= Santa Ana River =

The Santa Ana River is the largest river entirely within Southern California in the United States . Its drainage basin spans four counties . It rises in the San Bernardino Mountains and flows past the cities of San Bernardino and Riverside , before cutting through the northern tip of the Santa Ana Mountains and flowing southwest past Santa Ana to drain into the Pacific Ocean . The Santa Ana River is 96 miles (154 km) long , and drains a watershed of 2 @,@ 650 square miles (6 @,@ 900 km2) .

For its size the Santa Ana drainage basin is quite diverse . It ranges from high peaks of inland mountains in the north and east , to the hot , dry interior and semi @-@ desert basin , to flat coastal plains in the west . Its climates range from dry alpine to chaparral and desert , and the watershed as a whole is very arid . Relatively little water actually flows in the river or most of its tributaries . One of its largest tributaries , the San Jacinto River , rarely reaches the Santa Ana except in extremely wet years . The relative lack of vegetation also makes the river prone to flash flooding . Even so , a wide variety of animal and plant life has always been dependent on the river .

People have lived on the Santa Ana River for at least 9 @,@ 000 years . There were four distinct indigenous groups in the area , all of which depended heavily on the river for their livelihoods . The river was first crossed by Europeans in 1769 , when it received its name from members of the Spanish Portola expedition . Because it is one of the largest water sources in the four @-@ county region , many large ranchos developed alongside the river and one of its major tributaries , Santiago Creek . This period of growth culminated in the establishment of many large cities on the river , including Santa Ana , Riverside and Anaheim , all of which derived their names from the River . In the early 20th century , devastating floods poured down the Santa Ana River , leading to much of the river being channelized and dammed in recent times .

= = Course = =

The Santa Ana River rises in Santa Ana Canyon in the southern San Bernardino Mountains , at the confluence of two tiny streams , Heart Bar Creek and Coon Creek , at an elevation of 6 @,@ 991 feet (2 @,@ 131 m) . Its highest sources are Dollar Lake , at 9 @,@ 288 feet (2 @,@ 831 m) , and Dry Lake , at 9 @,@ 068 feet (2 @,@ 764 m) , both on the northern flank of San Gorgonio Mountain , at the headwaters of a small left tributary , the South Fork Santa Ana River . The river initially flows west through this broad and deep gorge , and about 18 miles (29 km) from its headwaters , receives its first major tributary from the right : Bear Creek , flowing southwest from well @-@ known Big Bear Lake . The river turns south , passing through the Seven Oaks Dam , flowing out of its canyon into the arid interior basin of San Bernardino County and Riverside County , and receives Mill Creek from the left as it winds westwards towards the city of San Bernardino . As it passes through the urban area , it receives City Creek from the right and enters a flood control channel flanked by earthen levees on both sides .

Not long after the confluence with City Creek , Lytle Creek enters from the right . Lytle Creek is one of the largest tributaries of the Santa Ana river , rising in three forks in the San Gabriel Mountains and flowing southeast , becoming the Lytle Creek Wash before discharging into the main stem . From there , the Santa Ana flows southwest , and after passing through the city of Riverside , it discharges into the normally dry flood control reservoir formed by Prado Dam . Two major tributaries of the river join in the reservoir area : Chino Creek from the right , and Temescal Creek from the left . Temescal Creek drains the largest area of all the tributaries , because it provides the outflow from Lake Elsinore , into which the San Jacinto River flows . It is also one of the longest , at 32 miles (51 km) in length . Except during the wettest years , Temescal Creek contains little or no water because Lake Elsinore is not high enough to overflow .

After flowing out of the Prado Dam , the Santa Ana River cuts a second Santa Ana Canyon , a water gap , between the northern Santa Ana Mountains and the Puente Hills and Chino Hills , crossing into Orange County . The river roughly bisects the county as it flows southwest towards the ocean . The river is then entirely diverted into spreading grounds for groundwater recharge of the

aquifer of north Orange County , providing about half of the entire county 's municipal water . Downstream of there , the river serves only for flood control and waste drainage purposes , and typically has no more than a trickle of water . Passing the cities of Orange and Anaheim , it receives Santiago Creek from the east as it enters the city of Santa Ana . Here , the river is entirely confined to a concrete flood control channel between earthen levees . After crossing under Interstate 5 the riverbed again becomes earthen for a time and then becomes concrete again through most of Santa Ana and past the 405 Freeway . It flows to its mouth between Huntington Beach and Costa Mesa . The river accretes in a small lagoon before flowing out to sea at the northern end of Santa Ana River County Beach .

= = Watershed = =

One of the largest river basins in Southern California and the largest on the South Coast , the Santa Ana River watershed covers 2 @,@ 650 square miles (6 @,@ 900 km2) in parts of four California counties . The main stem of the river flows through three of these counties , and tributaries drain parts of Los Angeles County into the Santa Ana . The watershed is characterized by the flat , arid basin of the Inland Empire and the coastal plain of north @-@ central Orange County , and is bisected by the Santa Ana Mountains , which run nearly perpendicular to the river ? northwest to southeast . There are over 50 major tributaries to the once free flowing and perennial river . The Temescal Creek valley constitutes a major portion and physiographic feature of the Santa Ana River watershed . The area drained by Temescal Creek and the San Jacinto River constitute some 45 % of the watershed and extend its boundaries as far south as the Anza @-@ Borrego State Park area .

About 4 @.@ 8 million people lived in the Santa Ana River basin as of 2000 . Most of the population is concentrated close to the river in urban centers such as San Bernardino , Riverside , and Santa Ana . In the Inland Empire , most people live in a thin ribbon of land along the river , while the rest of the land is used for agriculture and ranching . In Orange County , however , nearly all the land is urban . As a result , the Santa Ana River watershed can be thought of as having two distinct parts , separated by the Santa Ana Mountains . Some major bodies of water in the watershed include Lake Elsinore , Lake Irvine , Lake Mathews , Lake Perris , Diamond Valley Lake , Lake Skinner , and Big Bear Lake . Only one , Lake Elsinore , is naturally formed . The rest are all formed by dams constructed by county or state water agencies . As an example , Diamond Valley Lake is for the California State Water Project .

Several major Southern California drainage basins border on that of the Santa Ana River . In the northwest is the San Gabriel River , another major river with its mouth in Long Beach . On the southwest , the San Diego Creek watershed forms much of the boundary within Orange County . Some of the rivers and streams that drain the area between the southwestern boundary of the watershed and the Pacific Ocean are Aliso Creek , San Juan Creek , San Mateo Creek , the Santa Margarita River , and the San Luis Rey River . On the east are the drainage basins of the Whitewater River and the Coachella Valley , flowing into the Salton Sea , and on the north is the Mojave River , which flows into the endorheic basin of the Mojave Desert .

However , the area that the river drains in Orange County downstream of Santiago Creek is extremely narrow , because of the diversion of its former Orange County drainage area to the Talbert and Huntington Beach flood control channels , which empty into the Pacific very near the mouth of the Santa Ana . Most of the Santa Ana through Orange County now functions as a conduit to carry runoff from upstream areas directly to the Pacific and drains very little area downstream of the Santiago Creek confluence . About 21 @.@ 4 square miles (55 km2) of land that originally drained to the Santa Ana River in Orange County now is drained by the two flood control channels , colloquially called the " Talbert watershed " . The river originally had many different outlets to the Pacific , one of which even extended as far north as the San Gabriel River or as far south as Newport Bay . In fact , the original mouth of the river which drained eventually into the Pacific Ocean , was located at what is today the entrance to Newport Harbor . Based on a U.S. Coastal Survey from 1878 , Newport Bay was predominantly a river estuary with few open channels . The river

flowed into the bay bringing with it heavy silt and making boating difficult . To eventually create Newport Harbor , sand that was deposited by the Santa Ana River had to be kept from choking the bay . In 1920 , the Bitter Point Dam was built to divert the river away from the bay and on its current course to the ocean at Huntington Beach . Stone jetties were built to form the new river mouth . All of the Islands in Newport Harbor are the product of dredging and man made forming from the sands and silt deposited over time by the Santa Ana River .

= = Geology = =

Ancient igneous , metamorphic and sedimentary rock underlie and form the geologic base of the Santa Ana River . Most of the strata in the flat valleys and basins of the watershed are underlain by thousands of feet of sediment deposited by transient seas during climate changes and by erosion . Most of the mountains in and rimming the basin consist of granite batholiths only about 75 million years old . However , much of the rock overlying the highlands , above elevations of 8 @,@ 000 to 9 @,@ 000 feet (2 @,@ 400 to 2 @,@ 700 m) , is ancient metamorphic rock up to 1 @.@ 7 billion years old . This rock originally formed at the bottom of the ancient Pacific Ocean and was uplifted to the highest peaks of the mountains . Even in ice ages , glaciers have rarely occurred on Southern California mountains , so the rock has remained there for tens of millions of years without significant erosion .

Diverse and complex faulting and geologic instability have shaped the Santa Ana River watershed . The San Andreas Fault runs across the northern section of the watershed and is responsible for causing the uplift of the San Bernardino Mountains , part of the Transverse Ranges of Southern California . The Elsinore ? Whittier Fault Zone crosses the Santa Ana River further downstream , near the Orange County / Riverside County line . This fault caused the rising of the Santa Ana Mountains , Puente Hills , East Orange Hills , Chino Hills , Loma Ridge , and the other mountain ranges and ridges that run northwest @-@ southeast across the lower section of the watershed , comprising the coastal Peninsular Ranges . While the larger San Andreas Fault allowed the Transverse Ranges to rise to above 10 @,@ 000 feet (3 @,@ 000 m) in many places , the Peninsular Ranges are only about half that height .

During the last glacial period , when climate change during the Wisconsinian Glaciation caused rivers in Southern California to increase greatly in volume , the Santa Ana was able to cut across the Peninsular Ranges , creating the only gap across the range . During this period , the Santa Ana changed course multiple times , creating wind gaps in the Peninsular Range and occasionally entrenching into the channel of the ancestral San Diego Creek . The river later returned to its old course and abandoned the San Diego Creek channel , leaving it a wind gap across the Huntington Beach / Newport Beach mesa .

= = Ecology = =

Hundreds of species of animals and plants characterize the Santa Ana River 's diversity of climates and vegetation zones . There are over ten of these vegetation zones in the watershed ? including the sparsely vegetated alpine and subalpine zones in the mountains , mid @-@ elevation forests of pine , lodgepole and oak , chaparral , coastal sage scrub , the increasingly rare riparian forest and marshes along the river bed , lined with trees and rushes , and the thinly vegetated coastal areas virtually flush with sea level . The watershed supports up to 200 bird species , fifty mammal species , 13 reptile species , 7 amphibian species , and 15 fish species , including steelhead trout .

The largest portion of the watershed , the Inland Empire portion , is dominated by a hot , dry desert climate that supports sparse wildlife , while the climate and vegetation of the San Jacinto River and Temescal Creek watershed is similar to that of the southern Central Valley . Downstream of the desert was once the coastal sage scrub and dry grassland community of the Orange County coastal plain , but that region has been almost entirely lost to urbanization . Rimming the arid portions of the watershed are the chaparral zones , consisting of sclerophyllous , thick , low bushes and small trees . The chaparral generally is found between elevations of 1 @,@ 000 feet (300 m) and 6 @,@ 500

feet (2 @,@ 000 m) , and occurs mainly closer to the coast on the windward side of the Peninsular Ranges . The scrub oak is one of the most common plants in chaparral regions , forming a dense groundcover that makes it difficult for humans and large animals such as mountain lions , coyotes , and bobcats to traverse . Chaparral growth is determined by wildfires and droughts , and depends on the semi @-@ arid climate of the region .

Perennial and seasonal streams often are lined with live oak and sycamore , which transition into the riparian zones of the main stem Santa Ana River . The inland riparian marshes upstream of the Riverside / Orange County line , although degraded by pollution , have otherwise been mostly left in their natural state . Although much of the riparian system along the river has been degraded , one of the largest places where it occurs is the enormous marsh behind Prado Dam , an area closed to development because it functions as a flood control basin , similar to the Sepulveda Dam . The Santa Ana sucker , a small bottom @-@ dwelling fish , once was found throughout riparian zones , but now is rarely seen in the Santa Ana River drainage . Near the mouth , the river was once abundant in salt marshes , which stretched for miles on either side of the river , even near Upper Newport Bay , which has also served as an alternate mouth of the river .

The alpine and subalpine zones , despite their high elevation (above 9500 feet , 2900 meters) and significant rainfall (at least 35 inches , 89 cm per year , except in drought years) , are sparsely vegetated . The windswept terrain of the alpine zone is primarily small brush and weeds , while trees ? mostly small gnarled pines and junipers ? occur in canyons and shielded depressions in the subalpine zone . Inland elevations above 5 @,@ 000 feet (1 @,@ 500 m) support much denser forest . Jeffrey pine , ponderosa pine , black oak , lodgepole pine , and willow constitute most of the forested lands . The mountain habitats of the watershed support many animals typical of Californian mountain regions , including squirrels , chipmunks , black bears , mule deer , and many species of migratory birds . In the canyons of the San Bernardinos , the river is abundant in rainbow trout and is lined with alders , willow and cottonwoods . Where the river and its large upper tributaries empty out of the mountain canyons into the Inland Empire basin , they are surrounded by the alluvial scrub zone , a mix of desert and upper riparian vegetation . Along the main stem , this zone begins at the base of Seven Oaks Dam and ends at the Lytle Creek confluence .

Historically , the Santa Ana was named " the best stream in Southern California [for steelhead trout habitat] " . The steelhead is an anadromous fish , similar to salmon , that migrates up rivers and streams to spawn . Unlike salmon , which usually only reproduce once , steelhead may reproduce multiple times and have a much longer life span . Steelhead was once found along the entire main stem of the Santa Ana River , as well as on some of its main tributaries ? Santiago Creek , San Antonio and Chino Creeks , Cucamonga Creek , Lytle Creek , City Creek , and Mill Creek . Few , if any , steelhead were present in Temescal Creek (although one of its tributaries was stocked in the 1930s) and none inhabited the San Jacinto River , because it is disconnected from most of the Santa Ana River system . Up to the 1950s , significant numbers of steelhead trout still migrated in from the ocean . Because of pollution and modifications to the river , very few steelhead still use the river . There is a population of wild stream resident coastal rainbow trout upstream of Seven Oaks Dam and in the upper reaches of a few tributaries . Despite the rarity of steelhead , in recent years fin samples from 13 trout were collected from Harding Canyon in the Santiago Creek tributary of the Santa Ana River and genetic analysis has shown them to be of native and not hatchery stocks .

Invasive species ? those that are not native to the region ? have caused problems in the watershed for many years . One of the most troublesome invasive species is the giant reed , which plagues many coastal Southern California waterways . The giant reed is similar to a tall grass or thin bamboo , but grows quickly and can take over native stands of vegetation , block the streambed , hurts the habitat of native animals , and increases the hazard of wildfires . Perhaps the largest effect that giant reed has is its usage of water . To support its fast growth rate , the giant reed population in the Santa Ana River watershed can consume 56 @,@ 200 acre feet (69 @,@ 300 @,@ 000 m3) of water per year .

Other invasive species also have affected the Santa Ana River . One of the most prominent is the brown @-@ headed cowbird , which feeds off parasites and insects identified with cattle , which were brought to Southern California during the Spanish Rancho period . The brown @-@ headed

cowbird is a " brood parasite " , or a bird that lays its eggs in another bird 's nest . One of the most afflicted birds is the least Bell 's vireo , whose population also suffers from the loss of riparian habitat . The least Bell 's vireo is considered an endangered species , as is the southwestern willow flycatcher , whose habitat is often shared with the other bird . The saltcedar is another invasive large weed that also , like the giant reed , uses large amounts of water . Unlike giant reed , the saltcedar has deeper roots , not only making it more difficult to remove but allowing it to access and use up deep groundwater . However , the saltcedar is similar in that it also provides little usable habitat for native animals .

= = History = =

= = = First peoples = = =

Human habitation on the Santa Ana River dates back 9 @,@ 000 to 12 @,@ 000 years ago , close to the early stages of the Holocene period . The first Native Americans to live in the area were nomadic tribes that traveled from place to place , grazing animals on fertile grasslands and gathering fruits and seeds for food . The ancestors of these early people originated from the Shoshone and Uto @-@ Aztecan people of the northwestern United States . Eventually , the human population of the watershed reached a peak of about 15 @,@ 000 . About 8 @,@ 000 years ago , the climate experienced a change becoming more arid and the originally nomadic tribes began to stay in individual places longer , becoming semi @-@ nomadic . However , they did not establish agriculture , nor did they raise animals or live in villages . Like many Native American tribes in California , acorns were a staple food of many of the inland valley people . People closer to the ocean often fished and hunted small animals , often from tide pools and coastal stream areas , for food .

Several major premodern Native American groups eventually gained control of lands along the river : the Yuhaviatam or Yuharetum people in the upper basin , the Payomkowishum in the southeastern basin , the Cahuilla in the desert areas of the watershed , and the Tongva people in the lower basin . The Yuhaviatam generally lived in the mountain headwaters of the Santa Ana River and its tributaries rimming the present @-@ day Inland Empire basin , in present @-@ day San Bernardino County , as well as in the foothills of the San Bernardino Mountains . The Tongva lived on the flat coastal plains of present @-@ day Orange County south of the Santa Ana Mountains . They were also the larger of the two groups , controlling all the coastal lands from the San Gabriel Mountains in the north to Aliso Creek in the south , including all of the Los Angeles Basin .

= = = Spanish period = = =

When Spanish explorer Juan Rodriguez Cabrillo sailed along the Southern California coast on his voyage of 1542 , he passed the mouth of the Santa Ana River without noting it . Neither did any of the subsequent Spanish sea @-@ borne explorers leave any written notice of the river mouth .

It was not until 1769 that Gaspar de Portolà led the first overland expedition northwards through coastal Southern California ? still a largely unexplored part of the Alta California province of New Spain ? and gave the river its name . On July 28 , the party camped " about three leagues " from where the Santa Ana River exits the canyon through the northern Santa Ana Mountains , near present @-@ day Olive . Fray Juan Crespí , one of the members of the expedition , wrote in his diary that he called the spot " Jesus de los Temblores " , referring to an earthquake that struck while they were camped alongside there . Crespi also noted that the soldiers were calling the river " Rio de Santa Ana " , probably because they had recently celebrated Saint Anne 's Day . That name remains today (the second oldest place name in Orange County , after Santiago Creek) , and the name of the mountain range and city were derived from the river .

Although no missions were actually located along the Santa Ana River or within the watershed , the river basin was nearly depleted of native people because the Spanish forced them to work at nearby

missions , including Mission San Gabriel Arcangel and Mission San Luis Rey . The affected tribes were usually renamed after the missions , resulting in tribal names such as Gabrieliño and Luiseño . Difficult working and living conditions and European diseases such as smallpox killed much of the native population during the roughly 50 @-@ year @-@ long Mission Period . The Secularization Act of 1833 , passed by the newly independent country of Mexico , eventually brought an end to the Mission Period . The post @-@ Mission Period native population was almost entirely devastated . The population was very little , their native religions were nearly lost , and most of their land had been taken by Spanish settlers . Although the Mexican government 's original intention with the Secularization Act was to provide the Native Americans with their own land and property , most of the provisions made by the act never actually happened . Spanish settlers continued to press into the remaining tribal lands , and eventually , the tribes were forced into the surrounding desert lands or into the high mountains .

Following the Mission Period came the Rancho Period . This occurred when the enormous land holdings of the missions were subdivided into ranchos owned by individuals . Some of the new private ranchos were merely converted mission ranchos . The first private rancho along the Santa Ana River was Rancho Santiago de Santa Ana , a 62 @,@ 500 @-@ acre (253 km2) rancho on the left bank of the lower Santa Ana River . This rancho was acquired by Don Juan Pablo Grijalva as early as 1801 . Other ranchos on the river followed , including ones in inland areas that had not been exploited in the Mission Period . The ranchos (beginning with the missions) established the tradition of raising cattle in coastal Southern California , a custom upheld until the late 19th century . Agriculture , however , although established , was not yet a major industry . A flood that raged down the Santa Ana in 1825 caused the river 's course to change temporarily to an outlet at Newport Bay , depositing sediment that partially created Balboa Island . Spread throughout the ranchos on the Santa Ana River were a few towns , military outposts and trading posts . The Santa Ana River valley was one of the most prosperous regions in Southern California for many decades .

= = = American settlement = = =

In the late 1840s , California fought for its independence from Mexico in the Mexican ? American War . The Santa Ana river played an important part in the victory of the Americans over the Mexican army . In 1847 , one year after the Bear Flag Revolt , a Mexican military force set out northwards to attack a smaller American force in the Los Angeles area . However , the Santa Ana River flooded , preventing the Mexicans from crossing the river to attack the Americans . When the river 's flow finally subsided , the American forces had been reinforced enough to drive the Mexicans out of the region .

When the California Republic was assimilated into the United States in 1848 , American settlers began to move into the Santa Ana River region in great numbers . The Mexican ranchos were divided into smaller individual properties , and irrigated agriculture began on a large scale . The city of Santa Ana Viejo , the original location of Santa Ana , was founded in this period . In 1854 , Mormons settled in the upper Inland Empire area and started the city of San Bernardino , gaining prosperity by using water from the river , as well as Lytle Creek and Mill Creek , to irrigate crops . The cattle industry began to decline as farms began to replace ranches . Soon , white settlers in the region were more numerous than Hispanics as well . The California Gold Rush around this time was responsible for attracting many of these people to the state , but many remained in Southern California afterwards .

In 1860 , a much closer gold rush occurred in the San Bernardino Mountains when prospector William Holcomb discovered significant deposits , just over the northern drainage divide of the Santa Ana River . This discovery exploded into a full @-@ scale gold mining operation in days . The Santa Ana River served as a conduit for miners traveling to the region and many of the forests in the upper basin experienced clearcutting as a result of the high resource demands of the boom . Gold was also discovered in Lytle Creek in that same year . Following the gold rush , the cultivation of citrus became the mainstay of the economy of the lower Santa Ana River area . Through the late 19th century , citrus fields covered much of the coastal plain and led to the naming of Orange County .

= = = Floods , droughts and legacy = = =

Notwithstanding the increased prosperity in the 1860s , this decade was also the scene of a series of natural disasters . In the Great Flood of 1862 , heavy rains dropped by a series of winter storms caused the Santa Ana to burst its banks , flooding thousands of acres of land and killing 20 to 40 people in the greatest flood it had experienced in recorded history . The levees along the river burst in many places , flooding part of the Inland Empire into a continuous body of water several miles wide stretching from the mouth of Santa Ana Canyon to where the river cuts through the Santa Ana Mountains . Downstream in Orange County , the river overwhelmed nearly all the existing floodworks and transformed the coastal plain into a transient inland sea . The flow , now calculated as a 1 @,@ 000 @-@ year flood , peaked at roughly 9 @,@ 000 cubic meters per second (320 @,@ 000 cu ft / s) , over half the average flow of the Mississippi River . Even after the flood , detrimental conditions continued in the region . For the two years following the flood , an intense drought caused the deaths of tens of thousands of head of livestock . Despite all of the hardships experienced in the three years , after conditions finally returned to normal , the Santa Ana River watershed again became a prospering agricultural region . The cities of Santa Ana and Riverside were established in 1869 and 1870 , respectively .

1934 and 1938 saw a further pair of devastating floods that in part brought an end to the area 's citrus industry . In 1938 , the Santa Ana again burst its banks and flooded Anaheim and Orange in up to 4 feet (1 @.@ 2 m) of water , stripping away thousands of acres of rich topsoil and destroying many of the citrus groves . Almost 60 people were killed in the disaster and about 68 @,@ 400 acres (277 km2) of land were flooded , despite the fact that the flow in the river was only one @-@ third of that of the 1862 flood . With the extreme damage from the floods , the U.S. Army Corps of Engineers made the decision to dam and concrete the river beginning in the 1940s , and declared it as the greatest flood hazard in the U.S. west of the Mississippi River . Prado Dam , built in 1941 , was designed to capture floodwaters from the Inland Empire about 30 miles (48 km) upstream from the river 's mouth . The dam 's impoundment , Prado Flood Control Basin , was designed to handle a 70 @-@ year flood .

With the increased flood protection afforded by the Prado Dam , major industrial development migrating south from the Los Angeles Basin , and the Southern California housing boom in the 1950s and 1960s , the Santa Ana River watershed began its third and final transition ? from agricultural to urban . The population of the Santa Ana River basin increased dramatically , but brought with it the threat of greater damage from floods , somewhat compromising the protection afforded by Prado Dam . Because housing and urban areas encroached on the river 's historic floodplain ? an area once occupied by farms ? and the river became confined to a narrow channel ? a flood similar to the ones surrounding the turn of the 20th century would cause much more damage . The construction of roads and buildings also heightened the runoff that would flow into the river during rainfall , a process known as urban runoff . In fact , the river flooded again in 1969 , and while much of the runoff from the Inland Empire was captured behind Prado Dam ? probably saving Orange County from an even greater flood ? Santiago Creek , a large tributary flowing from the Santa Ana Mountains , eroded its banks until it swept away portions of residential communities in the cities of Tustin and Orange .

In 1964 , the Santa Ana River Mainstem Project , which involved concreting the lower 30 @.@ 4 miles (48 @.@ 9 km) of the river , was first proposed . Construction work began in 1989 , and today , through much of Orange County , the river 's channel is essentially an enormous box culvert . The second dam , Seven Oaks Dam , was completed in 1999 . This dam captures flood runoff from Santa Ana Canyon before it can enter the Inland Empire . The dam was designed to withstand a 350 @-@ year flood . Today , the river lies mainly between levees and concrete channels , and especially in its lower course , functions only as a flood drainage channel .

= = Present @-@ day activities = =

= = = Pollution and restoration = = =

As with many Southern California rivers , the Santa Ana is heavily polluted and used . The main stem above Seven Oaks Dam is free @-@ flowing , as are many of its upper tributaries . Once the river enters the Inland Empire basin , however , much of its flow is diverted for municipal and agricultural water use . Most of the flow in the river below the city of San Bernardino consists of effluent from 45 wastewater treatment plants and dry season urban runoff , which is collected behind Prado Dam . Any flow that makes it downstream to Orange County is diverted by another pair of dams into approximately 1 @,@ 100 acres (4 @.@ 5 km2) of groundwater recharge basins , providing approximately 218 @,@ 000 acre feet (269 @,@ 000 @,@ 000 m3) of municipal water for the county every year , or one @-@ third of its water supply . Downstream of that dam , the river gathers further urban runoff before finally making it into the Pacific . The Santa Ana River is included on the U.S. Environmental Protection Agency 's (EPA) list of " 304 (l) ' toxic hot spots ' list of impaired waterways " .

A number of organizations have been formed to try to gain public interest in restoring the river . One of the most prominent is the Santa Ana Watershed Project Authority (SAWPA) , formed by five municipal water districts in the Santa Ana River area . A second one is the Santa Ana River Dischargers Association . Both have conducted studies as to what beneficial uses the Santa Ana River would have aside from water supply and flood control , as well as the removal of some of the concreted sections of the lower river . This set of studies is known as the " Use @-@ Attainability Analysis " , which was submitted to the state Congress , which approved it . However , upon submission to the EPA , it was rejected . As a result , little work has been done to repair the ecological damage that has been caused by urbanization along the river . Other projects include the Santa Ana Watershed Planning Advisory Committee , and the Santa Ana River Watershed Alliance (SARWA) .

= = = Recreation = = =

There are many recreational opportunities along the Santa Ana River . The Santa Ana River watershed includes parts of the Cleveland National Forest , San Bernardino National Forest , Angeles National Forest , Mount San Jacinto State Wilderness Area , Chino Hills State Park , and Lake Perris State Recreation Area . Big Bear Lake , Lake Elsinore , and Lake Irvine are popular recreational lakes in the watershed . The river never actually flows through any of these lakes , but they each have drainage to the river via tributaries .

The Santa Ana River bicycle path which , when complete , will run from the river 's mouth at Huntington Beach to near the San Bernardino Mountains , currently extends about 30 miles (48 km) along the river to Prado Dam . The proposed distance along the trail is over 70 miles (110 km) . In Riverside County , the Hidden Valley Wildlife Area also has 25 miles (40 km) of recreational paths . Some entities have been opting for a Santa Ana River Park , which would encompass a strip of land on either side of the river for its entire course . The city of Redlands would like to develop riverside green space near the historic downtown district . The Santa Ana River Lakes , located near Anaheim , are a popular recreational fish farm fed with water from the river . Ultimately , the trail could link a network of river @-@ bottom parks . In 2014 , naturalists navigated the stretch of river flanked by Chino Hills State Park on the north and the Cleveland National Forest on the south . The rafts made it 2 miles (3 @.@ 2 km) before the vegetation was impenetrable but they were convinced there were possibilities of improving public access and recreational opportunities .

= = Crossings = =

The Santa Ana River has 70 significant crossings , bridges and dams . This list places them from mouth to source .

= = = Archival collections = = =

Guide to the Santa Ana River Report . Special Collections and Archives , The UC Irvine Libraries , Irvine , California .

= = = Other = = =

Santa Ana Watershed Association
Santa Ana River Watershed Alliance