Diego River for at least ten thousand years. They often settled their villages around local springs and water sources. Food such as acorns and rabbits, was found locally. The river provided materials for their livelihood. Riparian vegetation such as reeds, willows and juncus were made into rafts, house thatching, clothing and baskets. River clay was made into pottery for cooking and storage (Alter, 2002). It is possible they used the river as a corridor when traveling inland to collect seasonal food and trade with neighboring tribes to the east (Christenson, 2002). Fire management was practiced to generate more nutritious grass shoots for their diet and to attract game (Christenson, 2002).

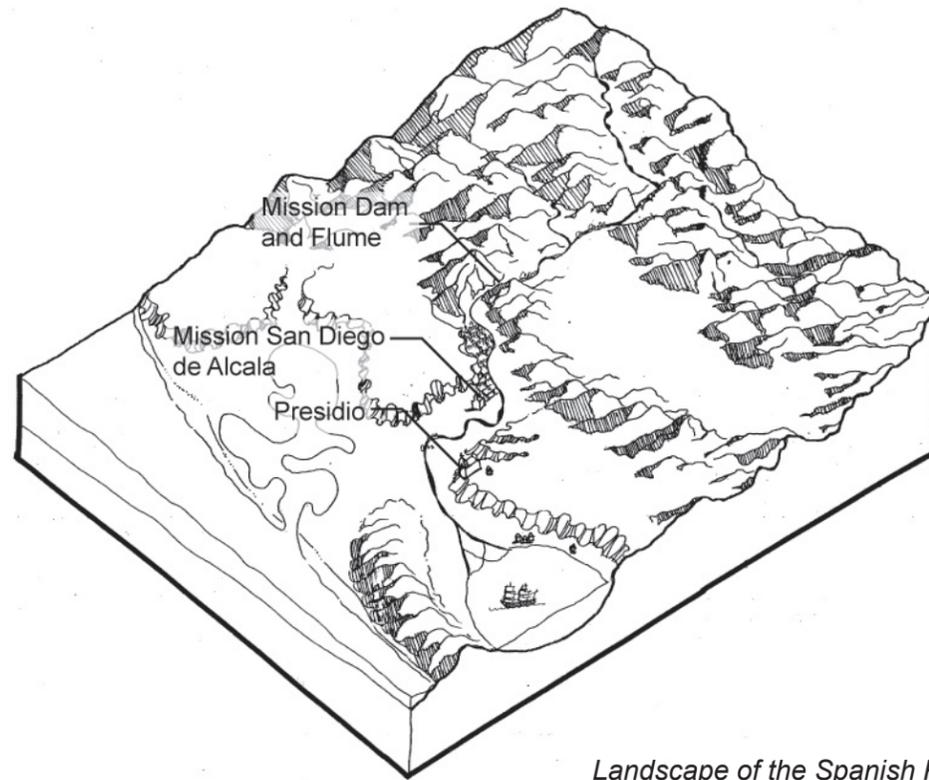
Several known village sites existed along the river, such as Cosoy and Nipaguay, located in Mission Valley, Sinyeweche, located in Santee and Sinyau-Tehwir and Witlimak located in the headwaters. Kumeyaay reservations are located in the San Diego River headwaters today, but unfortunately, much of the historical evidence regarding the Kumeyaay throughout the watershed has been lost due to subsequent settlement and extermination of the Kumeyaay culture.

*Spanish Period
(1769-1821)*

The Spanish arrived in 1769, led by Father Junipero Serra. Along the San Diego River the Franciscan missionaries established what would be the first in a chain of twenty-one missions in California. They built their first mission and presidio on a hillside above the Cosoy, a Kumeyaay village, which was located along the river near today's Old Town. Many Kumeyaay were converted to Christianity and they provided labor to build and sustain the mission. This was the first European settlement on the West Coast of the United States and Canada. Five years later, the Mission San Diego de Alcalá was reestablished approximately 5.5 miles upstream above Nipaguay, another Kumeyaay village, due to better-suited agricultural land nearby.

The Spanish introduced cattle and used the local trees as lumber for their buildings. In order to irrigate their crops, the mission built a dam at the river's entrance to the gorge, approximately six miles further upstream. A gravity-fed flume was also constructed to transport the water to their crops and livestock (Alter, 2002). They stopped the Kumeyaay's practice of burning the grasslands, which subsequently converted to chaparral. The cattle preferred the annual bunch grasses for their food and the nonnative carpet grasses brought by the Spanish spread (Christenson, 2002).

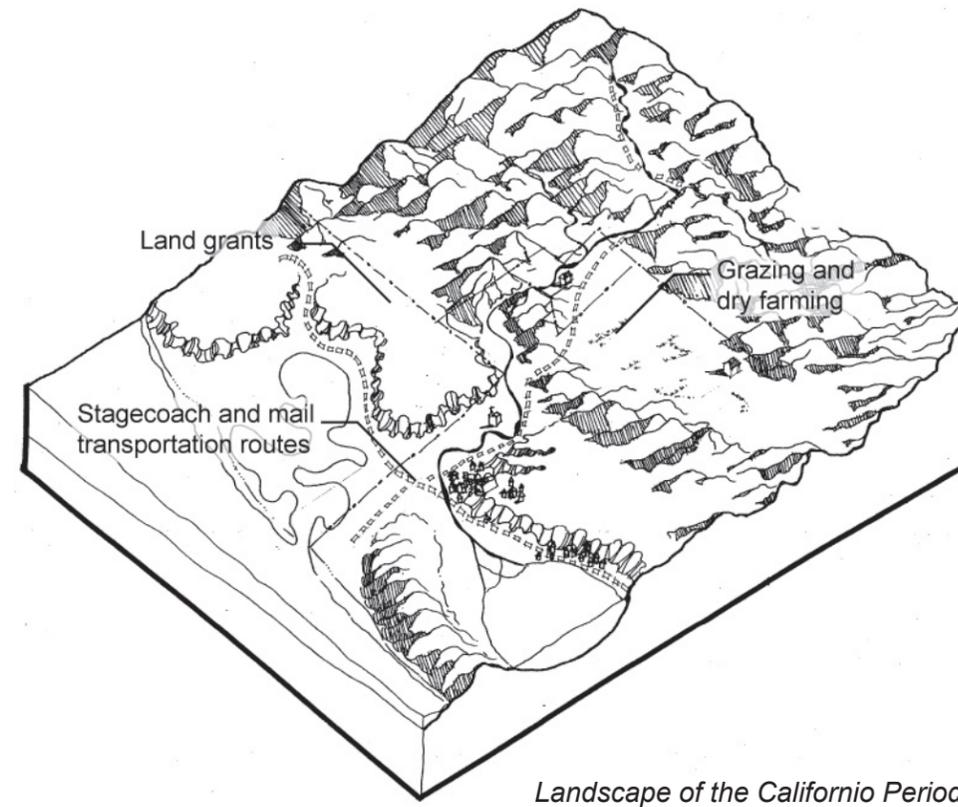
A small pueblo began to develop around the first mission and presidio, which later developed into Old Town. Cultural landmarks from this period are present today mainly in the river's lower valley. These sites include the Mission Presidio and Mission San Diego de Alcalá State Historical Landmarks, Mission Dam and Flume National Historic Landmark and Old Town San Diego State Historic Park.



Landscape of the Spanish Period

*Californio Period
(1821-1848)*

Mexico broke away from Spanish control and governed California from 1821 until 1848. By the 1830s, the missions were secularized, became stagnant and the Kumeyaay villages disappeared. Because of a lack of money from the war, the Mexican government reimbursed their soldiers through the distribution of land grants. Segments between landscape features were designated on rancho maps to delineate the property boundaries. Families built ranchos and the valleys were primarily used for large scale ranching and dry farming. As the region grew, transportation routes began to spread outward by stagecoach and a transcontinental mail route was established along a portion of the river's corridor (Christenson, 2002).



Landscape of the Californio Period

*Early American Period
(1848 – 1945)*

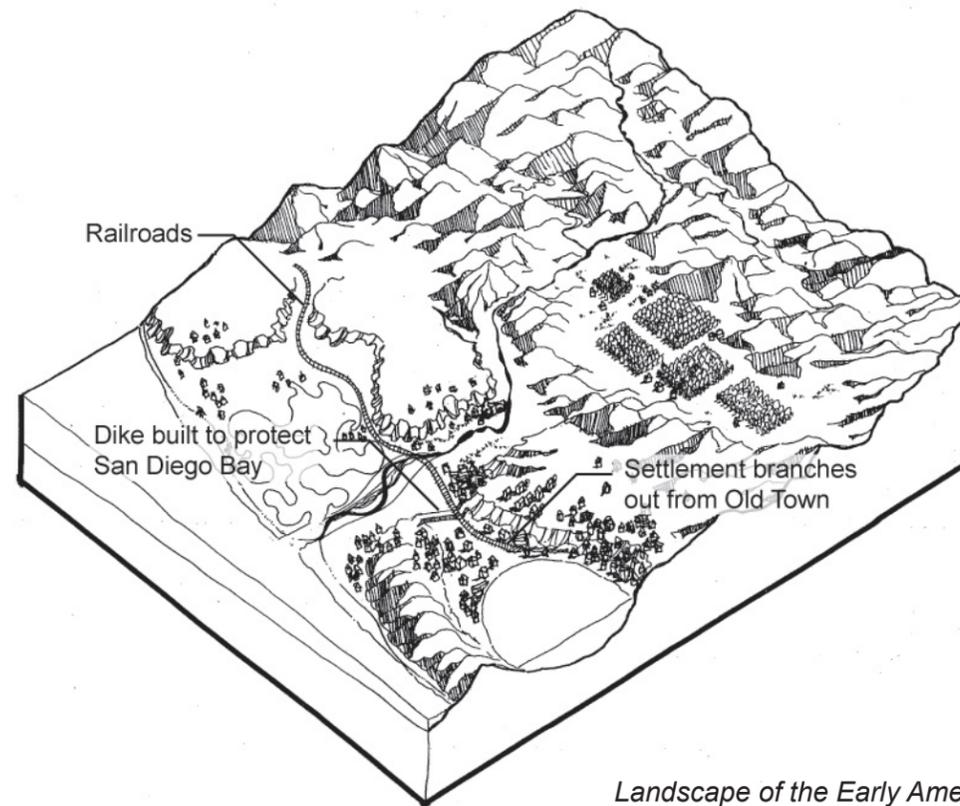
The city and county of San Diego were established in 1850 when California acquired statehood. Many of the ranchos exchanged hands when the government began taxing landowners. Changes occurred throughout the region and many developments took place within the watershed that changed the structure and function of the river forever.

As settlement expanded, the San Diego Bay became a major West Coast shipping port, the Army Corps of Engineers constructed the Derby Dike in the 1850s in order to prevent silt build-up in the bay. The Derby Dike permanently diverted the river to False Bay, today known as Mission Bay. This was one of the first major projects undertaken by the federal government in California.

A main commercial area began to develop south of Old Town and was dubbed New Town, which is the location of today's main business district. The town of Julian located near the river's headwaters experienced its short-lived gold rush when it was discovered in 1870 (Pryde, 1992).

The agriculture lands in Lakeside began to transform into residential areas. The county established Indian reservations in 1875 in the upper valleys and later relocated them in the upper watershed when the reservoirs were later created. In 1885, the Santa Fe railroad arrived which expedited trade with outside regions. Materials from the river were used to build some of the area's large infrastructure projects such as dams, the jetty and railroads.

As population levels increased, so did the construction aggregate and sand

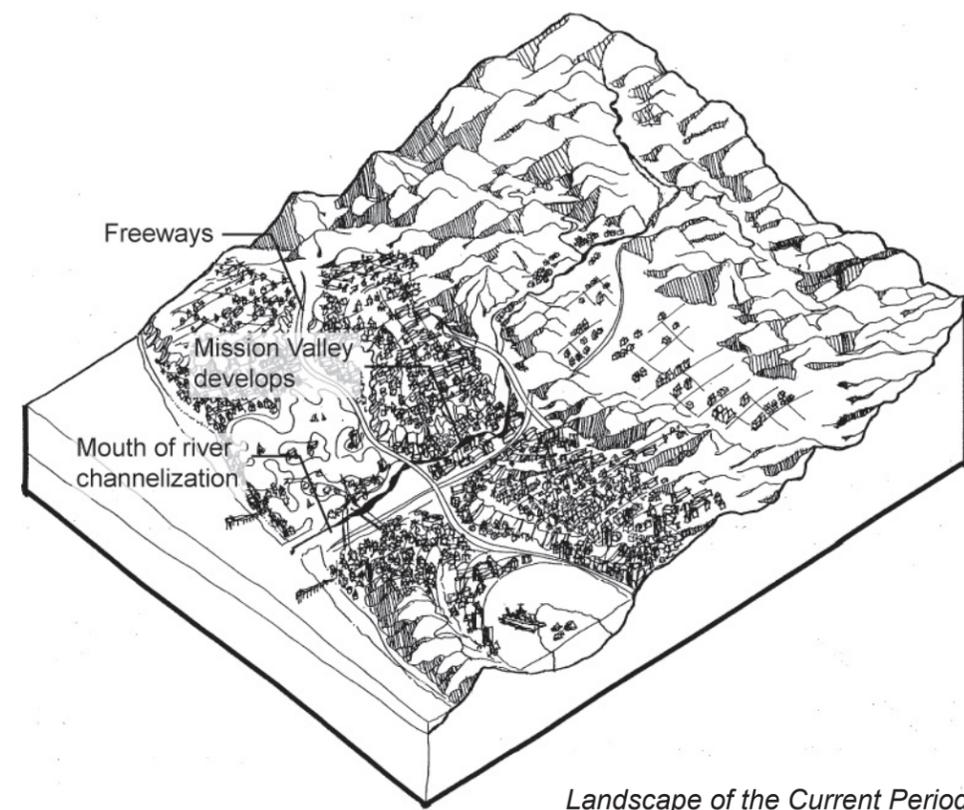


Landscape of the Early American Period

mining industry along the river (Abbott, 1991). During the 1880s, the county's population grew from 8,000 to 35,000 residents. The need for water grew and the reliance on ground water from Mission Valley was insufficient. A flume was built from the Cuyamaca Reservoir and local streams were dammed (Pryde, 1992). The Cleveland National Forest was established to protect the watershed's resources from mismanagement (www.gorp.com).

By the end of the 1800s, irrigated agriculture was widespread. In order to meet

the growing demands for water, the City of San Diego created two reservoirs along the river, El Capitan and the San Vicente Dam and Reservoir. One of the most damaging floods washed out many of the human developments and historic landmarks along the river in 1916, including part of the Mission Flume, and was followed eleven years later by another damaging flood in 1927 (Pryde, 1992). The cultural landmarks that remain from this period are the Derby Dike and the town of Julian State Historical Landmarks.



Landscape of the Current Period

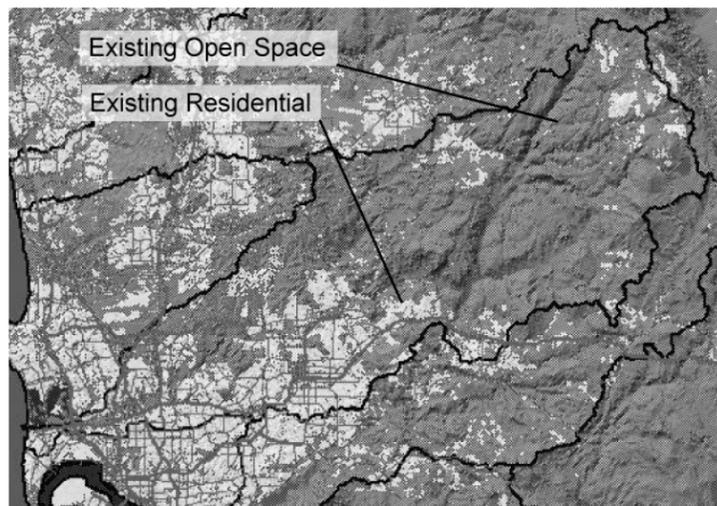
*Current Period
(1945 – Today)*

In the 1940s and 1950s the county experienced its second population boom due to the war industry. The county's population grew from 300,000 to over one million. People living within the basin began to move from the flat mesa tops into the valleys (Lynch, 1974). In 1947, water from the Colorado River reached the reservoirs to supply the residents for their consumption. As the value of the land and businesses adjacent to the river increased, the mouth of the river was ultimately channelized between 1950-1953 to further protect against flooding.

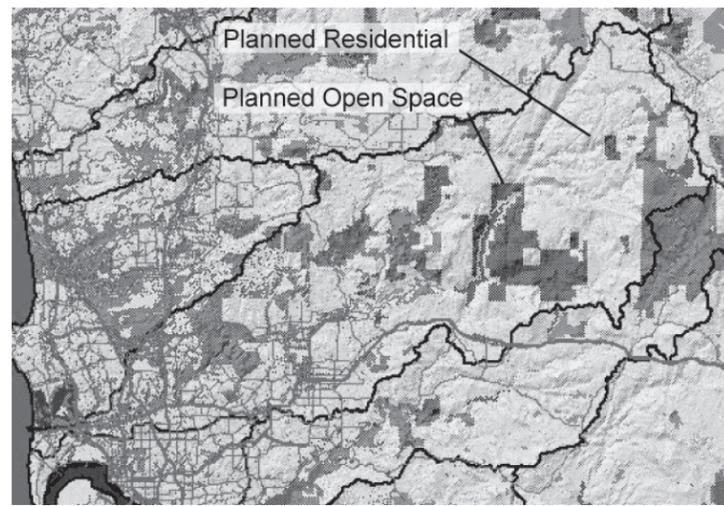
In the 1950s, Santee began to urbanize and develop into a suburb of San

Diego. Freeways spread across the area and the lower portion of the river transformed into a major corridor with I-8 flanking its south side. Mission Valley, likewise, began to fill in with shopping malls followed by condominiums. Private organizations have financed channelization of segments of the river in Mission Valley and there are ongoing projects in Lakeside to do the same. Land use zoning laws allow for development to occur within the natural flood plain in the more urban areas. Many of the large commercial and residential structures face away from the river, leaving their less attractive operations visible from the river's corridor.

While the San Diego River hosts national and state historic landmarks, it is losing many of the settlement landscapes that embody the river's heritage. Archeological sites are prey to damage or loss due to lack of public knowledge and development activities. By comprehensively inventorying the historic resources, defining how to preserve or conserve heritage landscapes and developing a management plan for the river park, many of the unique cultural features that have occurred along the river will provide valuable historical resources for future generations.



Existing land use in the San Diego Watershed



Proposed land use for 2020 (SANDAG, 2002)

GROWTH PROJECTIONS

The San Diego River watershed's population is continually growing. In 1997, the population was 506,420 averaging 1.82 people per acre. By 2015, the watershed is predicted to have a population of 620,542, with an average of 2.24 people per acre. Because much of the lower watershed has already been developed, there is a projected 23% increase in the density of the population for the San Diego River watershed over 18 years, compared to a 37% increase expected for the entire San Diego region (SANDAG, 1998).

This increasing population growth will continue to take its toll on the San Diego River. In 1995, 115,459 acres of the total 277,543 acres of the San Diego River watershed were developed. According to a 1998 regional watershed study based on forecasted land use, if the currently-approved plans stood, 60,361 of the remaining 162,084 undeveloped acres of the San Diego River watershed could be built-out in the future. The vast majority of this area, 59,096 acres, is slated for residential development (SANDAG, 1998). Private land inholdings in the upper watershed that are currently zoned at forty acres may become open to sub-

division in 2010, increasing developmental pressures on the upper watershed (www.co.san_diego.ca.us).

OPPORTUNITIES

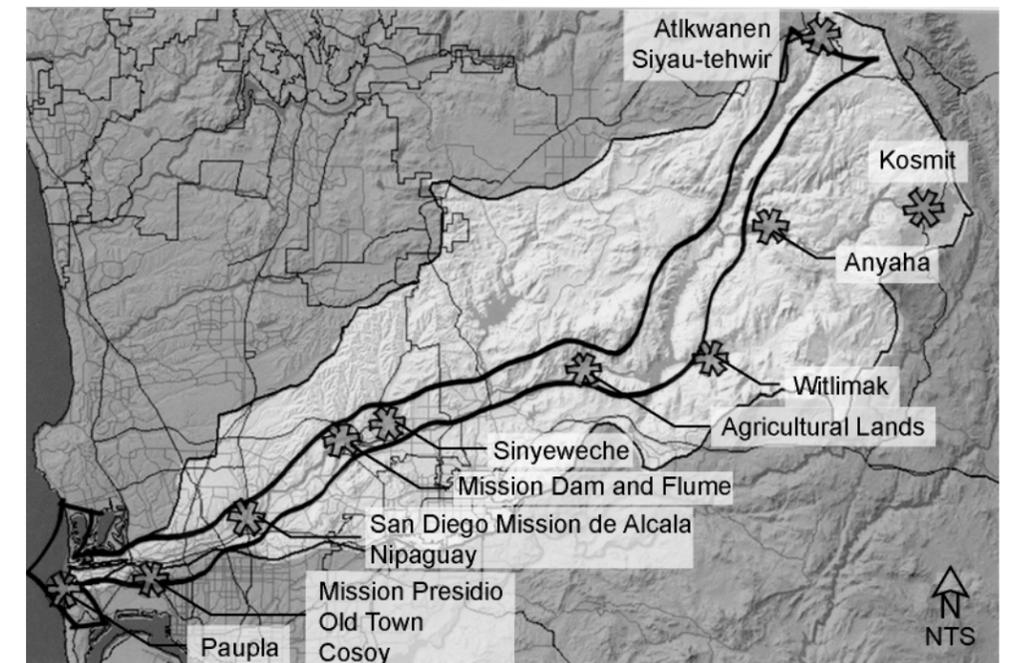
Opportunities provided by the cultural context of the river park include opportunities for developing partnerships with existing facilities and locations, enhancing historic preservation, and facilitating community education.

Develop Partnerships

1. The local Kumeyaay Reservations provide partnership opportunities for promoting the cultural heritage of the early history of the San Diego River.
2. The location of the river in Cleveland National Forest and Mission Trails Regional Park offers opportunities for partnerships to promote the cultural history of the river within these popular recreation destinations.
3. Existing developed historic sites, including the Mission Presidio, Mission San Diego de Alcalá State Historical Landmark, Old Town State Historic Park and Julian State Historic Landmark, provide opportunities for partnerships increase the recognition of the river as a strong force in San Diego's history.

Enhance Preservation

4. The historic locations of the Atlkwanen, Sinyau-tehwir, Kosmit, Anyaha, Witlimak, Sinyaweche, Nipaguay, Cosoy, and Paulpa Kumeyaay village sites (White, 2002) can be highlighted to link present day locations with their Native American cultural history.
5. An opportunity exists to preserve the rich agricultural history of the river, threatened by increasing urbanization, particularly in the upper reaches.



Cultural and historic resources along the San Diego River

6. The establishment of the river park offers an opportunity to develop an extensive inventory and management plan for historic sites along the river.
7. Opportunities exist to employ the river park as a catalyst for increased interest in historic preservation and cultural heritage recognition.

Facilitate Education

8. The river's role as a transportation route for the Kumeyaay, stage-coaches, the first transcontinental mail route, and present day freeways can be acknowledged and highlighted.
9. An opportunity exists to highlight the watershed and the river corridor's role in providing much

- of the building materials for the infrastructure of San Diego County including large amounts of sand and gravel used to make concrete and asphalt.
10. Hydrological engineering projects, including the Mission Dam and Flume, Derby Dike, Mission Bay's transformation from False Bay after the river was rerouted from San Diego Bay and the reservoirs and dams of Cuyamaca, San Vicente and El Capitan, provide opportunities to reveal changes people have made to the river through time and the consequences to the watershed.



River access is dependant on water quality

WATER RESOURCES

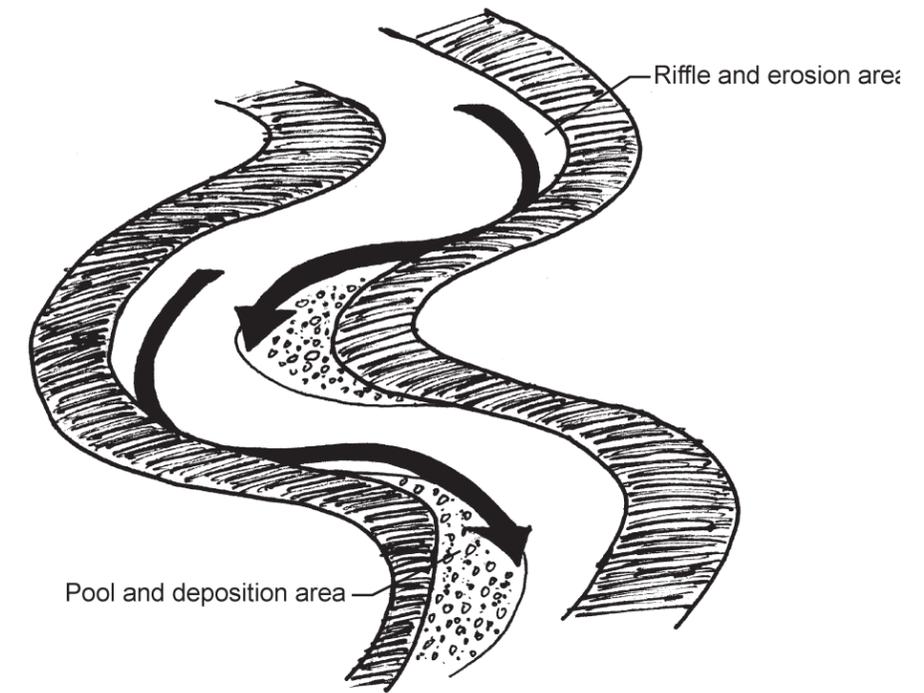
The hydrology of the San Diego River has changed significantly through time. As the river begins as a trickle in the headwaters and makes its way through the valleys and gorges of the watershed, the river encounters several obstacles that affect its natural processes. The changes are most evident in sediment transport, water volume, and water quality. The change in the ability of the river to transport sediment is seen visibly in river

structure and altered habitat. Changes in water volume have affected flood, surface, and groundwater levels. Water quality issues threaten to make the river water unsafe for human activities and wildlife. These three main issues confronting the San Diego River are critical to the environmental health of the region. A river park system would help manage and preserve this vital hydrological resource.

Sediment Transport

Sediment transport is a key component in the natural function of a river. In an undeveloped state, the San Diego River carried nutrients and soil from the Volcan Mountains to the Pacific Ocean. The sediment transport process can be described as taking place in three zones: the zone of erosion, the zone of sediment storage and the zone of deposition. Historically, the zone of erosion for the San Diego River was in the headwaters in the Volcan Mountains. As the water flowed through the mountains, erosion processes carved steep valleys and sediment loads in the river increased. As the river reached the El Monte Valley, historically the zone of sediment storage and transport, the decreasing gradient allowed the water to slow and drop its sediment load. With regular flows and periodic flooding, silts and nutrients were deposited, creating deep, sandy soils and a productive, fertile floodplain. A secondary zone of erosion occurred as the river entered Mission Gorge located in today's Mission Trails Regional Park. In this narrow, constricted geological formation, the erosion increased with the speed of the river. Deep, sandy soils were then deposited again in Mission Valley. During periods of heavy rains, sediment washed rapidly downstream, transporting the sediment all the way to the coast, maintaining southern San Diego's County's sandy beaches.

On a smaller scale, sediment deposition and erosion processes played a major role in creating habitat and maintaining the river's character. The river's structure contained sequences of pool and riffles. Pools occurred on the inside edges of natural stream meanders in the San Diego River, and riffles occurred on the outside edges of stream meanders. Sediment accumulated in the pool areas where water movement was slower,



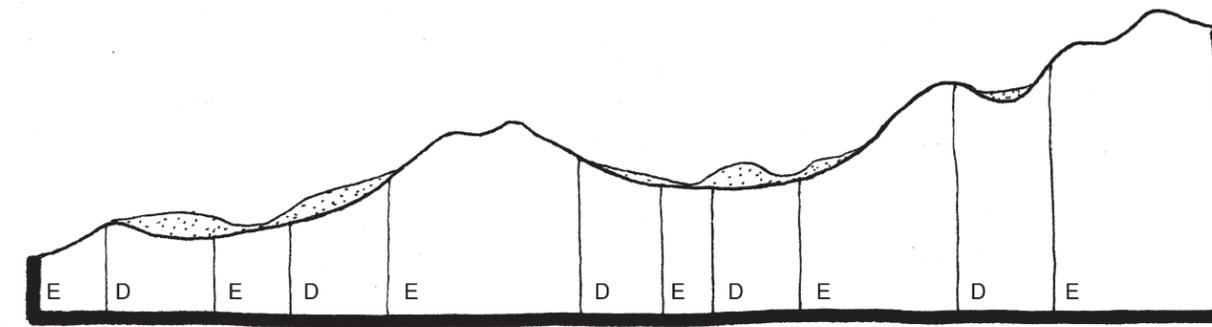
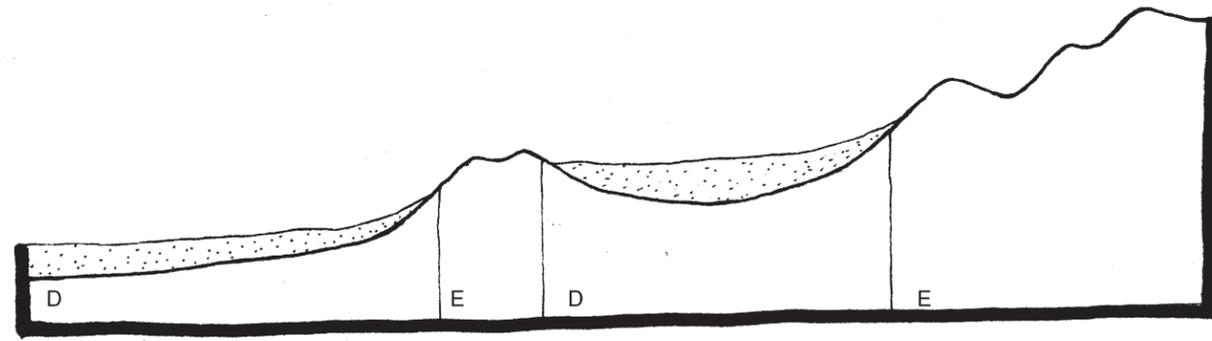
Natural stream processes

creating new stream banks and habitat, while erosion occurred in the riffles where water movement was faster, carving wider curves in the river and carrying sediment downstream.

Sediment transport has been greatly altered throughout the watershed by human activities including dam construction and extensive sand and gravel mining. Today, the headwaters is still the area of greatest erosion and sediment production, but the construction of El Capitan, San Vicente, and Cuyumaca Dams has prevented the sediment from reaching the valleys below. When water is slowed at the dams, sediment is dropped, and the water that passes through the dams is clear of sediment. Sediment accumulation behind the dams will eventually result in either decommissioning of the dams or costly sediment removal.

As the river enters its historic zone of sediment storage and transport in the valley, rather than releasing sediment, the clear "hungry" water from the dams picks up sediment through a natural process to maintain its sediment balance (Kondolf, 2002). The erosion and scouring in this area can lead to undermining of roads and structures, and the river no longer replenishes the fertility of the agricultural lands naturally.

Humans have extensively mined the deep soils of the Lakeside, Santee and Mission Valley, providing sand and gravel used in the construction of much of San Diego's infrastructure. The San Diego River has been one of the most heavily sand-mined rivers in the nation (Chang, 2002), and the mining pits created in this process act much like the dams but on a smaller scale, slowing the water and causing it to release its sediments. The water



E- Erosion D- Deposition

Changes in sediment flow have led to increased erosion in the valleys and loss of sand replenishment at the beaches

that flows from these pits is once again hungry, and scouring and erosion occur to pick up sediment again.

Channelization has occurred in Lakeside to control flooding. The riverbanks are reinforced with four feet of stone buried under four feet of soil and replanted with native vegetation. While this process is helping to restore valuable riparian habitat, the loss of pool and riffle sequences eliminates the natural regeneration of native habitats occurring in natural river environments.

The river remains largely unaltered as it flows through Mission Trails Regional Park, and erosion and natural stream processes continue here today, although the historic Mission Dam near the mouth of the gorge collects sediment before the river enters the gorge. Mission Valley has

a single remaining sand mining operation at the mouth of Mission Gorge, scheduled to end mining operations within ten years. The channelization that has occurred in Mission Valley is similar to the channelization in Lakeside, resulting in comparable habitat consequences.

The river is channelized at its estuary adjacent to Mission Bay. The decreased gradient of the river in this flat alluvial plain leads to deposition again, creating a rich estuary environment within the concrete sides. With sediment being accumulated and dropped repeatedly throughout the course of the river, sediment from large storm events is no longer able to reach the ocean in the same quantity as in the past. The loss of this natural source of sand replenishment from the San Diego River and other rivers in the area

contributes to the costly sand replenishments county wide, which in 2002 cost San Diego County over seventeen million dollars (SANDAG, 2002).

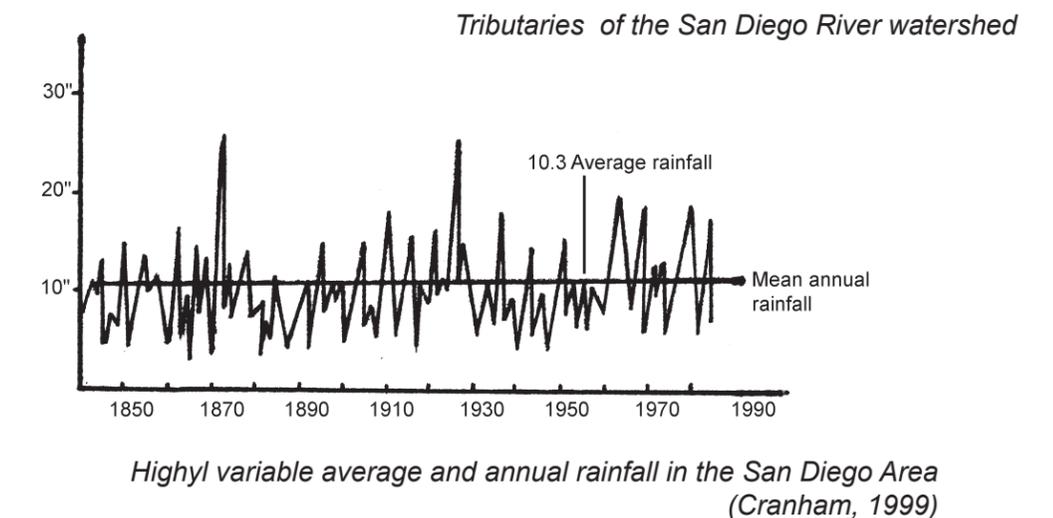
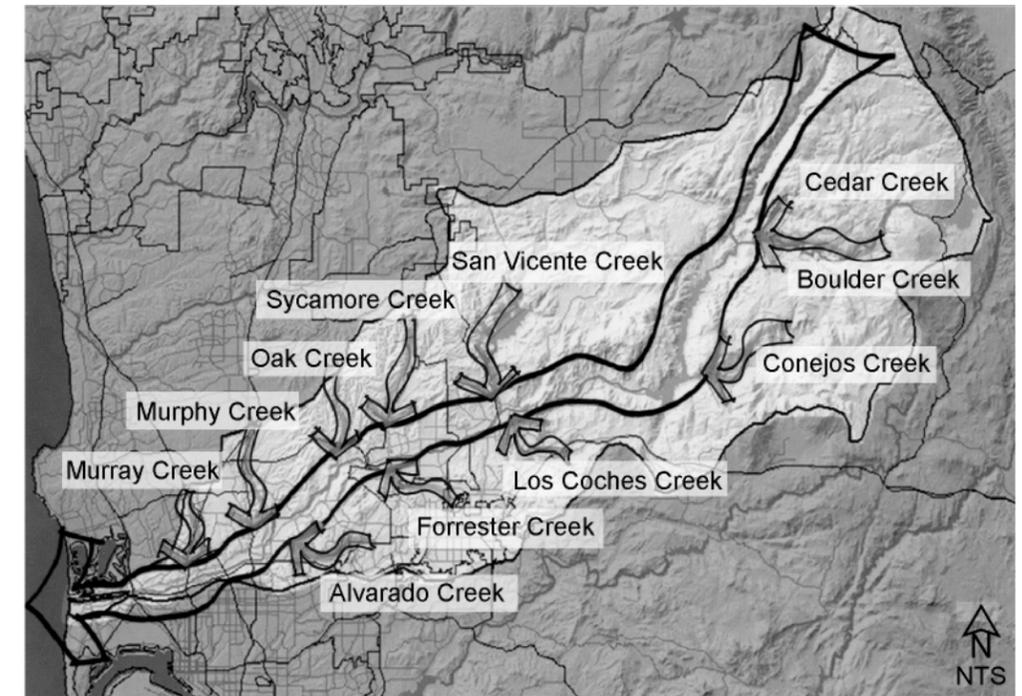
Changes to the natural river character have led to increased erosion along the river, but only a small amount of this sediment reaches the ocean and replenish the beaches. Most sediment is deposited in freshwater and terrestrial environments at the dams and mining pits, and behind the drop structures that accompany river channelization. This change in the natural sediment balance is costly, as illustrated by the high cost of sand replenishment at the beaches and removing sediment accumulation behind the dams and drop structures.

Water Volume

Water volume in the San Diego River has also been altered by human activity over time. Historically, the volume of water in San Diego River varied throughout the year and from year to year. Water flowed freely from throughout the watershed, collecting in tributaries and flowing into the river. In dry years, the river and tributaries were very low and could disappear completely during summer months. During wet years with heavy snowfall in the headwaters, the river could flow strong year-round. Major flooding occurred infrequently in the landscape during high impact storms, making the river so powerful, it could change courses between reaching the ocean at San Diego Bay or present day Mission Bay.

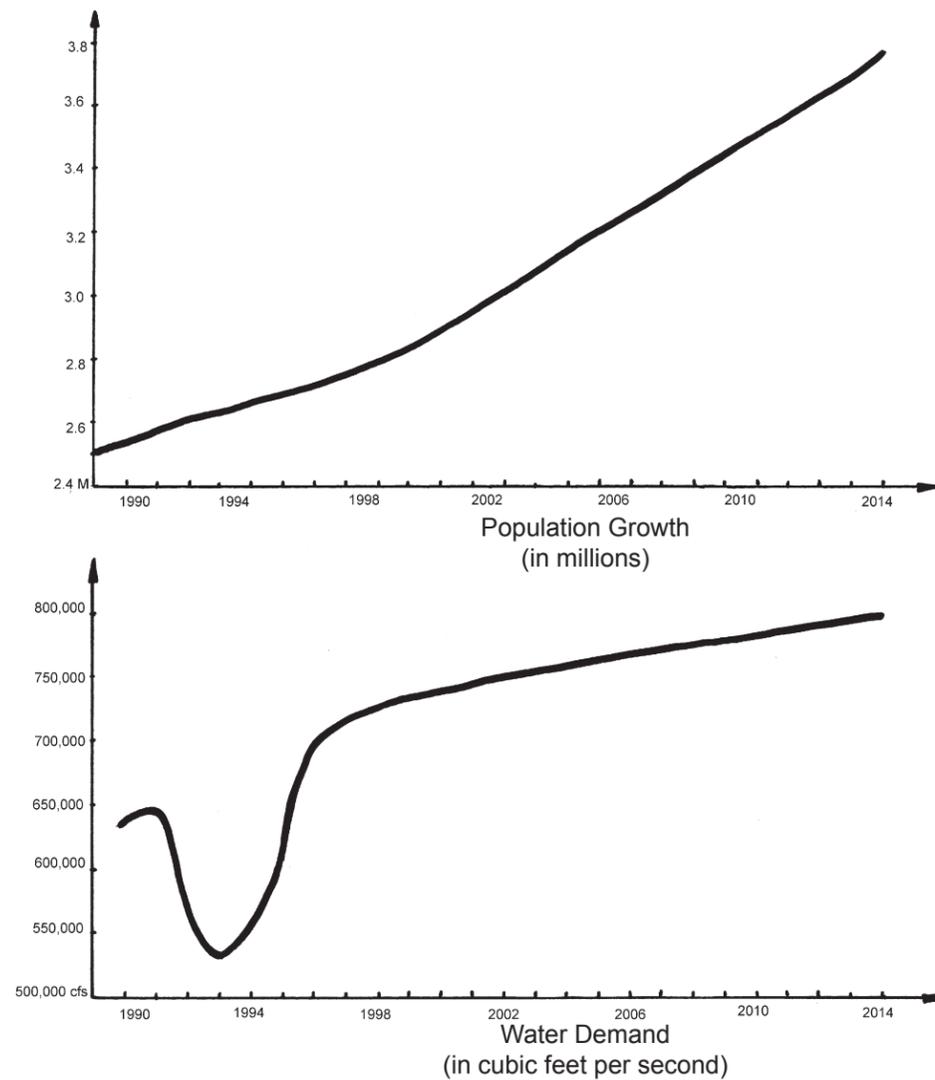
Groundwater in the watershed was amply replenished as most of the precipitation infiltrated into the open landscape. The groundwater collected in two large shallow underground aquifers, the Santee / El Monte basin located in the upper watershed and the Mission Valley basin located in the lower reaches of the river. Springs, including Alvarado Creek in Mission Valley, occurred along tributaries to the river where the aquifer was located close to the surface.

Population growth in the watershed has increased water demands in this arid environment. In efforts to capture the river's water before it flowed to the sea, a number of dams were constructed. The first dam on the San Diego River was completed in 1816, with Native American labor, to hold water for the Mission San Diego de Alcalá. Large amounts of sediment built up behind this historic structure, so its water holding capacity today is very small. Cuyamaca Dam, with a holding capacity of 11,600 acre-feet of



water, was constructed on the major San Diego River tributary of Boulder Creek in 1887. El Capitan Dam, with a holding capacity of 112,800 acre-feet of water, was completed in 1935. San Vicente Dam, with a holding capacity of 90,230 acre-feet of water, was constructed on the major tributary of San Vicente Creek in 1943 (El Capitan Golf Course Final

Environmental Impact Report, 1998). The modern dams were constructed primarily to facilitate increased water supply, but they also serve to control and regulate flooding in moderate storm circumstances and provide recreational opportunities.



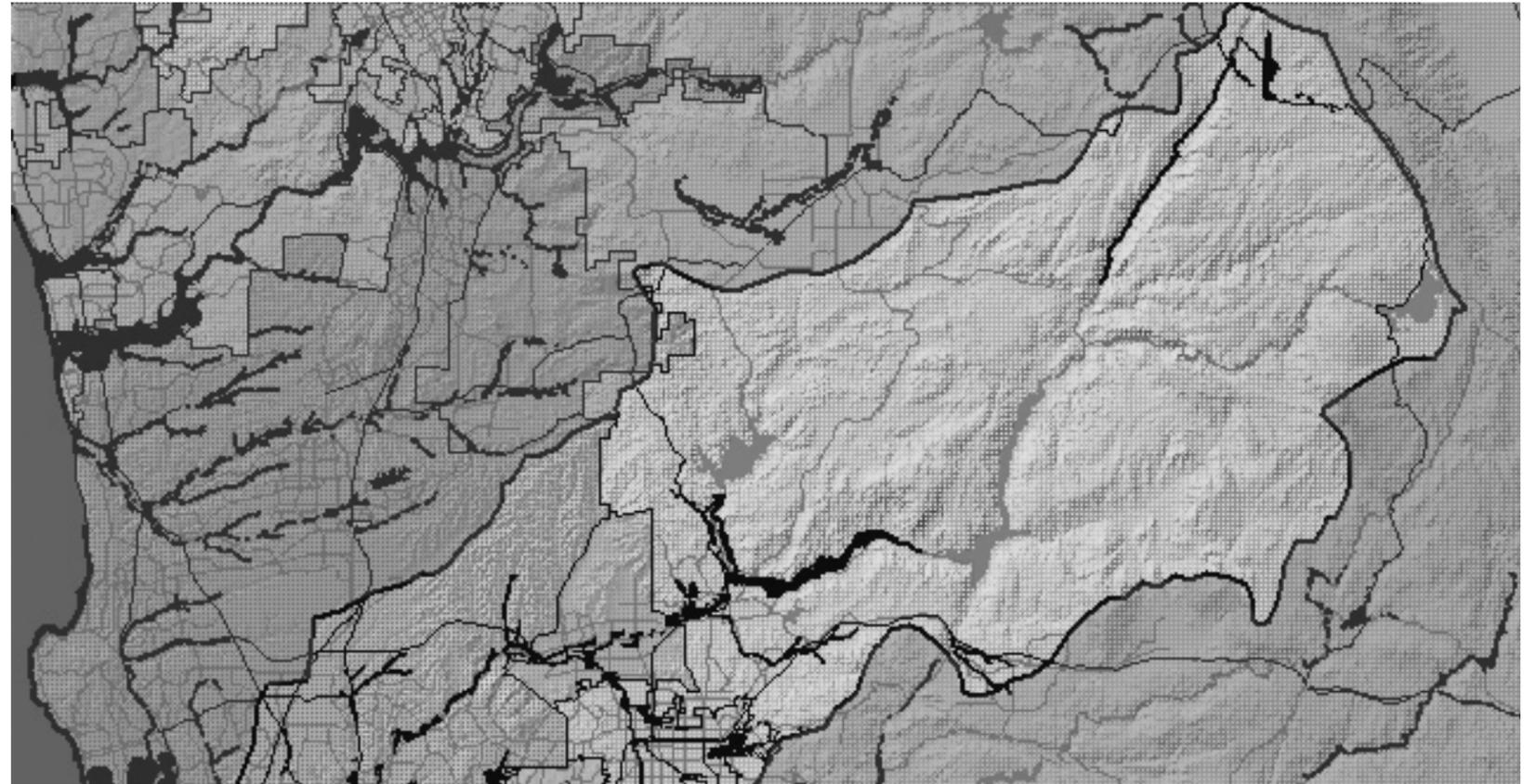
Changes in population and water demand over time. Large decline in water demand was due to conservation during drought years

The dams catch much of the water falling in the upper watershed and hold it for local use, yet the quantity of water in the river has increased over time. Imported water contributes to the increased water volume in the river. Despite water collection in dams, the City of San Diego receives only ten to twenty percent of its water supply from local sources in a normal year. The remaining proportion is imported via the Metropolitan Water District of Southern California and the San Diego Water Quality Authority. The imported water, originating as precipitation in locations as far as Utah, Wyoming, Colorado and Northern California, enters the county through aqueducts and is

stored in reservoirs for community use (SANNET, 2002). This water enters the river through residential and commercial runoff, from yard and planting irrigation, from treated effluent of a sewage treatment facility in Santee, and during flooding events from reservoir overflow. Imported water is the major cause of year-round flow in the lower reaches today.

As more areas of the watershed are developed, more of the open landscapes that once allowed precipitation to percolate into the ground are replaced by impermeable surfaces such as buildings, roads and parking lots. Water that once would have

recharged the aquifers is instead carried through storm drains and sewers into the San Diego River. Due to decreased infiltration, ground water quantities are reduced, and potential sources for future water in the local aquifers are disappearing. Decreasing levels of groundwater also leads to changes to the native habitat which depends on subsurface water to survive, and could result in saltwater intrusion in the lower watershed. At the same time, the natural flooding tendency of the river is increasing, especially in the lower reaches where the cumulative effects of increased runoff throughout the watershed are most strongly felt (Pryde, 1992).



Extents of the San Diego River 100-year floodplain (SANDAG, 2002)

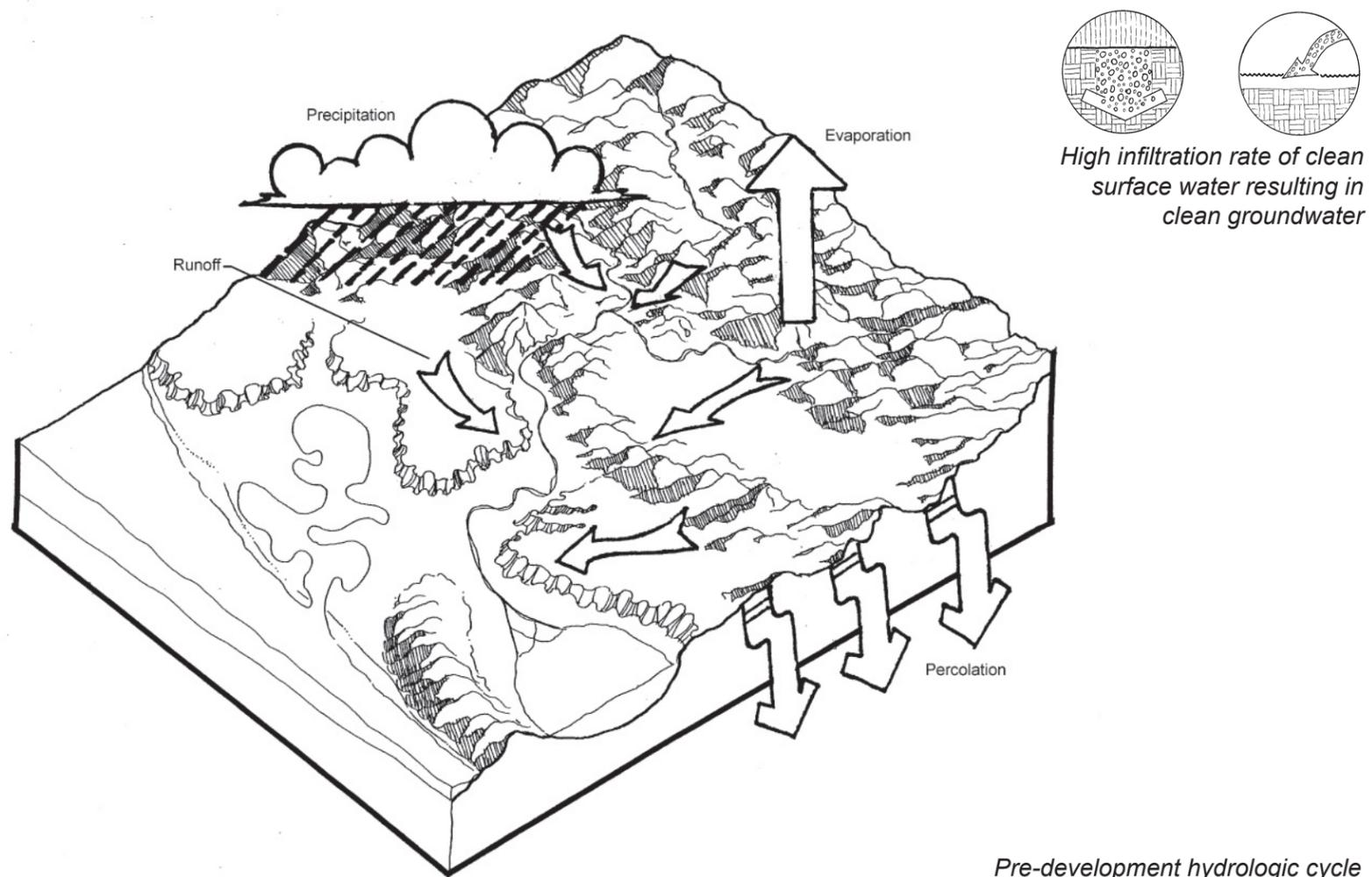
Flooding in the San Diego River occurs with unpredictable frequency and at unpredictable levels due to highly variable rainfall from year to year, making construction within the flood plain of this river especially dangerous (Pryde, 1992). Growth throughout the watershed increases pressure to develop within these volatile areas. River channelization is often seen as a solution to potentially devastating floods, but channelization also offers increased opportunities for development leading to more impermeable surfaces and subsequent increases in stormwater volume. If development continues at this rate, runoff throughout the watershed will continue to increase the amount of water entering the river, and flood risks will continue to rise (www.sdearthtimes.com/et1097sl.html). Nonnative plant species such as giant

reed, *Arundo donax*, which accumulates in large mats of debris during flood can potentially increase flood damage (County of San Diego, 2002).

Long-term residents along the San Diego River remember major flooding events. Major flooding in March, 1978 (www.co.san-diego.ca.us) caused extensive damage to infrastructure in Lakeside, washing out bridges connecting the north and south portion of the community. Mission Valley is famous for its frequent flooding, and some structures such as the Fashion Valley Mall Parking Structure have been constructed to withstand major flooding. Channelization that occurred in the 1970s provides increased protection from flooding, but channel capacity will not provide protection from flood events the size of those occurring in 1916 or

1927 (Pryde, 1992). Further development in the floodplain faces an increasing risk of devastating floods.

Surface and subsurface water is closely associated; they are in a continuous process of exchange. Urbanization in the San Diego River watershed has increased water volume in the river, while subsequently decreasing water volume in underground aquifers. Groundwater extraction in the Santee / El Monte aquifer further reduces groundwater quantity in this reach. The natural intermittent character of the river is altered due to the use of imported water, and the potential for devastating flooding is increased.



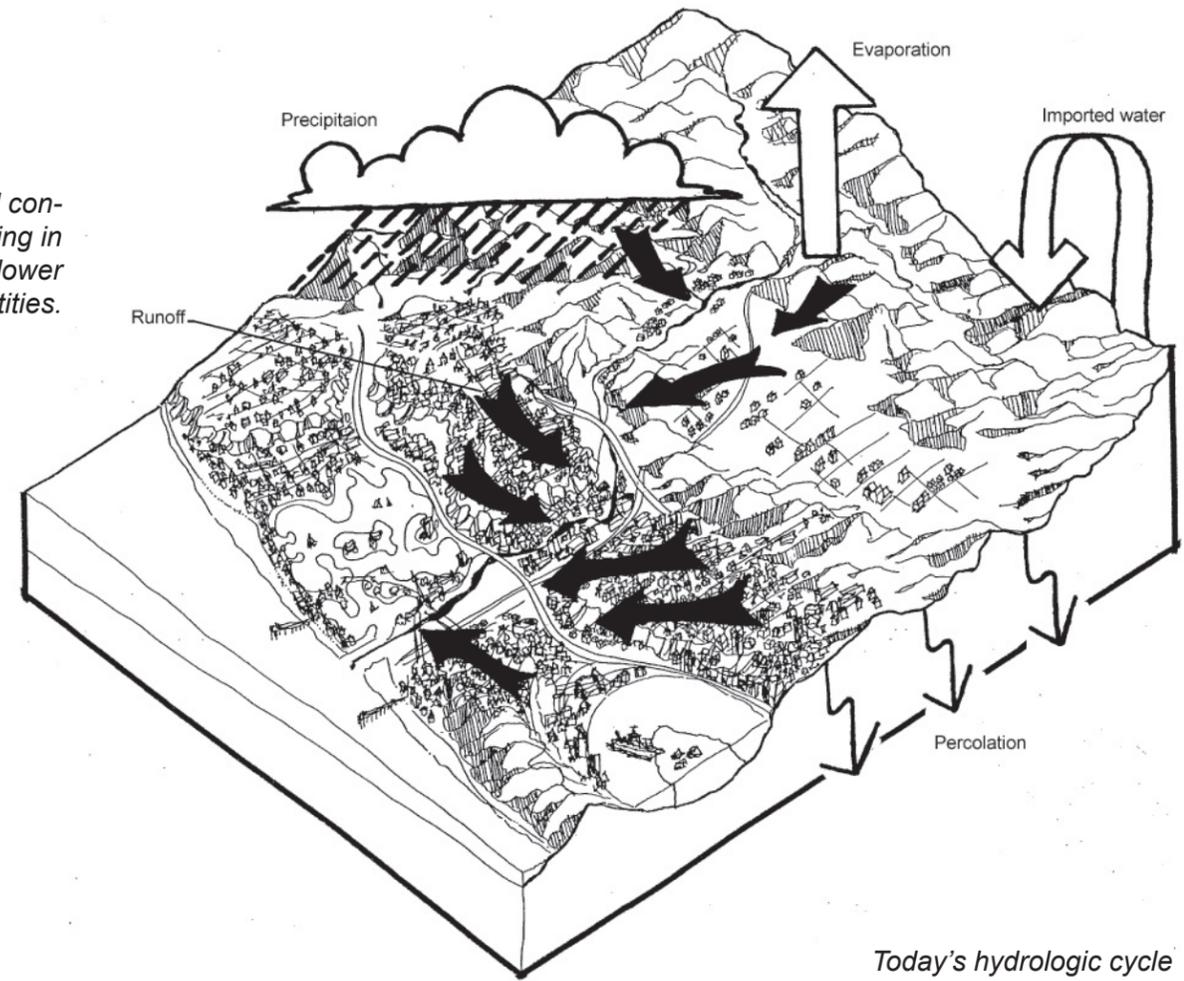
Pre-development hydrologic cycle

Water Quality

Water quality is the third issue of great concern for the San Diego River. Before the human development of the watershed, all runoff from the headwaters and tributaries not infiltrating the ground was collected in the San Diego River and conveyed to the ocean. The river water was clean except for the soil and sediment it carried with its flow. In the natural exchanging process between surface and groundwater, the aquifers were clean and free of chemical contaminants.



Lower infiltration rates and contaminated surface water resulting in contaminated groundwater in lower quantities.



Today's hydrologic cycle

Today, many factors contribute to the decreased water quality of the San Diego River. Loss of riparian habitat along the river decreases the natural ability of riparian plants to filter contaminants. Agricultural runoff in the upper watershed may contain fertilizers, pesticides and animal wastes that wash into the river or percolate into the groundwater. Recreational fields and golf courses located along the river's banks may also contribute fertilizers and pesticides to the watershed if not managed properly. Industry located along the river leads to periodic spills and leakages, with potentially harmful effects to water quality. Known sources of MTBE (methyl ter-

tiary-butyl ether), a carcinogen, groundwater contamination from industrial tank leakage are found in Lakeside and Mission Valley. The Padre Dam Water Recycling Facility which treats sewage in Santee causes increased phosphorous in the river. Sewage spills and septic tank leakage can seriously impact water quality.

The highest volume of contaminated water entering the river results from urban runoff. With increased urbanization, paved surfaces and automobiles comes decreased stormwater quality. Stormwater and other water that is allowed to flow into storm sewers from yards and planting areas becomes pol-

luted through contact with contaminated surfaces such as roofs, streets, parking lots and driveways. These surfaces contribute oil, paint, lead, and organic compounds to the water of the San Diego River. The first flush, or first five minutes, of a storm event carries the highest concentrations of pollutants, as contaminants are washed from these surfaces. Concentrations of contaminants build during dry periods, leading to high levels of water contamination when the rains do fall. Household chemicals, soaps and lawn and garden fertilizers and pesticides are also washed into storm drains which empty into the river. The aquifers are further affected by stormwater runoff that infiltrates the ground.

	Headwaters	Reservoir to 67 Freeway	Lakeside	Santee	Mission Trails Regional Park	Mission Valley	Estuary
Water Sources	Snow, rain	Imported water, groundwater pumping	Imported water, groundwater pumping	Imported water, groundwater pumping	Rain	Imported water, future groundwater pumping	Imported water
Run-off	10%	60%	50%	50%	10%	90%	60-90%
Contamination sources	None	Residential, industrial, agricultural, animal waste	Residential, industrial, golf course, animal waste	Residential, industrial, reclaimed water, animal waste	Carried from upstream	Residential, urban, golf course, industrial, sewage spills	Residential, urban, dog waste
Contamination contents	None	Fertilizers, pesticides	Fertilizers, pesticides, MTBE	Fertilizers, pesticides, phosphorous, fecal coliform, dissolved oxygen, TDS	None	Fertilizers, pesticides, fecal coliform, dissolved oxygen, phosphorus, TDS, MTBE	Fertilizers, pesticides, eutrophic, fecal coliform, lead

*Summary of water quality by reach
(Marsh, 1997; Regional Water Quality Control Board, 2002)*

The watershed wide problems with water quality are intensified in the lower reaches of the river, as contaminated water from throughout the watershed is concentrated as it flows toward the ocean. These reaches are also the most highly urbanized within the watershed, further impacting water quality. The lower twenty miles of the river are proposed for listing as an impaired water body (Clean Water Act 303(D) listing) due to high concentrations of coliform, chlordane, phosphorous, dissolved oxygen and total dissolved solids. The estuary at the mouth of the river in Ocean Beach and near-by Famosa Slough are currently listed as impaired water bodies due to high levels of coliform, which means their water quality falls below standards set for designated uses (SWRCB, 2002). High con-

tamination levels have probable but yet undocumented, effects on native plants and animals. Contaminated river water also effects the ocean; beach closings and postings more than doubled in San Diego County between 1996 and 1999, due to urban runoff contamination and sewage spills (County of San Diego, 2002).

The water resource issues of sediment transport, water quantity and water quality in the San Diego River are inseparably linked to one another and to the natural river processes of the watershed. Human development in the watershed has lead to a vast alteration of natural processes of the river. Sediment transport processes changed, leading to changes in erosion patterns, degradation of natural habitat and loss of sand replenishment at local

beaches. Water quantities increased in the river, leading to a higher potential for flooding, and water quantities decreased in the aquifers threatening of habitat and future human use if current tendencies continue. Water quality has degraded throughout the watershed, especially in the lower reaches, impacting habitat, and human use.

Opportunities

Based on this understanding of the current water processes in the San Diego River watershed, the following opportunities were identified, focusing on the issues of sediment transport, water quantity and water quality.

Support Sediment Transport Processes

1. Preserve free flowing portions of the river to prevent further deterioration of the natural sediment transport processes that effect erosion balance, habitat quality and sand replenishment at local beaches.
2. Restore the natural grade in mining pits as they are decommissioned to prevent further sediment loss and downstream erosion effecting habitat and beach sand replenishment.

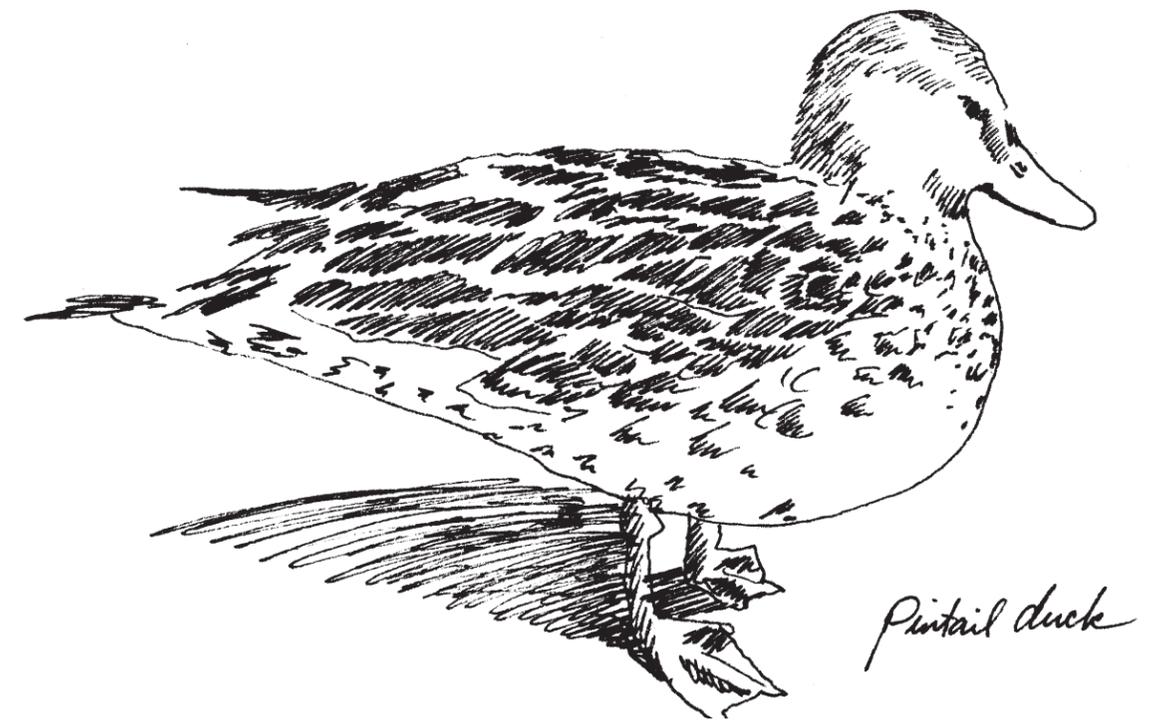
Decrease River Water Volume and Increase Ground Water Volume

3. Maintain and promote the increase of permeable surfaces to decrease runoff into the river and increase groundwater infiltration.
4. Prevent further development in the floodplain in the face of increased flood risk.
5. Remove nonnative plant species in the river that exacerbate flood risks.
6. Facilitate public education about runoff quantity reduction and how to reduce flooding and increase groundwater storage.

Improve Water Quality

7. Maintain natural habitat of the river to maintain natural water filtration processes.

8. Promote management strategies for agriculture, recreational fields and golf courses that improve water quality.
9. Use the filtration abilities of vegetation to improve ground water and runoff water quality.
10. Promote public education about runoff contamination and how to improve water quality for the river and groundwater.





PLANTS AND ANIMALS

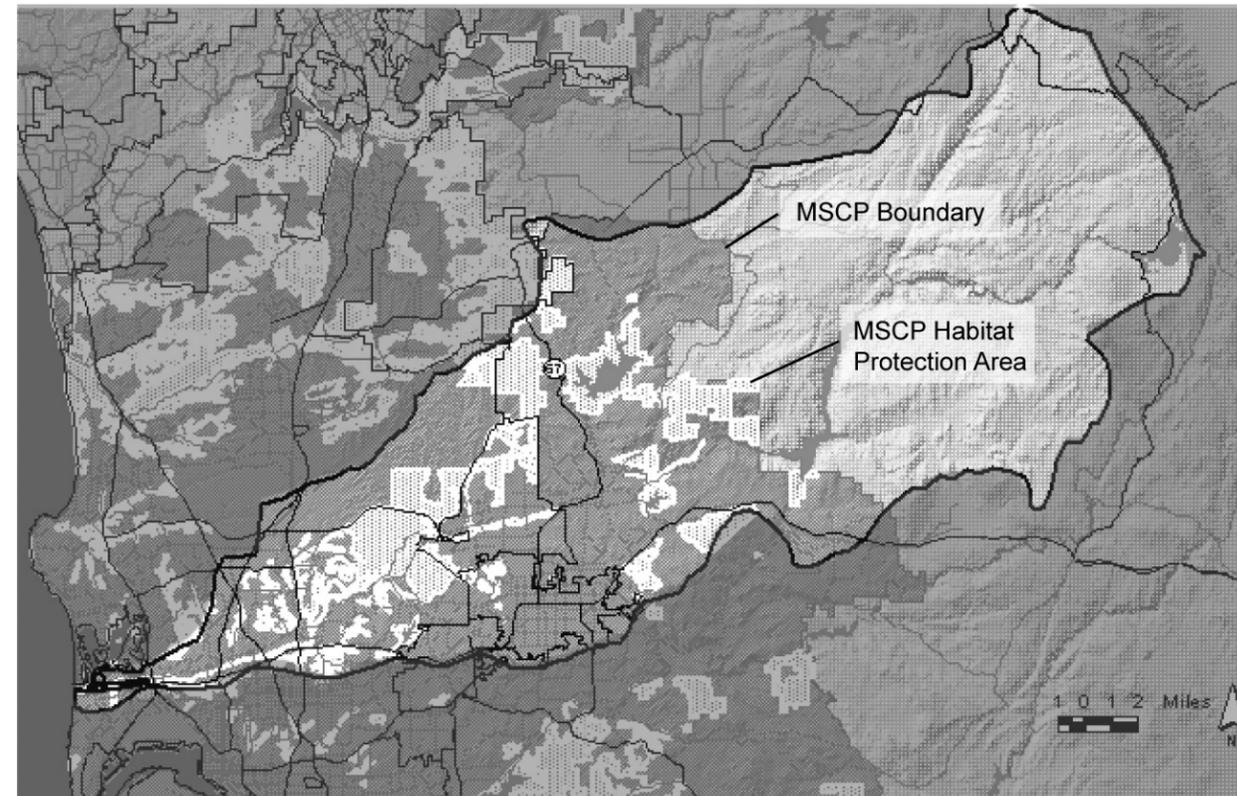
The San Diego River, despite the pressures of an expanding population and increasing urbanization, currently provides habitat to a wide variety of wildlife. As the region continues to grow and develop, however, these pressures may overwhelm the river's ability to provide refuge to many sensitive species. The creation of the San Diego River Park offers opportunities to preserve and enhance this highly valuable riparian resource.

Habitat and Disturbances

The San Diego region has been classified as a global conservation hot spot (Conservation International, 2002), and is home to exceptionally high concentrations of endangered species and facing rapid and widespread habitat loss due to increased urbanization. In arid land-

scapes, such as in San Diego River watershed, stream and river corridors support higher species richness compared to the surrounding landscape (Forman, 1999). Indeed, the San Diego River's habitat provides home and refuge to a wide variety of southern California's highly impacted riparian wildlife, including at least 25 federal and state listed species (please see appendix B1 for information about the San Diego River's sensitive species). Bobcats, mule deer, coyotes, foxes, small native mammals, native birds, native lizards, reptiles and amphibians, native fish and other aquatic species, native mosquito-eating dragonflies and other insects, and native plant communities all inhabit the San Diego River corridor today.

While much is known about many species in the San Diego River, much still remains to be discovered (Pregill, 2002). The proposed San Diego River Park can provide an outstanding laboratory in which to better understand the ecological functions of a natural system in an urban and suburban environment and the changes occurring there over time. Information about local species populations, interactions and adaptation can provide insight into this and other southern California riparian systems. Local high schools, colleges and universities will all have the opportunity to study this unique resource (please see Appendix B-2 for descriptions of the San Diego River's natural communities).



Multiple Species Conservation Plan (2001) boundaries area and protected habitat

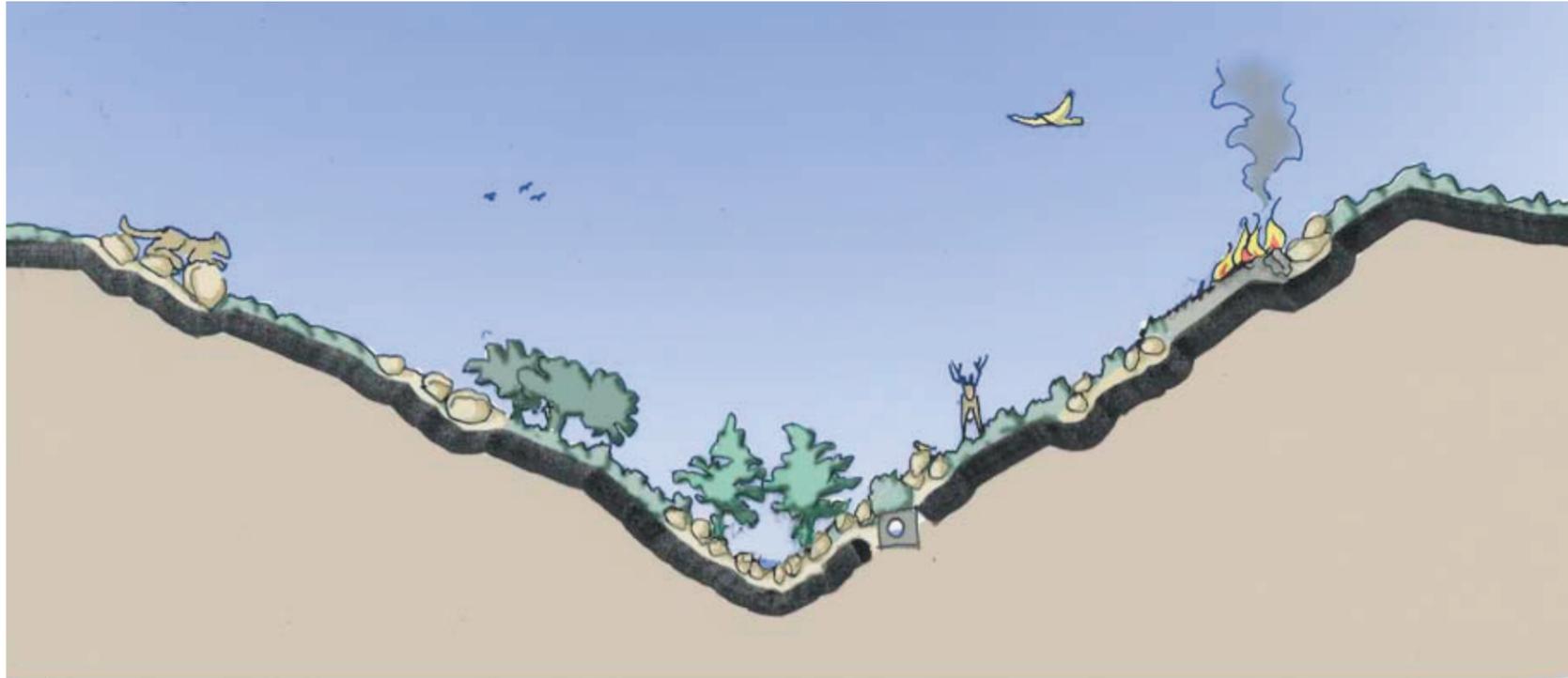
A regional effort has recently been put forth to protect sensitive species through the Multiple Species Conservation Plan (MSCP). Adopted in 2001, the MSCP provides regional protection for 86 sensitive species over 582,243 acres. Conservation areas of habitat and linkages are set aside and protected from development to satisfy minimum survival percentages of protected species, while, areas outside conservation areas may be developed as zoned, regardless of presence of sensitive species. MSCP conservation areas offer protection to most of the proposed San Diego River Park habitat. This approach is highly beneficial to the proposed park, but protection from development alone does not guarantee high quality habitat. The proposed San Diego River Park habitat still faces many pressures on habitat quality. Dozens of

invasive exotic plant species currently inhabit the river (please see Appendix B-3 for a summary of invasive exotic plant species in the San Diego River corridor). The presence of these exotic species results in decreased area available for native plant growth as well as decreased habitat value for many native animal and insect species. Some of these plants also impact the hydrology and natural water flow of the river.

Currently, there are many ongoing restoration efforts in areas throughout the proposed river park, conducted by the hard-working people from local parks, preserves, community and nonprofit organizations. These efforts, however, are not coordinated and unified by a single vision or plan. Some particularly invasive species, such as giant reed, *Arundo*

donax, and others, are most successfully eliminated only through a unified plan that considers the elimination of local populations as well as source populations. The proposed river park offers the opportunity to better coordinate and plan restoration efforts.

Nonnative plants should be understood at the river-wide scale. Many other pressures on the wildlife habitat of the San Diego River are best understood by examining the unique conditions in each of the river's seven reaches. Habitat characterizations summarized here for each reach are based on SANDAG, San Diego's Regional Planning Agency, data available on line at www.sandag.cog.ca.us, and are based on the Holland 1995 vegetation classification system.



Typical habitat and disturbances in the headwaters

Headwaters

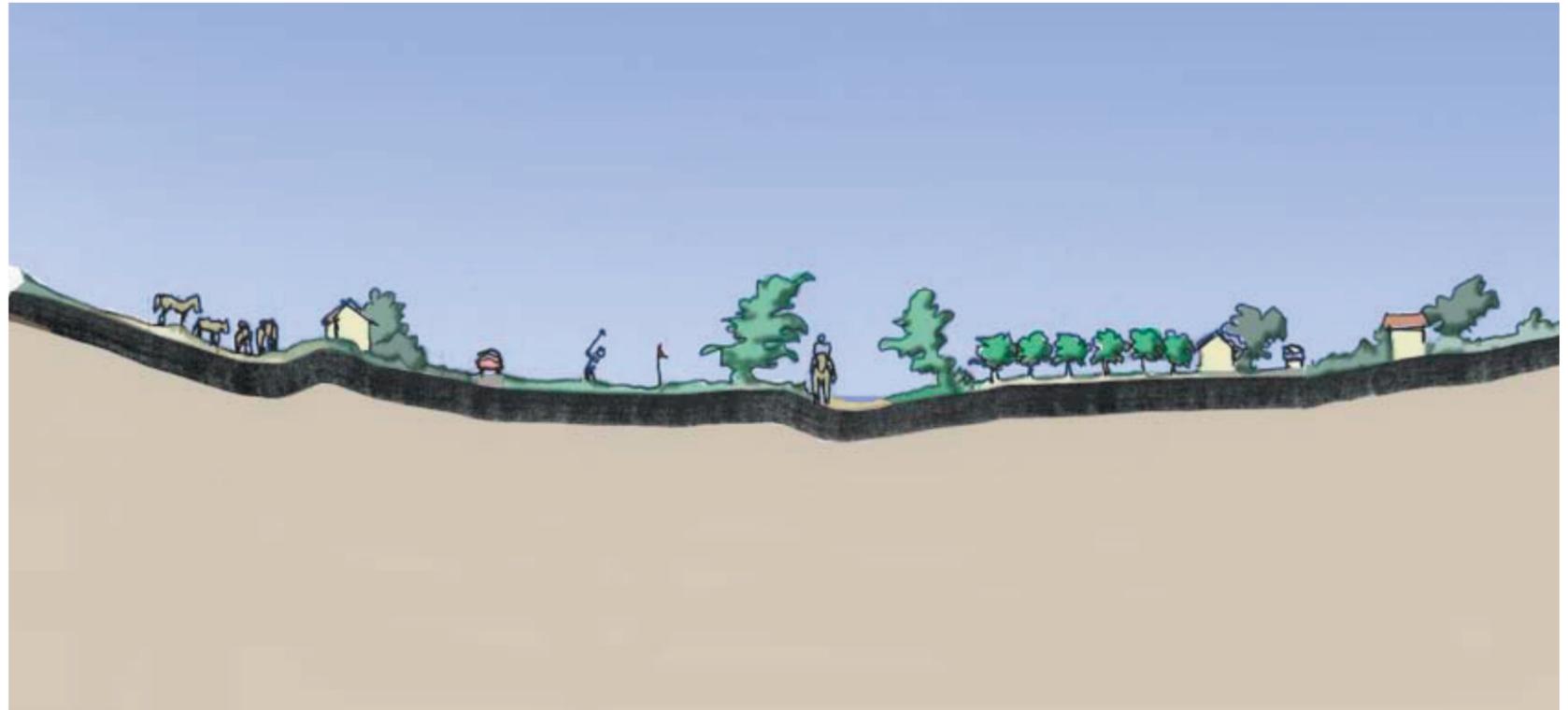
Steep rocky slopes characterize the headwaters. Chaparral communities, including southern maritime, northern mixed and chamise chaparral, dominate these hot, dry slopes. Oak woodland, communities, including dense coast live oak woodland and mixed oak woodland grow in the cooler shaded areas of north facing slopes. Diegan coastal sage scrub occurs nearer the river bottom at lower elevations and in alluvial soils. The river

bottom itself is predominantly characterized by southern riparian forest. This habitat is largely protected because of its location within Cleveland National Forest and other public ownership areas, but it is not free from the threats of disturbances.

- Flooding has always been a natural disturbance process here, periodically destroying and renewing the riparian habitat.
- Periodic fires in the chaparral once were also a natural disturbance

process, restoring and rejuvenating this fire-dependant habitat. Fire suppression has greatly altered this natural process today. Due to longer periods between fires and fuel load build-up, modern fires have the potential to burn hotter, threatening habitat and species when they occur.

- Culverts and channeling the river under driveways and roads disrupts habitat for some small species.



Typical habitat and disturbances from El Capitan Reservoir to the 67 freeway

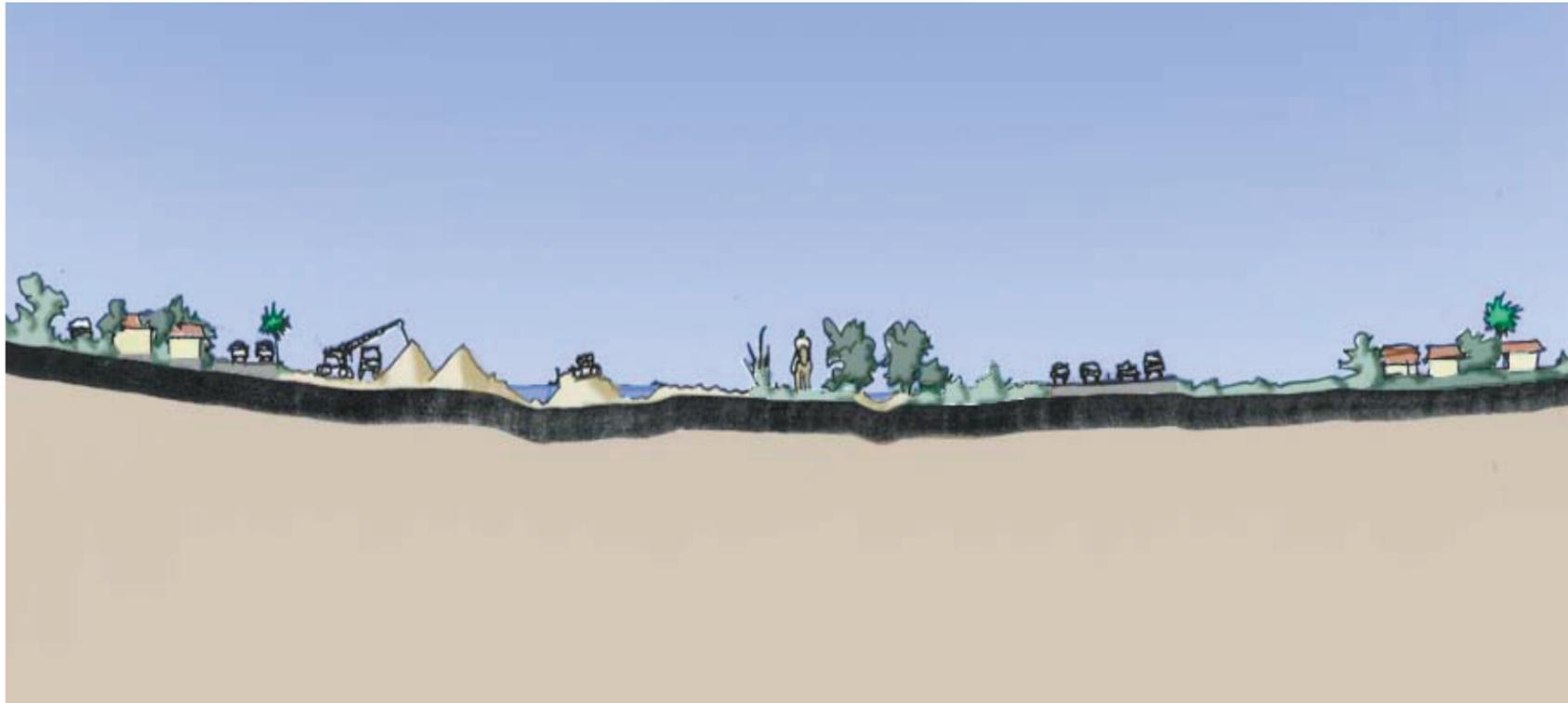
Reservoir to 67 Freeway

Here, the steep valley sides move out farther from the river, providing rich soils on flat lands dominated by agriculture. Surrounding the river, Diegan coastal sage scrub predominates where agriculture is absent. The river bottom contains the riparian communities of southern riparian scrub with some areas of southern coastal live oak riparian woodland. Disturbances in this reach

are primarily caused by agriculture and human recreation.

- Agriculture increases runoff and nutrients in the river, altering its natural habitat character.
- Golf courses disrupt native habitat but preserve riparian habitat adjacent to the river. Nutrient loading from heavy use of fertilizers on turf areas may alter community composition.

- Horseback riding in the river bottom tramples native vegetation and reduces water quality. Horse waste also attracts an introduced bird species, the brown-headed cowbirds, *Molothrus ater*, which parasitize the nests of the federally endangered least Bell's vireo, *Vireo belli pusillus*.



Typical habitat and disturbances in Lakeside

Lakeside

The deep, sandy soils of the San Diego River through Lakeside were significantly mined over the past 50 years. Deep pools left behind from mining operations have largely replaced the river channel. Southern riparian forest and southern riparian scrub dominate river and pool banks. Spreading urbanization interrupts pockets of Diegan coastal sage scrub and chaparral in the surrounding areas.

Mining and urbanization are the major sources of biological disturbances in this reach.

- Sand mining disrupts habitat, but leaves behind ponds which become valuable aquatic habitat.
- Channelization and drop structure construction is replanting native habitat and monitoring for endangered species, but allows for

increased development adjacent to the river.

- A freeway and roads crossing the river fragment habitat, making species movement more difficult and dangerous.



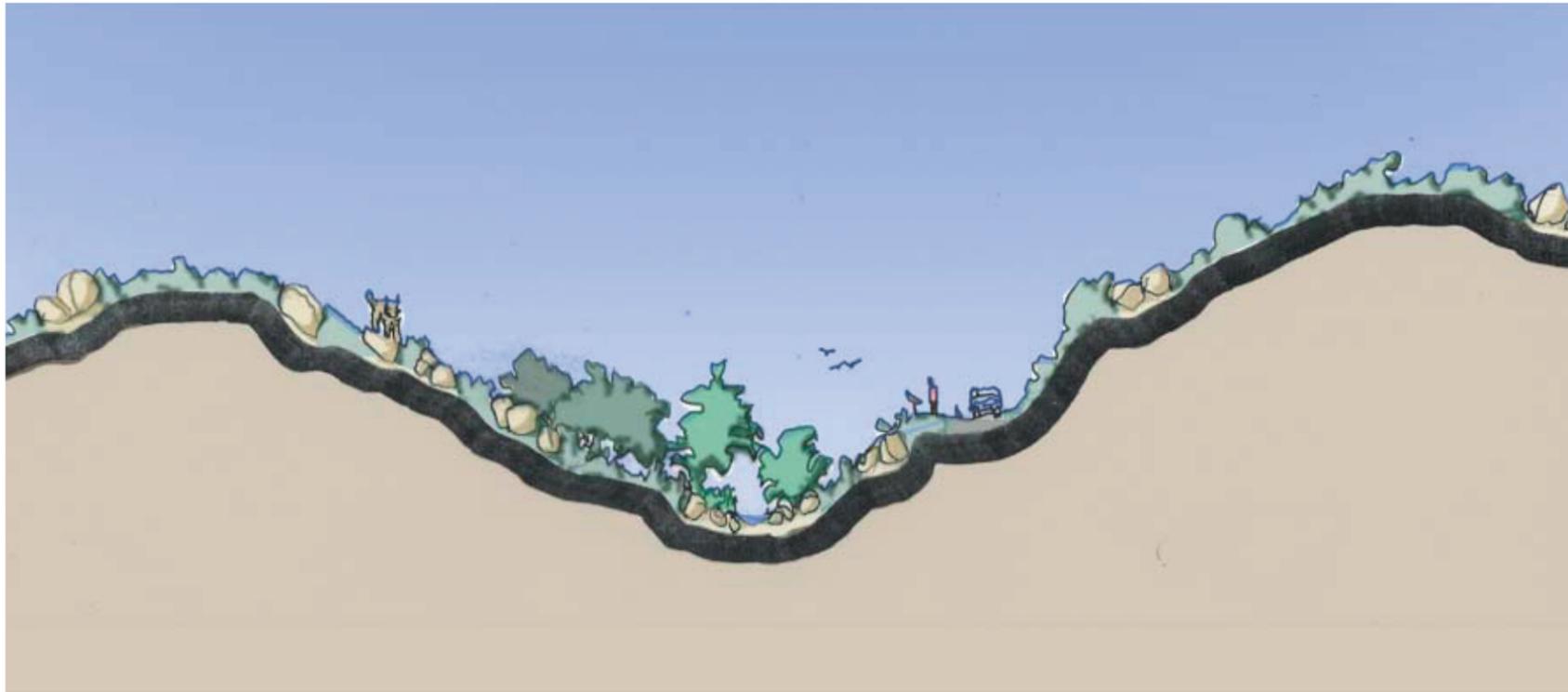
Typical habitat and disturbances in Santee

Santee

The San Diego River through Santee contains a matrix of previously mined and natural areas. Tributaries to the river are both channelized and free flowing. Many riparian areas are within park boundaries, surrounded by suburban development, with small pockets of Diegan coastal sage scrub and chaparral communities remain-

ing. The riparian areas are dominated by southern riparian forest with areas of southern riparian scrub. The aquatic community of coastal valley freshwater marsh is found in some of the previously mined areas. The growth of Santee causes most of the disturbances in this reach.

- Suburbanization introduces pets that prey on native species.
- Recreation disturbs some sensitive species, but educates the public about the river.
- Urban development changes runoff and water quality, altering the natural habitat.



Typical habitat and disturbances in Mission Valley Regional Park

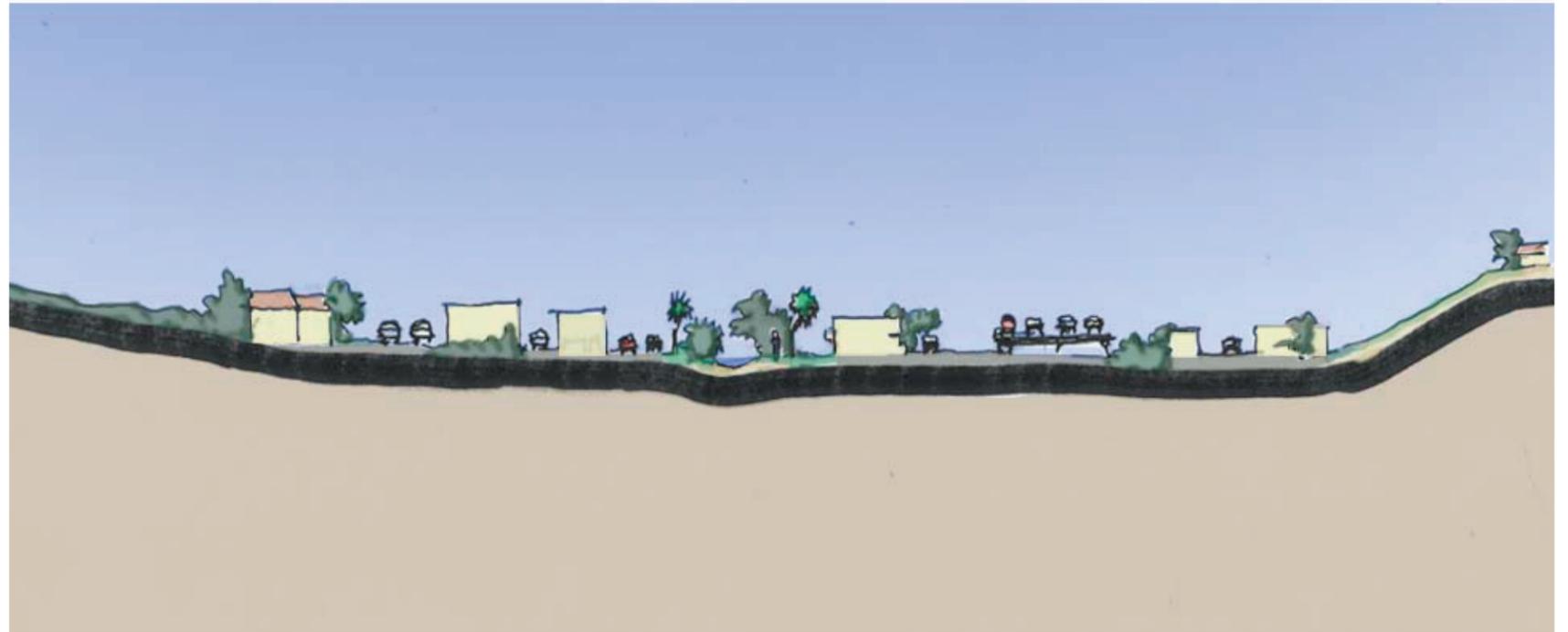
Mission Trails Regional Park

Within this large regional park, steep valley walls enclose the river once again. Diegan coastal sage scrub and chaparral dominate these dry slopes. The river bottom contains a matrix of southern riparian forest, southern riparian scrub and southern coast live oak riparian woodland. Aquatic freshwater habitat

occurs in some areas. Threats to this reach primarily stem from the influence of the surrounding reaches.

- Roads and development surrounding the park threaten it with isolation.
- Loss of connectivity to headwaters through Santee, Lakeside and

reservoir to 67 Freeway could threaten the long-term survival of bobcat populations within the park.



Typical habitat and disturbances in Mission Valley

Mission Valley

Here, urbanization presses right up to the river's edges, and disturbances begin to seriously affect the quality of the riparian habitat. The narrow river channel habitat communities include southern cottonwood-willow riparian forest, southern riparian scrub and disturbed wetland.

- Mass commercialization and groundwater contamination has reduced water quality for river dwelling species.
- Development limits the areas available for native habitat and reduces habitat quality, but mitigation

- projects have recreated pockets of good quality habitat.
- Many freeways and high-speed roads significantly fragment habitat and affect water quality.



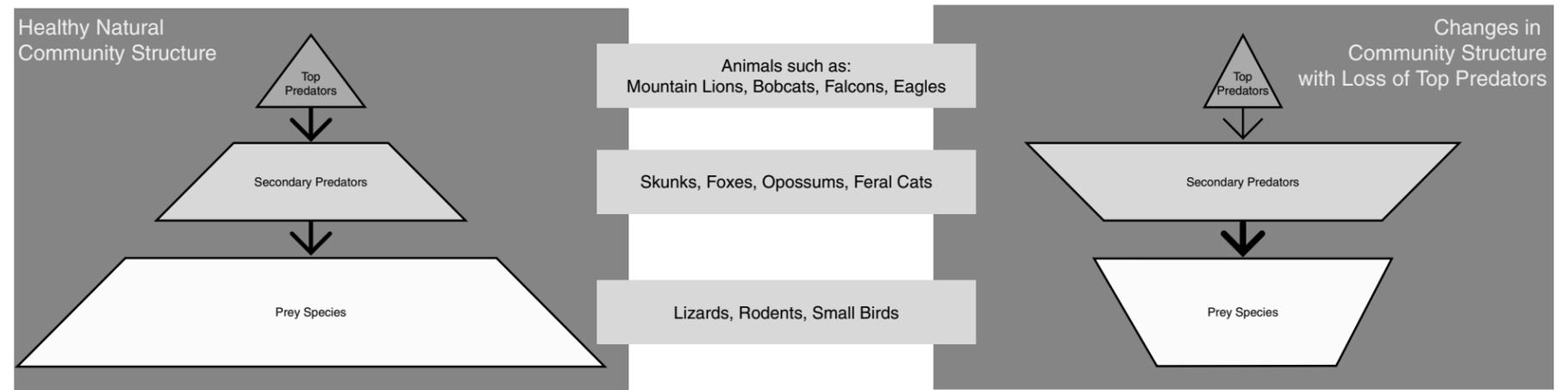
Typical habitat and disturbances in the estuary

Estuary

Where the river meets the ocean, it has been soft-bottomed channelized, with an engineered jetty separating its waters from the waters of Mission Bay. Aquatic communities include southern coastal salt marsh, estuarine and intertidal communities provide rich and thriving habitat for a wide variety of bird species, including many rare and threatened species, such

as the federally endangered light-footed clapper rail, *Rallus longirostris levipes* and California least tern, *Sterna antillarum brownii*. Threats to this habitat include the cumulative effects of the many disturbances throughout the watershed, and at the mouth of the river itself conflicts exist with recreational use.

- Recreational activities and dogs at Dog Beach, if not managed properly, impact birds nesting in the estuary.
- The cumulative effects of water quality issues throughout the watershed are concentrated here, and poor water quality impacts the health of the wetland community.



Effects of top predator loss to community structure

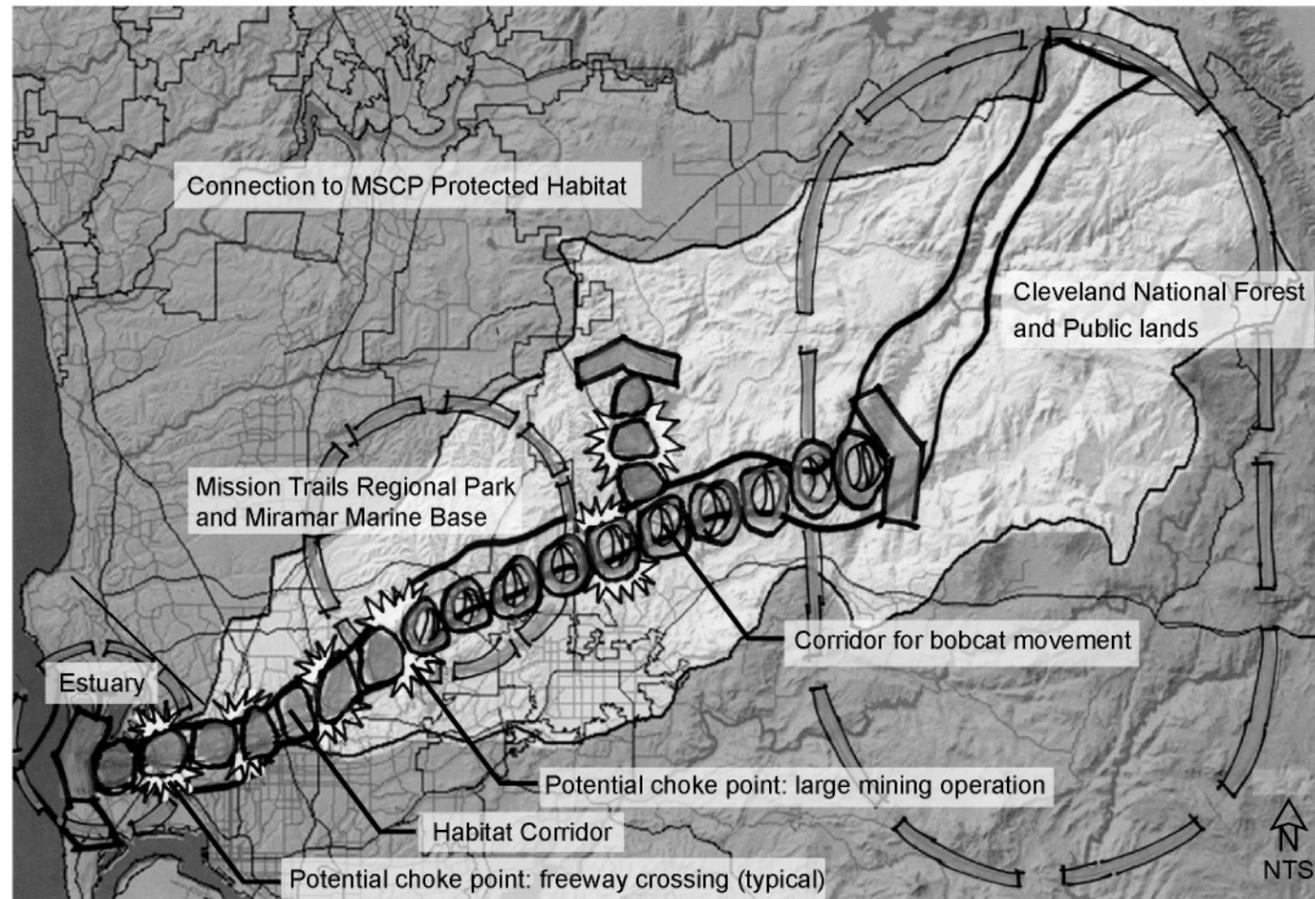
Connectivity

Along the proposed San Diego River Park corridor, there are three primary large patches of native habitat connected by a linear riparian corridor: Cleveland National Forest and adjacent public lands in the headwaters, Mission Trails Regional Park and the adjacent Miramar Marine Base, and the estuary. Maintaining and improving the viability of the corridor that connects these patches is essential to overall community health. If connectivity is lost and these patches become isolated, the patches lose genetic diversity and native populations decline over time (Beatley, 1994). Habitat corridors suitable for the move-

ment of birds, small mammals, reptiles, insects and plants must be maintained and enhanced along the entire length of the San Diego River Park (please see appendix F “Designing Riparian Corridors for Biodiveristy”). A connection should also be maintained along San Vicente Creek to connect with preserved habitats and larger habitat patches to the north of the proposed river park.

An issue of particular importance for the proposed San Diego River Park is the potential loss of top predator species. The loss of top predators, such as bobcats, *Lynx rufus*, and mountain lions, *Felis*

concolor, who require connectivity for survival, disrupts the balance of the entire community. Top predators have already been significantly reduced within the watershed. Mountain lions once represented the top predator species throughout the region. Spreading urbanization has pushed mountain lions out of all but the very western, rural portion of the watershed. Being less sensitive to urbanization, bobcats still range down as far down the river as Mission Trails Regional Park. Farther down the river, in Mission Valley and the estuary, bobcats have been mostly eliminated by intense urbanization and are not likely to return. Bobcats



Habitat patches, choke points and needed connections

are estimated to occur one per every one or two square miles of chaparral (Schoenherr, 1992), and when confined to habitat patches, require connectivity to meet their reproduction and dispersal needs. Without connectivity between isolated habitat patches, bobcat populations will not be able to survive over time, and the communities where they once hunted will be significantly affected.

When top predators, like bobcats and raptors such as falcons and eagles, are lost from a community, the meso-, or secondary, predators grow in number due to decreased competition and decreased

predation from the top predators. When mesopredators, such as skunks, foxes, opossums and feral cats are allowed to increase in number, they deplete their prey species, such as rodents, lizards and small birds. This, in turn, affects the species they eat, including insects and plants. Maintaining populations of top predators helps ensure better balance throughout the entire community. Raptors such as bald eagles, *Haliaeetus leucocephalus*, and Cooper's hawk, *Accipiter cooperii*, should be encouraged within the proposed park by designing for their specific needs. Maintaining connectivity for bobcats from the protected lands in the

headwaters through the reaches of Santee, Lakeside and Reservoir to 67 Freeway is essential to maintain the integrity of Mission Trails Regional Park habitat. A number of obstacles currently exist limiting habitat connectivity of the proposed park including freeway crossings and a large sand mining operation. As native populations continue to feel the pressures of increasing urbanization, these choke points become more critical and options to ensure better connectivity are necessary. Construction that diminishes current connectivity must be avoided.

Opportunities

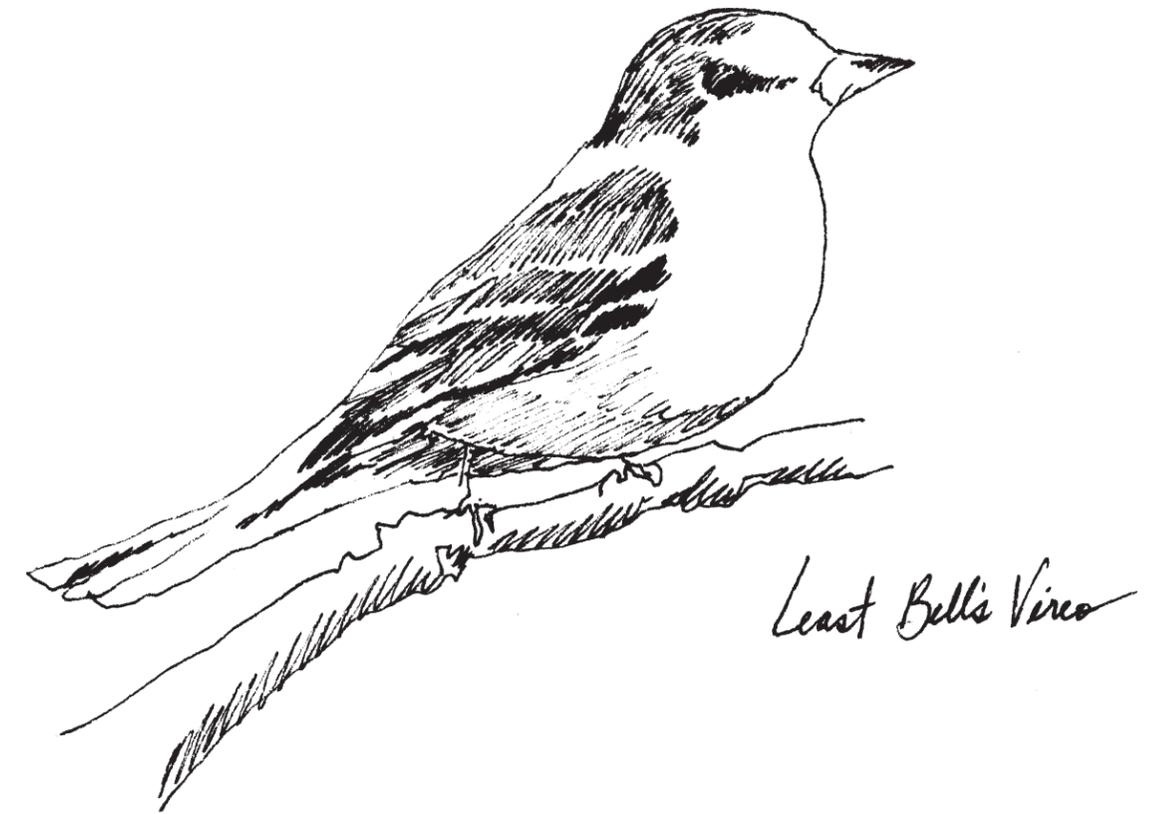
The creation of the San Diego River Park offers many opportunities for the plants and animals of the river by enhancing habitat, maintaining connectivity, integrating recreation and facilitating education.

Enhance Habitat

1. An important opportunity exists today to protect and preserve the remaining riparian habitat of the San Diego River to maintain the diversity of southern California's highly impacted riparian species, expanding the protection provided by the Multiple Species Conservation Plan.
2. Habitat restoration efforts and exotic invasive species eradication can be increased and better coordinated along the river within the park.
3. The completion of sand mining operations along the river offers opportunities to increase the native habitat of the river through restoration.
4. Management practices within the park can help compensate for the loss of periodic natural fires and flooding in the landscape, maintaining healthy plant communities.
5. The river park offers opportunities to improve water quality for the benefit of riparian species.

Maintain Connectivity

6. Urbanization, suburbanization, industry, freeways and roads currently threaten the connectivity of the river corridor habitat. The river park can provide protection of habitat connectivity from the headwaters to the coast by connecting three large existing habitat patches,



Least Bell's Vireo

maintaining community health throughout the watershed.

7. A bobcat corridor currently exists between the habitat in the headwaters and Mission Trails Regional Park, helping to maintain healthy populations in the park, but rapid growth in the upper watershed threatens this connection. The river park provides an opportunity to maintain this vital connection.

Integrate Recreation

8. Horseback riding, a popular activity on the San Diego River, disturbs habitat and sensitive species. The park provide opportunities to reduce the impact of horse riding through careful planning of horse trails and facilities.
9. The river park offers the opportunity to better integrate habitat and recreation along the river for the benefit of wildlife, by providing

increased protection from disturbances. People can also benefit from enhanced recreational experiences.

Facilitate Education

10. Recreational activities along the river offer opportunities to educate the public about diverse plants and animals of the river.
11. Establishment of the river park will provide opportunities to educate the public about the effects of disturbances, such as the impact of domestic pets on the river environment.
12. The river park can provide local schools, colleges and universities with an outdoor laboratory in which to better understand the ecological functions and changes over time in a natural system in an urban and suburban environment.



Hiking to Cedar Creek Falls

RECREATION AND EDUCATION

Areas along the San Diego River are rich with recreational opportunities. There are trails in close proximity to natural areas, urban centers and active recreation fields. Unfortunately, these trails do not link together. The communities along the river corridor have a vision to link these trails to make the recreational component of the San Diego River cohesive and comprehensive.

Recreational Resources

The San Diego River watershed is home to a wide variety of recreational areas, and the San Diego River runs through many of many of them. Each reach of the river park offers opportunities to expand this network and to integrate all of these into a single comprehensive system.

Headwaters

Cleveland National Forest is a series of wilderness islands that run about 130 miles from South Los Angeles to within five miles of the Mexican border. The southern segment in San Diego County contains much of the San Diego River's upper watershed within its boundaries and offers hiking, biking, backpacking, and camping in 26 developed campgrounds in large, open landscapes and rugged mountains.

Cuyamaca Rancho State Park covers 25,000 acres and includes hundreds of miles of hiking, horse and mountain bike trails. Park campgrounds include family, group, primitive trail and equestrian camping. Cuyamaca Reservoir is located within this park.

A small park located near the first trickles of the San Diego River, Inaja Memorial Picnic Ground and National Recreation Trail, commemorates eleven firefighters who lost their lives fighting the Inaja Forest fires of 1956. A monument is located adjacent to a small picnic area, and a trail provides a 30-minute half-mile loop with views of the river's headwater and plant identification markers.

Reservoir to 67 Freeway

El Capitan Reservoir, on the river itself, offers seasonal boating and water sport access depending on water levels. There are picnic facilities and fishing along four miles of the shoreline, accessible by foot.

El Monte County Park, located across El Monte Road from the river, is a 98-acre

family oriented park with seven recreation fields and a large picnic area.

Lake Jennings County Park is located east of the river along a tributary, Quail Canyon Creek. The Lake Jennings reservoir serves as the centerpiece of the park, providing water activities, hiking, fishing and overnight camping.

El Monte Golf Course is currently under construction along the river in this reach, and is Audubon Society certified for habitat.

Lakeside

Cactus Park is a community park located along the banks of the river offering a variety of activities including motor-cross, baseball, softball, picnicking.

San Vicente Reservoir provides recreational activities in a reservoir on the San Vicente Creek tributary. Fishing, boating and water-skiing are popular activities here.

Willowbrook Golf Course is located on the north side of the river in Lakeside.

Santee

Santee Town Center, a large project currently under construction, will consist of 706 acres of master-planned, mixed-use development with 80 acres of riverside parkland. It includes recreation fields, a skate park, a playground, picnic areas, pools, indoor soccer, a gymnasium and a community center.

Mission Creek Park, located adjacent to a busy WalMart shopping center, provides 40 acres of parkland with trail access along the river. Sand mining reclamation has returned former pits to habitat, and the least Bell's vireo was successfully reintroduced to this area.

Mast Park is a popular 45-acre park with a combination of active uses, trails and natural habitat along the river. Amenities include picnic areas, barbecue grills, horse trails, a playground, a multipurpose court and an exercise course.

Santee Lakes Regional Park and Campgrounds provides recreation and renowned bird watching along a series of seven scenic lakes that help clean and filter reclaimed water. This 190 acre park located along Sycamore Creek tributary, offers camping, fishing, playgrounds and picnic areas.

Carleton Oaks Golf Course and Country Club has plans to reestablish wetland habitat in disturbed areas, and has an easement for public access trails to connect with other river side parks in Santee.

Mission Trails Regional Park

This large regional park provides nearly 5,800 acres of both natural and developed recreational areas and is one of the largest urban parks in the country. The park contains over 40 miles of trails, including interpretive trails, a state of the art visitors' center with a large deck and amphitheater, as well as boating on Lake Murry. The park is home to the historic Old Mission Dam built to provide water for the Mission San Diego de Alcalá.

Mission Valley

The area known as "FSDRIP", the First San Diego River Improvement Project, is a flood management project along the river in Mission Valley. Although not a park, public access, parking, picnicking and a series of trails provide access to the river.

Adobe Falls, a spring fed waterfall on the Alvarado Creek tributary to the river is proposed to become a natural park in

the urban landscape of Mission Valley. Currently, trails offer access to the falls.

Located near Old Town, Presidio Park commemorates the site where Father Junipero Sera established the first mission in California. Pedestrian trails lead to a 1929 mission style building with striking views of Old Town, the San Diego River, Mission Valley and the Ocean.

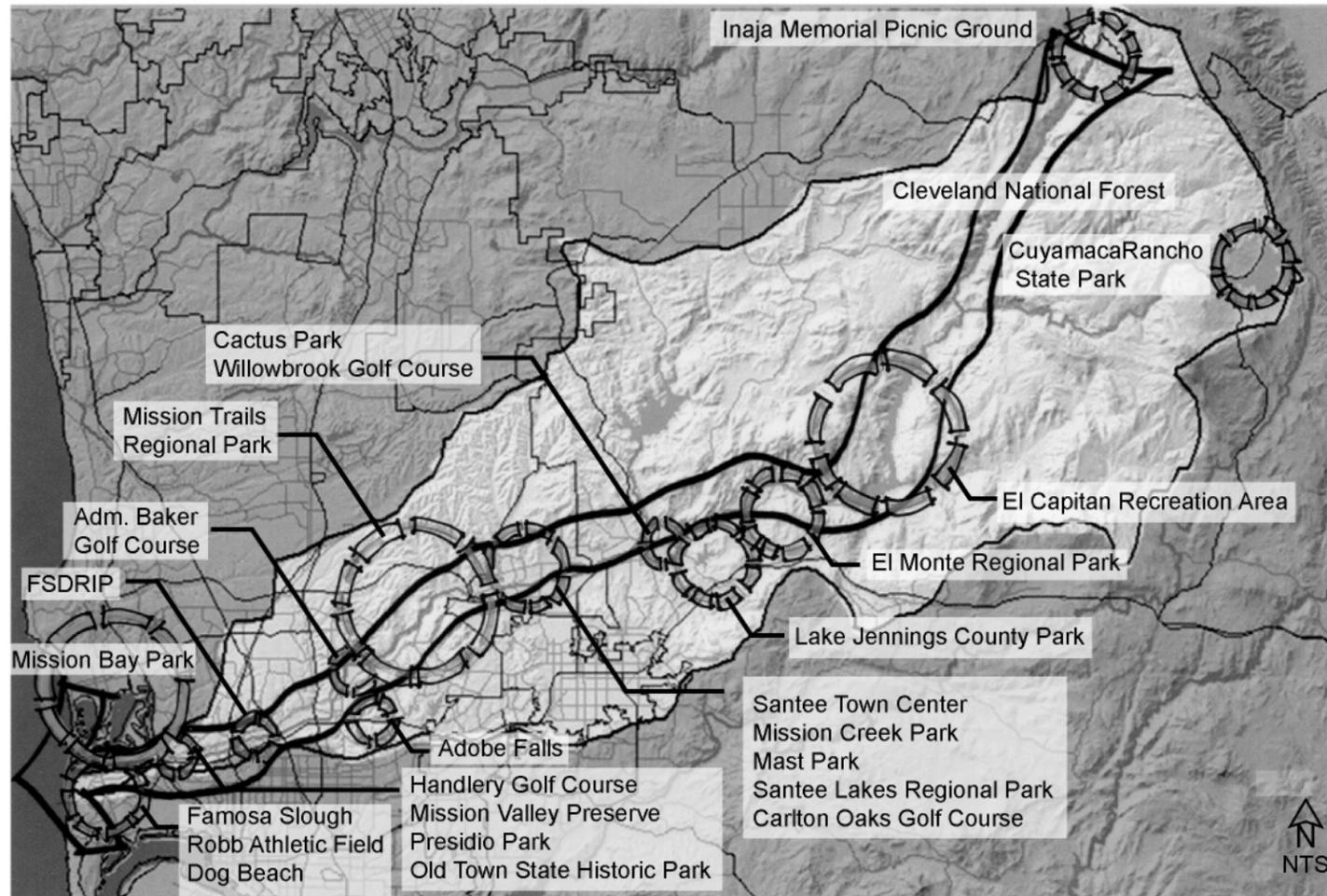
Old Town San Diego State Historic Park recreates life in the Mexican and early American periods in San Diego. Five original adobe structures and other historic buildings are part of the complex which includes restaurants, shops and a museum. Old Town was originally built near the banks of the San Diego River, but this connection was lost when the river was permanently redirected into Mission Bay.

Admiral Baker Golf Course is located on United States Navy land in Mission Valley, and provides golf facilities for military personnel.

Handerly Golf Course, located in the heart of Mission Valley, has an approved plan to convert the area to a mixed use development with river trail access.

Estuary

Famosa Slough is a thirty acre urban wetland originally part of the Mission Bay wetland complex. The slough was gradually isolated by the Ocean Beach trolley tracks, a landfill, channelization of the San Diego River, and freeway and road construction. The slough is flushed with salt water from the river channel, and collects rainwater and runoff from its 300-acre watershed. Recreational opportunities at the slough include walking trails and bird watching.

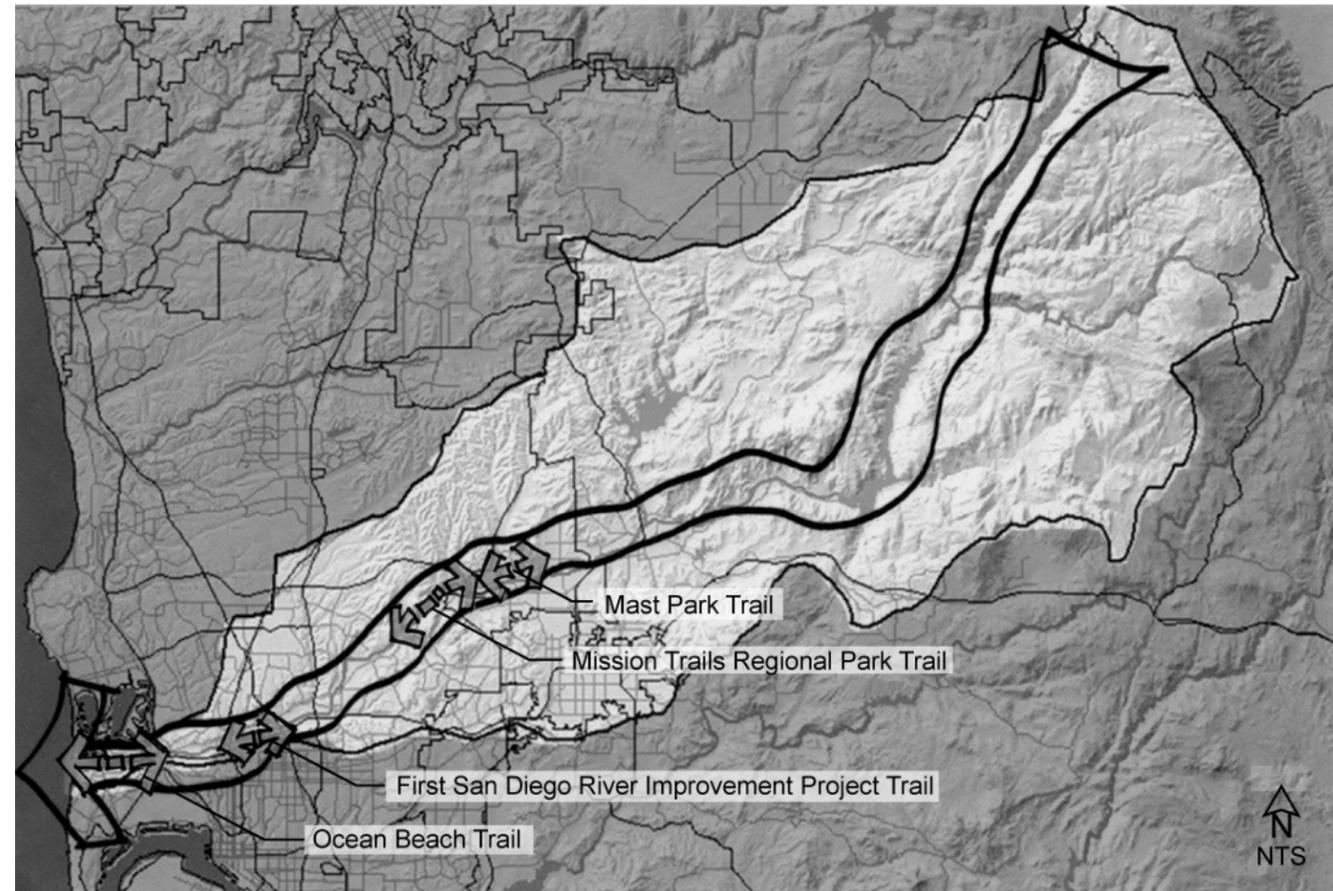


Parks and golf courses along the San Diego River

Robb Field Recreation Center is a heavily used active sports park located along the channelized bank of the river in the estuary. Facilities at this park include recreation fields, picnic areas, weightlifting, a community center and a skateboard park. A multi-use pedestrian and bicycle trail follows the river through the park.

Dog Beach, the final park along this system of recreational areas which began in the headwaters, provides a beach where dogs can be off-leash to enjoy the waters of the San Diego River and the Pacific Ocean. Trails meander through sandy habitat areas adjacent to the estuary.

Dusty Rhodes Park, located across Sunset Cliffs Boulevard from Robb Field Recreation Center provides a large open space used for sports, dog shows and other activities.



Existing local trails along the San Diego River

Trails

In addition to trails provided within the parks and recreational facilities along the river, a number of other trails follow the San Diego River or offer opportunities for connection to the river.

The Trans-County trail, located to the north of the San Diego River watershed, provides a connection from San Diego’s coast to the mountains, and provides a valuable regional link to the river park.

The National Forest and State Park provide many regional trail opportunities

in the headwaters, but the terrain is very steep along the river itself, so only limited access is provided.

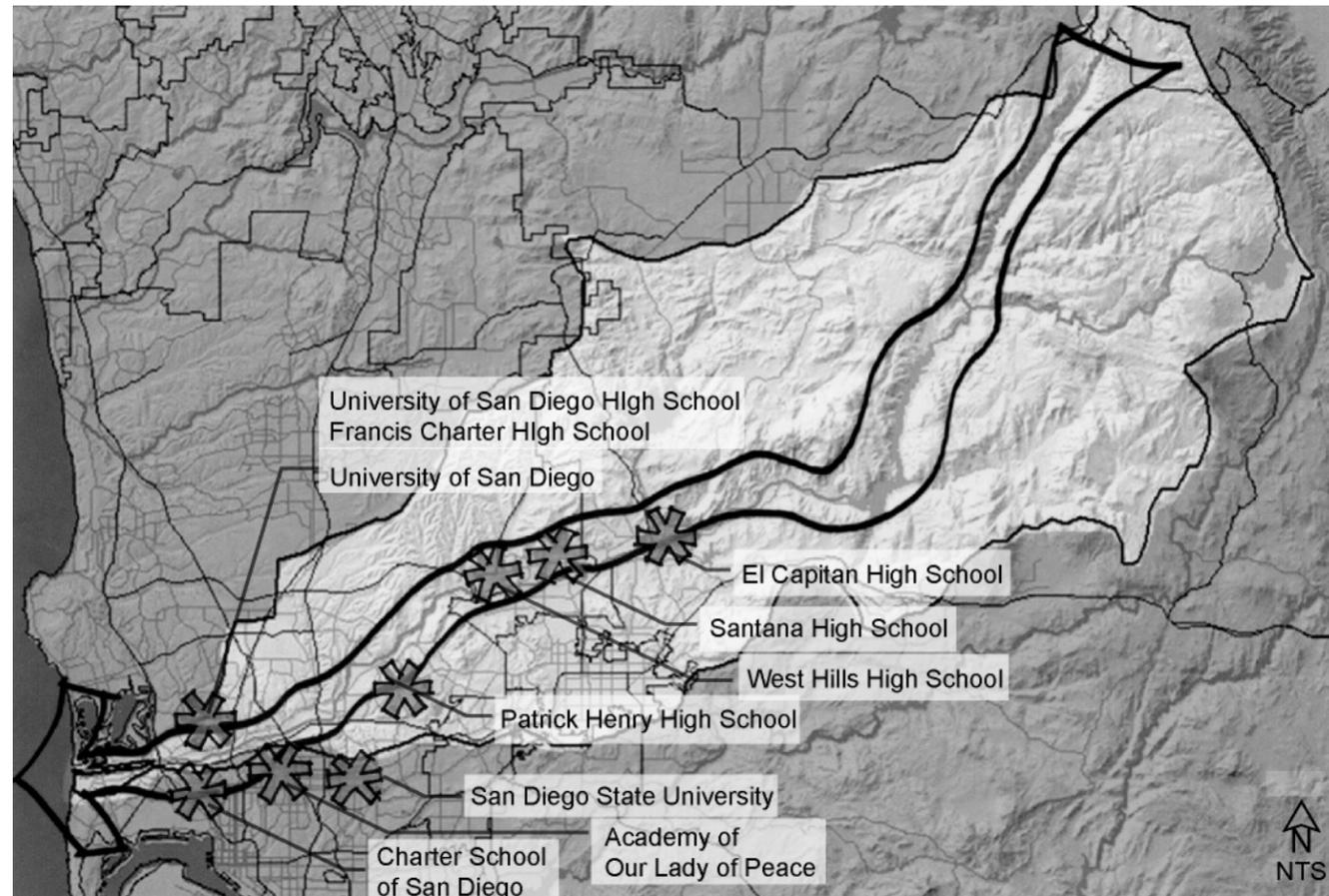
Reservoir to 67 Freeway does not currently have any official trails along the San Diego River.

Lakeside is working to establish trails along the San Diego River Improvement Project running through the community. Liability, easement issues and habitat conflicts need to be resolved to implement these trails.

The city of Santee provides trails through all of its river-adjacent parks, and a complete trail connection through the city along the river will be completed when their San Diego River Park Plan implementation is completed in 2010.

Mission Trails Regional Park (MTRP) offers a trail along the river through the entire length of the park.

Through Mission Valley, trails are provided along parts of the river, but not all. In addition to trails provided through



High schools and universities in the project area

FSDRIP, there are currently efforts to connect a bike trail along this portion of the river. Existing portions include a three-mile segment from Dog Beach west to Interstate 5, and a half-mile portion from Fashion Valley to Avenida Del Rio. Plans are pending for additional segments.

Educational Resources

There are several sites along the river that serve an educational purpose. First and foremost, are the many schools in close proximity to the San Diego River.

Lakeside and Santee both have high schools with active science departments for which a river park will be an invaluable resource (Purdy, 2002). Further down the valley the river flows below San Diego State University and the University of San Diego. Both schools already rely heavily on the river as a research area, but would benefit greatly from further research in a protected river park. In turn, this research can enhance and improve the river park into the future. Mission Trails Regional Park and Old Town State Historic Park provide interpretive

information on historic uses of the river corridor linking visitors with the past. Mission Trails Regional Park provides excellent facilities for learning about the natural history of the area, and there are a few interpretive signs in the estuary that signify a great first step in incorporating more outdoor education elements into the river park.

Opportunities

The San Diego River Park provides great opportunities to connect and expand upon the existing recreational systems within the region. Opportunities also exist to enhance the educational experiences at local schools, colleges and universities. Existing interpretive elements along the river can be expanded upon.

Connect Existing Facilities

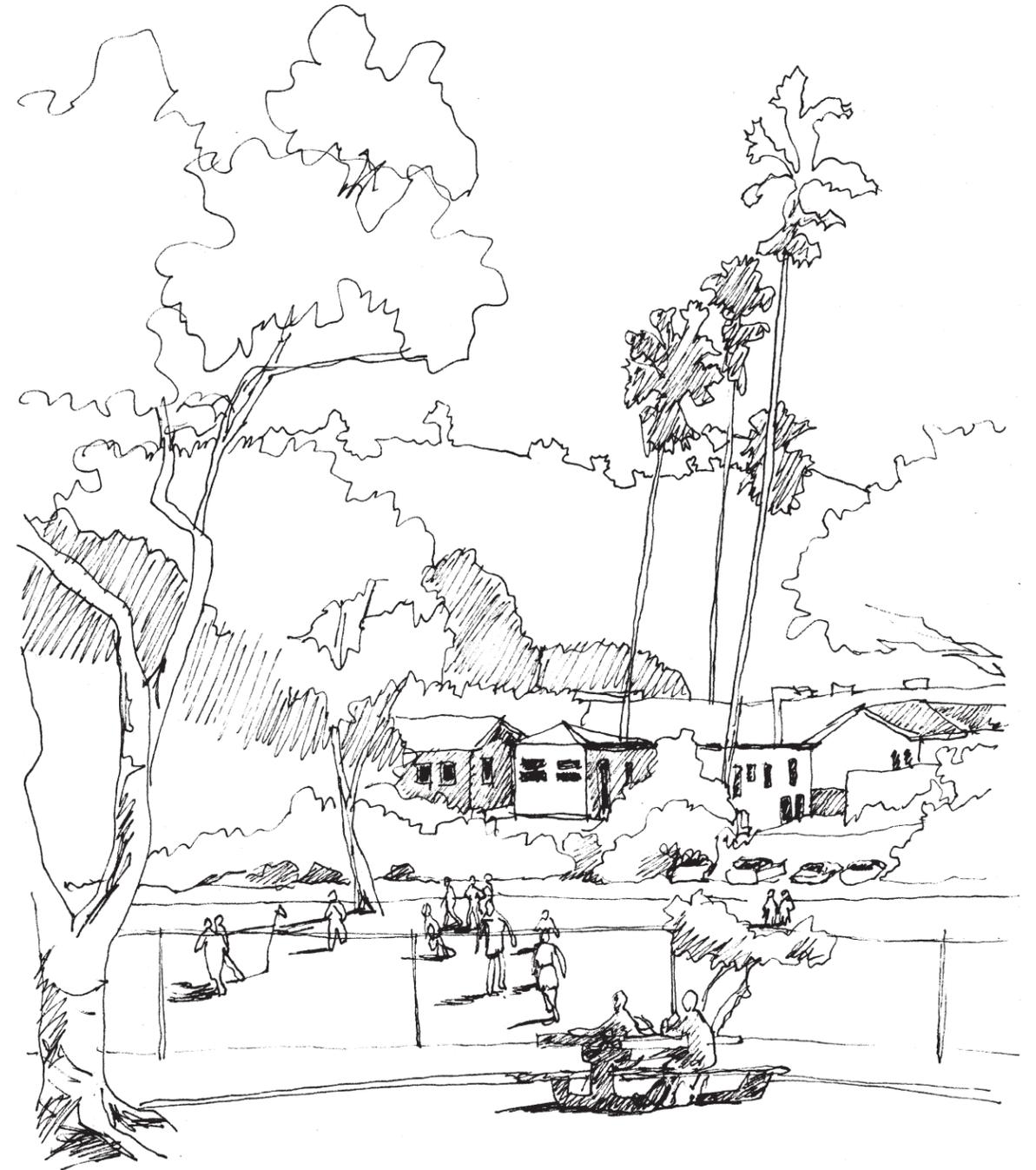
1. Currently, many recreational opportunities exist along parts of the river. Opportunities exist to unify and connect these facilities through the river park.
2. Existing trails along the river are fragmented and disconnected; the river park provides opportunities for a connected trail system used for recreational, as well as alternative commuting.

Provide Additional Facilities

3. As the watershed's population continues to grow, so will demand for recreational opportunities. The river park provides an opportunity to meet these future recreational needs.
4. There are many opportunities to expand the existing trail system. Secondary trails can provide river park users with a wider variety of experiences.

Enhance Educational Opportunities

5. Schools, Colleges and Universities: Many schools, colleges and universities utilize the educational opportunities provided by the river. Opportunities exist to expand this network, benefiting students and the park through future research.



Soccer at Robb Field

6. Interpretive Resources: There are few interpretive resources available along the river today. The river park can provide the opportunity to greatly expand the public's understanding about the San Diego River.