3.6 Ecosystems and Access to Nature

3.6.1 Habitats and Species 493
3.6.2 Steelhead 557
3.6.3 Matilija Dam Ecosystem Restoration Project. 601
3.6.4 Access to Nature 612

Great Blue Heron, Lake Casitas

Photo courtesy of Michael McFadden

3.6 Ecosystems and Access to Nature

3.6.1 Habitats and Species

The Ventura River watershed is noteworthy among coastal southern California watersheds for the abundance of healthy and biodiverse natural habitat it supports. Over half of the land is in protected status and habitats in these areas are in relatively undisturbed and pristine condition. Much of the remaining unprotected land is comprised of steep hillsides and undeveloped floodplains, which also continue to support native habitats.

The watershed's diverse geography—from steep mountains to coastal delta—supports a diverse array of natural habitats and these habitats in turn support a wide variety of native wildlife. Grassland, coastal sage scrub, chaparral, oak woodlands and savannas; coniferous woodlands; riparian scrub, woodlands and wetlands; alluvial scrub; freshwater aquatic habitats; estuarine wetlands; and coastal cobble, dune and intertidal habitats are all found within the watershed's 226 square miles.

> Plants play a crucial role in the ecology of the watershed. They provide the habitat, food, and shelter for the various animal species which inhabit the region. Plants help to prevent soil erosion by holding the soil together with their root systems. The leaf and branch canopies also reduce the impact of rain, and by absorbing rainfall from the soil, they help to reduce runoff too.
>
> —*Upper San Antonio Creek Watershed Giant Reed Removal Water Quality Monitoring Plan* (VCWPD 2010c)

Ojai Valley Wildlife, 1910

Hunting and Fish[ing] Near the Ojai Valley

While the people of Nordhoff and the Ojai Valley have never plumed themselves on the records of citizens and visitors as big game hunters this sport has been in vogue in the mountains nearby for many years. In this village are to be found some fine trophies of the chase, among them superb heads of antlers of the black-tail deer, paws of silver tip grizzlies, skin of mountain lions, etc.

The borders of the national forest reserve are the northern boundary of the Ojai Valley and within twenty miles of the village many ki[n]ds of big and little game may be found.

There are bear, lions, lynx, coyotes, wild cat, foxes in considerable numbers and of the lesser game such as mephitis, rabbits, squirrels, mountain quail, and valley quail there are thousands. There are also rattle snakes and other dangerous reptiles—in fact it is an ideal hunting country. All of the big game however, is well back in the mountains of the coast range and with the exception of deer none have been seen in the Ojai valley for several years.

—*The Ojai,* August 27, 1910 (Bowers 2008)

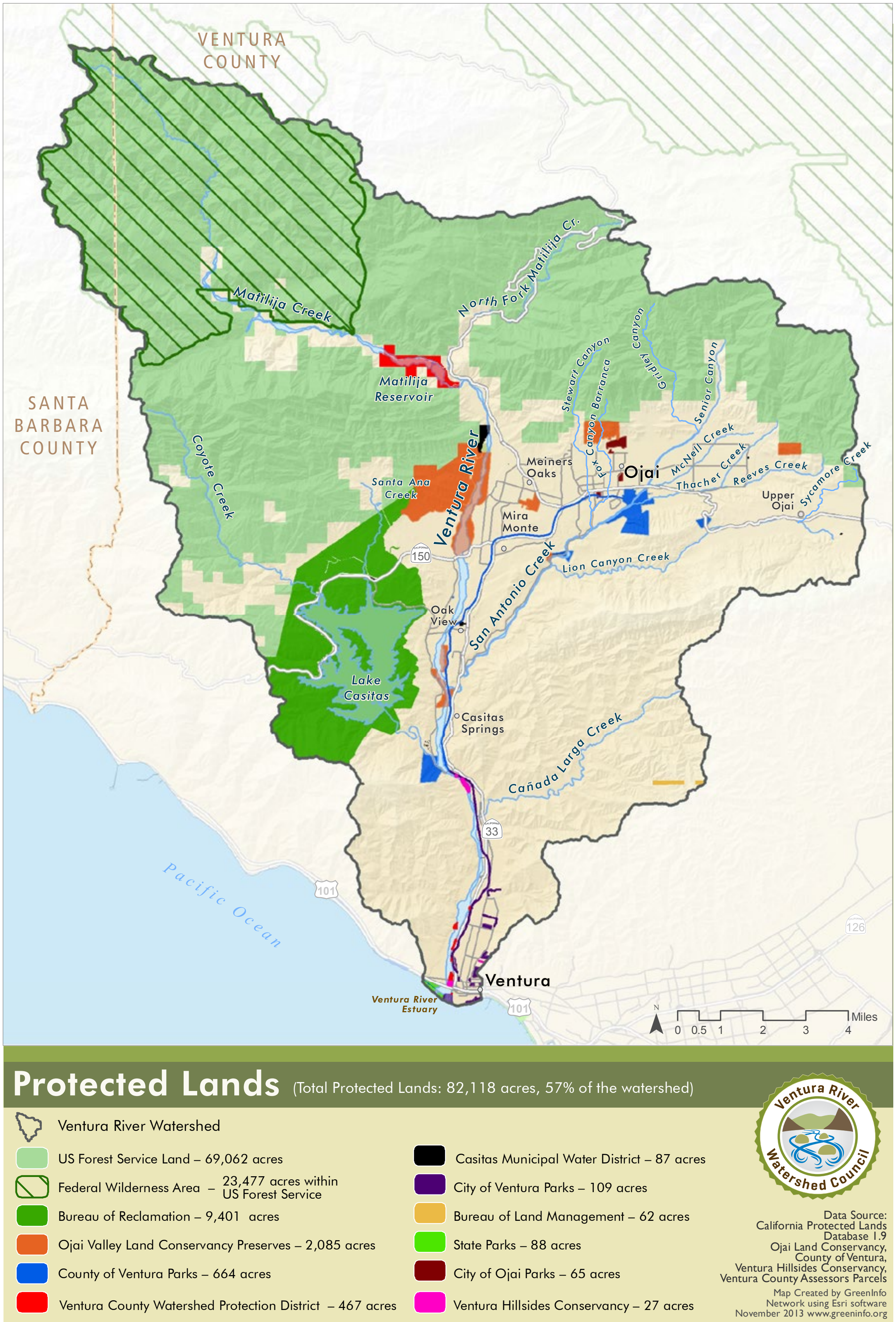

Figure 3.6.1.1 Protected Lands Map

White Alder and Willows Reemerging After 2005 Flood
Photo courtesy of Mary Meyer

Habitat Information Sources

Unless otherwise noted, the habitat descriptions in this section were compiled from the following sources (which are cited here once rather than repeatedly in the text): *California River Parkways Trailhead Project, Initial Study* (Aspen Environmental 2010), *City of Ojai Urban Watershed Assessment and Restoration Plan* (Magney 2005), *Community Habitat Types for Ventura Watershed* (Holly et al 2013), *Lake Casitas Final Resource Management Plan Environmental Impact Statement, & Appendices* (URS 2010), *Draft Environmental Impact Statement/Environmental Impact Report for the Matilija Dam Ecosystem Restoration Project* (USACE 2004), *Draft Program Environmental Impact Report, Environmental Protection Measures for the Ongoing Routine Maintenance Program* (VCWPD 2004), and *Ventura County General Plan, Resources Appendix* (VCPD 2011).

A special thanks to the team of local experts who contributed to the development of the *Quick Guide to Ventura County Wetlands* (VCPD 2005); that document was never published, but contributed heavily to the wetlands habitat descriptions used here.

3.6.1.1 Upland Habitats

Uplands are defined here to include those dry areas that are not wetlands or riparian habitats—everything at a higher elevation from the outside edge of the riparian zone.

Mixed Chaparral

Chaparral is the most common plant community in the watershed, covering 52% of the land. It is found on hillsides of moderate to steep slopes with dry, rocky, shallow soils, and is more abundant at higher elevations where temperatures are lower and soil moisture is greater.

The chaparral plant community is not dominated by a single species, hence the word "mixed" in the title. It is dominated by woody, evergreen shrubs that are densely spaced and relatively tall—commonly between six and 15 feet tall. Extensive deep root systems and small thick leaves help make these shrubs adapted to drought. Chaparral shrubs have adapted to periodic wildfires with mechanisms such as stump sprouting and germination from dormant seed banks.

Mixed Chaparral Plant Species

Common chaparral plants in the watershed include several species of ceanothus (California lilac), laurel sumac, chamise, scrub oak, yerba santa, bushmallow, hollyleaf cherry, several species of sage, bigberry manzanita, eastwood manzanita, mountain mahogany, coffeeberry, sugarbush, toyon, hollyleaf redberry, and redberry.

Many shrubs typical of coastal sage scrub also grow intermixed as associates with chaparral species.

Chaparral Habitat, Murrieta Canyon.
Wild Lilacs in a Hoary Leaf Ceanothus Shrubland Vegetation Alliance
Photo courtesy of Mary Meyer

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Vegetation

Ventura River Watershed

Vegetation Types	Acres	% of Watershed		Acres	% of Watershed
Mixed Chaparral	74,766.64	51.62	Water	2,913.43	2.01
Coastal Scrub	18,832.62	13.00	Valley Foothill Riparian	2,568.62	1.77
Oak Woodland	18,448.40	12.74	Montane Hardwood/Conifer Forest Sierran Mixed Conifer	2469.55	1.70
Annual Grassland	9,299.97	6.42	Barren	1,541.95	1.06
Urban	7,680.69	5.30	Desert Wash	670.96	.46
Crops and Pasture	5,625.68	3.88			

Ventura River Watershed Council

Data Source:
USDA Forest Service CalVeg Existing Data
South Coast 2002-2010
Map Created by
GreenInfo Network using Esri software,
July 2014 www.greeninfo.org

Figure 3.6.1.1.1 Vegetation Communities Map

Coastal Sage Scrub

Coastal sage scrub covers 13% of the watershed's land area. It is found at lower elevations (below 3,000 feet) and closer to the coast than chaparral. It may occur on a variety of slopes and aspects from nearly level hilltops to steep dry slopes.

Coastal sage scrub is dominated by low- to moderate-sized woody shrubs and sub-shrubs (1.6 to 6.6 feet tall). Plants are generally aromatic and drought-deciduous—dropping all their leaves during summer heat to help reduce moisture loss—with a sparse herbaceous layer below.

Coastal Sage Scrub Plant Species

Common coastal sage scrub plants in the watershed include purple sage, California sagebrush, coyote brush, prickly-pear, California buckwheat, black sage, white sage, coastal goldenbush, deerweed, sticky monkeyflower, chamise, Mexican elderberry, lemonadeberry, giant wild rye, and laurel sumac.

Coast Horned Lizard. State Species of Special Concern
Photo courtesy of Mary Meyer

Oak Woodland and Oak Savanna

Oak woodlands cover 13% of the watershed's land area. They are dominated by coast live oaks— large, tall (up to 90 feet) evergreen, wide-topped trees with spine-toothed, convex, dark green leaves. Oak woodlands form when these oaks are spaced closely enough to form an intermittent to continuous canopy. Oak savannas occur where coast live oak, along with valley oak, are more widely spaced, commonly with a grassland understory.

Oak Woodlands, Wills Canyon, Ventura River Preserve
Photo courtesy of Tania Parker

Definition: Oak Woodland

Per California's Oak Woodland Conservation Act (§ 1361 (h)), an oak woodland is "an oak stand with a greater than 10 percent canopy cover or that may have historically supported greater than 10 percent canopy cover."

Oak woodlands are both upland and riparian habitat. They tend to be found at lower elevations (below 4,000 feet) in valleys, and on steep, north-facing slopes, raised stream banks, and terraces. See "Riparian Woodlands" later in this section for a discussion of coast live oak riparian woodlands.

Oak woodlands are most common across the middle section of the Ventura River watershed, especially along Sulphur Mountain and Lion Canyon Creek, and on terraces and canyons along the Ventura River such as in the Foster Park area, and in Wills and Rice Canyons in the Ventura River Preserve.

Oak savannas are landscapes dominated by grasses and herbaceous plants with a scattering of oak trees. Oak savannas are found on lower elevation rolling foothills and open valleys and terraces, often in areas where grazing impedes regeneration of shrubs or other trees.

Coast live oak is considered to be the most fire-resistant California oak tree because of its evergreen leaves, thick bark and ability to sprout from the trunk and roots using food reserves stored in an extensive root system.

Oak Woodland and Oak Savanna Plant Species

Understory vegetation in oak woodlands can vary significantly depending on conditions such as soil type, elevation, and aspect. Common understory and co-dominant species include poison oak, snowberry, hummingbird sage, gooseberry, virgin's bower, monkey-flower, purple sanicle, California figwort, heart-leaved penstemon, California wild cucumber, southern California black walnut, toyon, California bay, California buckwheat, laurel sumac, basketbush, coyote brush, greenbark ceanothus, hollyleaf cherry, blue elderberry, and California blackberry. Many typical grassland species (described in the following section) are also common in the understory of oak woodlands. Grassland species commonly dominant the understory in oak savannas.

Annual Grassland

Grasslands cover about 6% of the watershed. This habitat is commonly found at elevations below 4,000 feet, especially on gradual slopes, flats, and coastal terraces, and as an understory in scrubland, woodland, and savanna habitats. Grasslands typically grow in well-developed, deeper, fine textured soils. Areas dominated by grasses are often in early successional stages, and over time tend to give way to scrublands or woodlands.

Grasslands are dominated by low-growing annual grasses and herbs. Perennial wildflowers, as well as naturalized annual forbs (broad-leaved herbs other than grasses), are important contributors to grasslands. Most of the watershed's grasslands are dominated by non-native species, especially where physical disturbance, such as mowing, grazing, repetitive fire, agriculture, or other disruptive means have altered soils and removed native seed sources.

Annual Grassland Plant Species

Native grassland species include needlegrasses, native fescues, native bluegrass, threeawn, melic grass, wild-rye, June grass, deer grass, California poppy, lupines, owls clover, blue dicks, and farewell-to-spring. Common non-native species include slender wild oats, ripgut brome, soft chess, red brome, hare barley, slender fescue, smilo grass, foxtail fescue, black mustard, shortpod mustard, Italian ryegrass, filaree, clovers, and Russian thistle.

Grasslands with Native Blue Dicks, Ojai

Photo Courtesy of Mary Meyer

Grasslands with Non-Native Mustard, Cañada Larga. Many grasslands have been invaded by non-native mustard, as seen on these hills.
Photo courtesy of Santa Barbara Channelkeeper

Montane Hardwood and Coniferous Forests

Montane hardwood and coniferous forests are found at the highest elevations of the watershed (above 4,000 feet), and cover less than 2% of the land.

Montane Hardwood and Coniferous Forest Plant Species

Montane hardwood and coniferous forests can be dominated by varying combinations of Douglas fir, ponderosa pine, Jeffrey pine, white fir, canyon live oak, incense cedar, and western juniper.

Coniferous Trees, Dry Lakes Ridge

3.6.1.2 Wetland and Riparian Habitats

Overview

While all native habitats have intrinsic value, wetland and riparian habitats are centrally important to watershed management because of the variety of critical functions they perform and the ecosystem niches they provide, and because of their sensitivity to impacts and the associated need for protection. This overview is followed by sections that describe the important wetland and riparian habitats located in the Ventura River watershed.

Wetland Habitats

Wetlands are lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface (Cowardin et al. 1979).

The official definition of "wetland" differs among regulatory agencies, but all variations involve these three elements:

Wetland Hydrology: The presence of water at or above the soil surface for a period of the year sufficient to significantly influence the plant types and soil chemistry.

Hydric Soil: Soil that is wet long enough during the growing season to develop low-oxygen conditions.

Hydrophytic Plants: Plants adapted to saturated soil conditions (VCPD 2006a).

Wetlands perform many useful functions and provide valuable assets:

> **Water Storage.** Wetlands function like natural tubs or sponges, storing water and slowly releasing it. This process slows the water's momentum and erosive potential, reduces flood heights, and allows for ground water recharge, which contributes to base flow to surface water systems during dry periods. Although a small wetland might not store much water, a network of many small wetlands can store an enormous amount of water. The ability of wetlands to store floodwaters reduces the risk of costly property damage and loss of life.
>
> **Water Filtration.** After being slowed by a wetland, water moves around plants, allowing the suspended sediment to drop out and settle to the wetland floor. Nutrients from fertilizer application, manure, leaking septic tanks, and municipal sewage that are dissolved in the water are often absorbed by plant roots and

Since the 1780s California has lost 91% of its wetlands (Dahl 1990).

> microorganisms in the soil. Other pollutants stick to soil particles. In many cases, this filtration process removes much of the water's nutrient and pollutant load by the time it leaves a wetland. Some types of wetlands are so good at this filtration function that environmental managers construct similar artificial wetlands to treat storm water and wastewater.
>
> **Biological Productivity.** Wetlands are some of the most biologically productive natural ecosystems in the world, comparable to tropical rain forests and coral reefs in their productivity and the diversity of species they support. Abundant vegetation and shallow water provide diverse habitats for fish and wildlife. Aquatic plant life flourishes in the nutrient-rich environment, and energy converted by the plants is passed up the food chain to fish, waterfowl, and other wildlife and to us as well.
>
> —*Functions and Values of Wetlands* (USEPA 2001)

California currently uses the U.S. Fish and Wildlife Service (USFWS) "Cowardin system" to classify wetlands into five basic types. These are the five categories used by the USFWS National Wetlands Inventory (NWI) program to map wetlands:

- Palustrine – Vernal wetlands, marshes, ponds, dune swales, seeps, springs, wet meadows, and riparian wetlands
- Lacustrine – Deepwater lakes and reservoirs
- Riverine – Streams, rivers, canals, etc.
- Estuarine – Saline and brackish estuaries
- Marine – Intertidal beaches and rocky habitats

The Ventura River watershed has wetlands in all five of these categories, as shown on the Wetlands & Riparian Habitats map (Figure 3.6.1.2.1). This map also includes riparian areas mapped by NWI. See "Riverine Wetlands and Riparian Habitats" later in this section for more information on the mapping of riparian areas.

Man-made reservoirs provide most of the wetland habitat in the watershed. The majority of the watershed's *natural* wetlands are associated with streams and rivers. The watershed also has coastal wetlands associated with its estuary and beaches. Other wetlands include ponds, freshwater marshes, seeps and springs, vernal wetlands, riparian scrub, and wet meadows.

Many of the watershed's wetlands can be hard to recognize because they are dry during part of the year. The type of plants growing in these wetlands is often the biggest indicator of the underlying soils and wetland conditions. As with all water resources in dry climates, these habitats are vitally important to wildlife.

Scalebroom: A flood storyteller and key insect feeder. Native scalebroom (not to be confused with the non-native Spanish broom) is an indicator of active alluvial systems in the Ventura River watershed. It germinates and establishes after flood events (or bulldozing). Therefore the size and distribution of scalebroom along a stream channel can be used to understand its flooding history.

Scalebroom also plays an essential ecosystem role. It produces abundant aromatic flowers in the fall, which attract and feed a wide variety of insects. This food source is especially important in supporting the food chain during the dry months of fall and extended droughts.

Photos and information courtesy of Mary Meyer

> Every California landscape has wetlands. They form where rainfall or runoff accumulates, or where groundwater saturates the topsoil. There are wetlands associated with desert playas, washes, and oases. Mountains and valleys have wet meadows, bogs, fens, sag ponds, vernal pools, and other kinds of wetlands along the shores of lakes, reservoirs, and ponds and on floodplains. The coastal landscapes have tidal flats and tidal marshes.
>
> —*Southern California Wetlands Recovery Project website* (SCWRP 2014)

Riparian Habitats

Riparian habitats (scrub and woodlands) are the water-dependent habitats adjacent to streams or other water bodies. These habitats serve as the transition between aquatic habitats and upland, or dry, habitats. Riparian habitats lack the amount or persistence of water usually present in wetlands, yet their connection to surface or subsurface water distinguishes them from adjacent uplands (USFWS 2009). Plants are

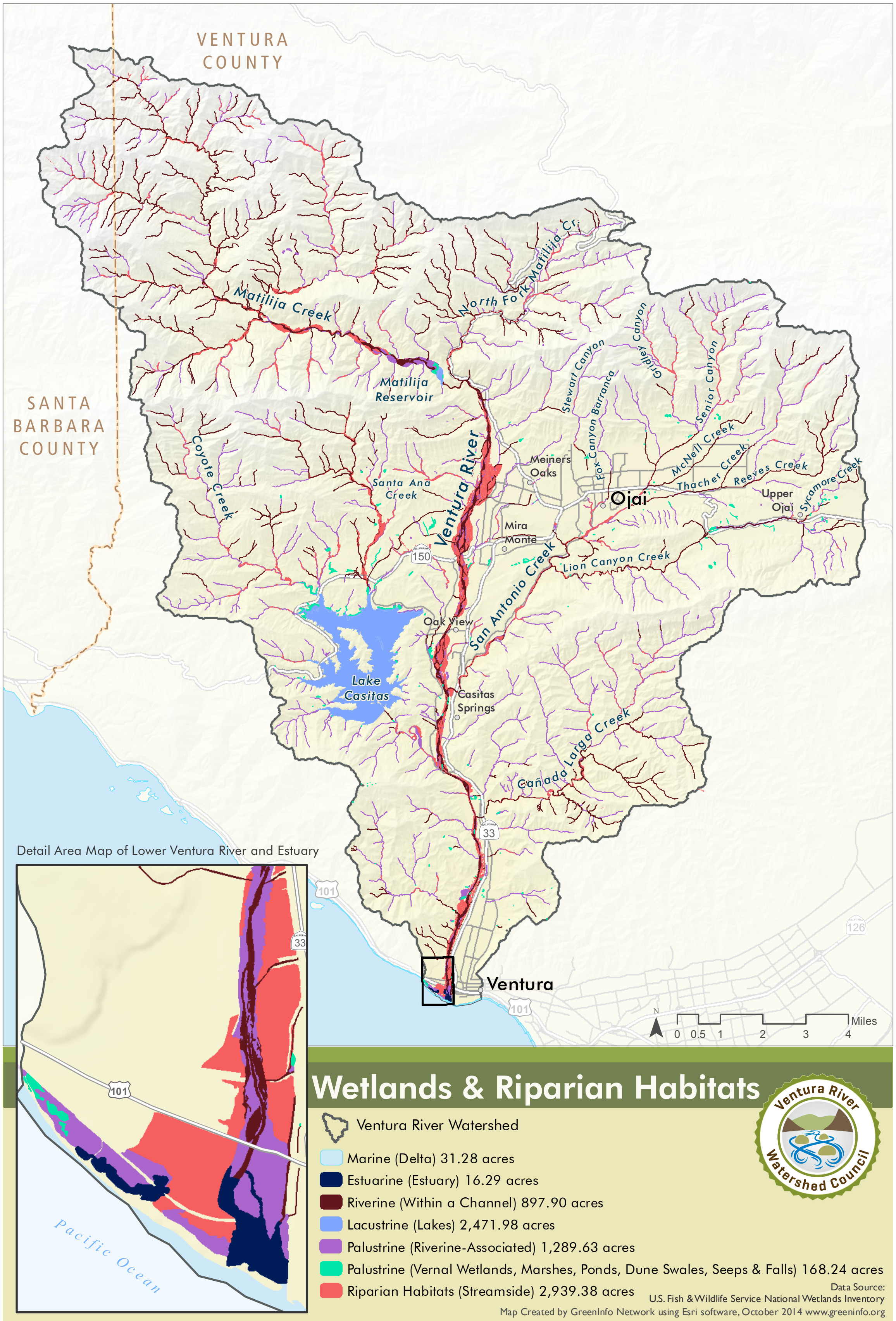


Figure 3.6.1.2.1 Wetlands & Riparian Habitats Map

often more abundant and diverse in riparian habitats than in uplands, especially in dry climates such as that of the Ventura River watershed. The majority of the watershed's wildlife species—including invertebrates (aquatic and terrestrial), fish, amphibians, reptiles, birds, and mammals—depend upon these areas for their survival. Riparian areas provide foraging, nesting, and cover habitat, and are used as migration corridors by various species of wildlife including small and large mammals, birds, and reptiles.

Riparian habitats perform many of the same useful functions as wetlands (described in "Wetland Habitats" above). Local regulators have found that protecting and expanding these natural habitats can sometimes be more economical than building and maintaining engineered facilities such as flood-control structures.

Riverine Wetlands and Riparian Habitats

The Ventura River and its many tributaries and drainages support hundreds of miles of riverine wetlands and riparian habitats—the watershed's most abundant natural wetlands.

In the following sections, the categories "riverine wetlands," "riparian scrub," and "riparian woodlands" are used to describe the ever-changing zone of riverine wetlands and riparian habitats.

The Riverine Wetland-Riparian Habitat Continuum

The Wetlands & Riparian Habitats map (Figure 3.6.1.2.1) indicates that the watershed has 898 acres of riverine wetlands, 1,290 acres of riverine-associated palustrine wetlands, and 2,939 acres of riparian habitats—a total of 5,127 acres.

In the NWI classification system used to create the map, "riverine wetlands" are wetlands within a stream or river channel; "riverine-associated palustrine wetlands" are typically bounded on one side by riverine wetlands and on the other by uplands; and "riparian habitats" are adjacent to stream channels but do not meet the definition of wetland.

The actual line between these categories is imprecise, especially since many of the watershed's stream channels are subject to flooding scour, erosion, drought, and other influences that can change the distribution of vegetation and the relative amount of wetland soils over time.

For example, the most recent mapping of Ventura County's wetlands by NWI was performed in 2004, a year before the big flood of 2005. The boundaries between these various riverine/riparian categories undoubtedly changed after that flood.

Riverine Wetlands

Riverine wetlands generally include the "active channel" of a river or stream system that contains the flow of water under non-flood conditions.

Because storm flows typically rip out vegetation in the active channel every year or every few years, riverine wetlands are characterized by non-persistent vegetation that reflects this unstable environment (Ferren et al. 1995). Perennial reaches support a greater variety of plants than intermittent or ephemeral reaches. While the active channels of most intermittent and ephemeral reaches are devoid of vegetation, perennial reaches support a variety of herbs, and floating and submerged vegetation.

Riverine wetlands provide essential habitat for many animals including fish, reptiles, and amphibians.

Ventura River's Dry Reach, Intermittent Riverine Wetland. The watershed's riverine wetlands are quite variable, ranging from intermittent stream/river reaches (sections) that usually flow only in the winter and spring, such as the "dry reach" (pictured above in its wet state), to perennial reaches that flow year-round.

Photo courtesy of South Coast Habitat Restoration

Upper Matilija Creek, Riverine Wetland, Bedrock and Boulders
Photo courtesy of Michael McFadden

Ventura River below Highway 150 Bridge, Riverine Wetland, Mixed Cobbles.
Riverine wetlands vary from upstream to downstream. Substrate in the channel centers changes from bedrock and large boulders in the upper reaches, to mixed cobbles and gravel in the middle reaches, to patchy boulders, cobbles, gravel, mud, and sand in the downstream reaches (Ferren et al. 1995).

Riverine Wetland Plant Species

Common herbaceous plants in riverine wetlands include: dotted water smartweed, willow-herb, water parsnip, water primrose, iris-leafed rush, water speedwell, and California bulrush. Submerged and floating aquatic plants, including leafy pondweed, fennel pondweed, horned pondweed, duckweed, duckweed fern, water cress, and green algae, grow in slow flowing channels.

Red-Legged Frog Egg Mass in Riverine Wetland, Casitas Springs Levee Pool, 2014. Federally Threatened, State Species of Special Concern

Photo courtesy of Chris Lima

Southwestern Pond Turtle Hatchlings in Riverine Wetland, Lion Creek, 2010. State Species of Special Concern

Photo courtesy of South Coast Habitat Restoration

Two-Striped Garter Snake in Riverine Wetland, 2013.
State Species of Special Concern

Photo courtesy of South Coast Habitat Restoration

Coast Range Newt in Riverine Wetland, 2013.
State Species of Special Concern

Photo courtesy of South Coast Habitat Restoration

Great Blue Heron in Riverine Wetland.
State Special Animal

Photo courtesy of Don DesJardin

Riparian Scrub

Riparian scrub is found immediately adjacent to intermittent and perennial streams and rivers, where there is periodic inundation, but scouring flows occur infrequently. This plant community is dominated by shrub-sized plants and fast-growing mid-sized trees; full-sized trees generally do not become established due to the frequency of disturbance by floodwaters. Plant density and height vary depending upon the amount of moisture and sunlight in the channel. This community provides habitat for a variety of small birds.

Several types of scrub habitats (sometimes found together) are common along the watershed's streams and river: alluvial scrub, mulefat scrub, and southern willow scrub.

Alluvial Scrub, Ventura River Bottom. This habitat type occurs primarily on variously elevated alluvial benches that are protected from regular flooding by topography, but may be subject to some infrequent flooding or inundation. Upland plant species may also be found growing periodically on alluvial scrub terraces. Ground cover between shrubs is open with variable cover of native and non-native annuals and herbaceous perennials. It is likely that these areas were washed over by high flows sometime in the past several decades.
Photo courtesy of Mary Meyer

Alluvial Scrub Plant Species

Alluvial scrub vegetation is dominated by scalebroom, California buckwheat, yerba santa, chaparral yucca, California sagebrush, white sage, prickly pear, redberry, lemonadeberry, mountain mahogany, sugarbush, and hollyleaf cherry.

Mulefat Scrub, Ventura River

Mulefat Scrub Plant Species

Mulefat, the dominant plant species in mulefat scrub, often occurs in pure stands or with a sparse ground layer of vegetation that may include mugwort. Typical secondary species include scalebroom and narrow-leaf willow.

Southern Willow Scrub, Ventura River above Main Street Bridge. The southern willow scrub plant community consists of dense stands of broad-leaved deciduous shrubs and small trees growing immediately adjacent to streams and rivers.

Photo courtesy of Santa Barbara Channelkeeper

Southern Willow Scrub Plant Species

Dominant plants in southern willow scrub include arroyo willow, narrowleaf willow, and shining willow. Other common native species include mulefat, Douglas' nightshade, and mugwort. Mulefat and arroyo willow are both examples of plants that can resprout from underground stems after disturbance.

Belted Kingfisher in Riparian Willow Woodland. Riparian habitats provide foraging and breeding areas for a large diversity of species, such as green herons, belted kingfishers, swallows, and warblers.
Photo courtesy of Allen Bertke

Riparian Woodlands

Riparian woodlands occur along perennial and intermittent streams in areas that are less frequently and less intensely disturbed by flood events than areas with riparian scrub habitat. With less scouring, trees in riparian woodlands have a chance to mature. Riparian woodlands can tolerate some flooding and are reliant on the relatively shallow groundwater associated with streams and rivers. In areas where non-seasonal streams flow out of the mountains and onto flat grasslands, the riparian woodland community may be relatively broad. In higher elevations, where water flows down a narrow passageway confined by geographical features, this community may be only a few meters in width. Riparian woodlands may also occupy the margins of man-made lakes and reservoirs.

Riparian corridors in the watershed support two general riparian woodland types: cottonwood-willow-sycamore and coast live oak.

Cottonwood-Willow-Sycamore Riparian Woodland

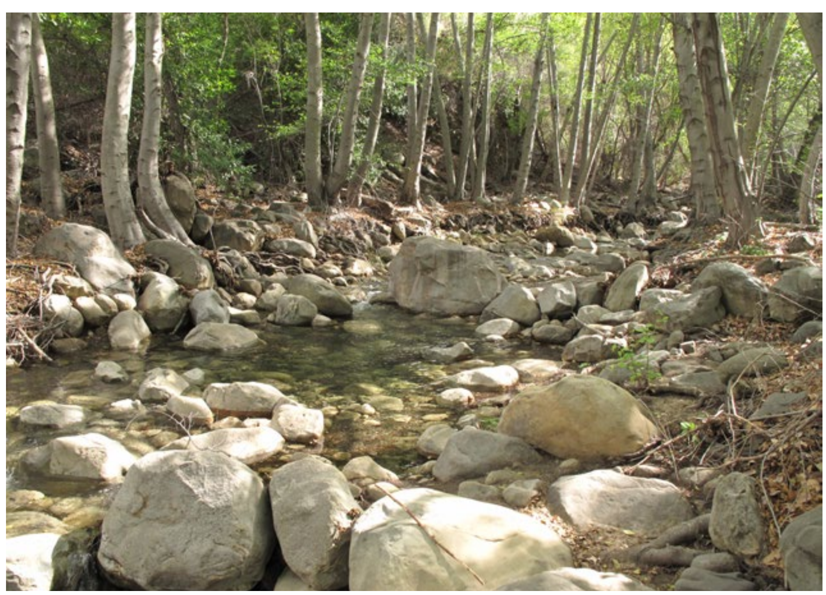
The cottonwood-willow-sycamore riparian woodland comprises a mix of mature broad-leaved, deciduous trees that are tolerant of flooding. Each tree species grows best under slightly different conditions, as illustrated below. Broad-leaved shrubs grow in openings and under tree canopies in riparian woodlands.

Cottonwood-Willow-Sycamore Riparian Woodland Plant Species

Common plant species in cottonwood-willow-sycamore riparian woodlands include Fremont and black cottonwood, red willow, yellow willow, arroyo willow, shining willow, California sycamore, white alder, scalebroom, mulefat, toyon, arroyo willow, elderberry, nightshade, and coyote brush. Numerous vines, including poison oak, virgin’s bower, California blackberry, and wild cucumber, may grow in these areas.

Cottonwood-Willow-Sycamore Riparian Woodland, Matilija Creek.
Wet: Fremont and black cottonwood, both broad-leafed deciduous trees, typically grow on floodplains that are temporarily flooded and on low terraces. California sycamore is one of the watershed's tallest trees and grows on terraces that are infrequently flooded. These large trees depend on occasional flooding for seedling and sapling establishment, but since flooding is infrequent, the trees can grow very large. This photo from Matilija Canyon shows black cottonwoods in fall color intermixed with California sycamores; the trees are located on a terrace away from the active channel.
Photo courtesy of Mary Meyer

Cottonwood-Willow-Sycamore Riparian Woodland, Ventura River.
Wetter: Red, yellow, arroyo, and shining willow are fast growing trees that are good indicators of riparian habitat. They are the watershed's most common riparian forest species, found on the edge of active channels as well as on floodplain terraces where they can reach the shallow groundwater. Arroyo willow has the widest range of occurrence as it can withstand drier conditions than the other willows.
Photo courtesy of Santa Barbara Channelkeeper



Cottonwood-Willow-Sycamore Riparian Woodland, Murrieta Creek.
Wettest: White alder grows along permanent watercourses where their roots remain in saturated soil year-round. White alder is an excellent indicator of a perennial stream.
Photo courtesy of Santa Barbara Channelkeeper

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Coast Live Oak Riparian Woodland

Coast live oaks dominate this type of riparian woodland, which is found on the banks of small streams, on high terraces away from active channels, on erosional deposits along the margins of canyon bottoms, and on the lower slopes of canyon sides.

Coast Live Oak Riparian Woodland, Wills Creek, Ventura River Preserve
Photo courtesy of Ojai Valley Land Conservancy

Coast Live Oak Riparian Woodland Plant Species

Coast live oak is an evergreen species that is not tolerant of extended flooding. Other common trees, shrubs, and vines found in this plant community include arroyo willow, Fremont cottonwood, valley oak, California sycamore, bigleaf maple, California bay, Mexican elderberry, mulefat, Pacific blackberry, gooseberry, snowberry, poison oak, California sagebrush, coyote brush, horsetails, and mugwort.

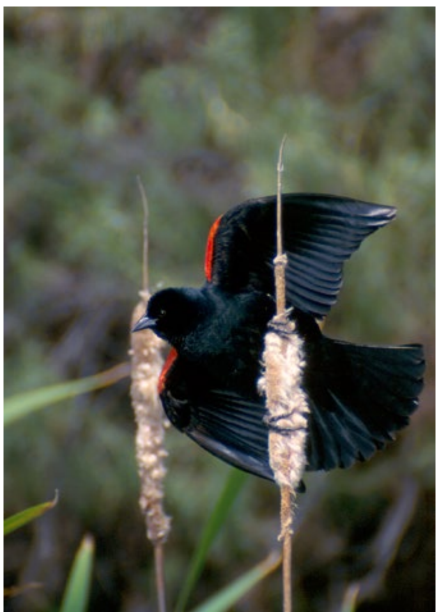
Lakes and their Marshes

Lakes occur in well-defined basins that are usually permanently flooded. Like most lakes in coastal southern California, the two lakes in the watershed, Lake Casitas and Matilija Reservoir, are artificial. Together, these lakes support 2,472 acres of lacustrine wetlands. The shores of these lakes also support roughly 50 acres of freshwater marsh wetlands (palustrine wetlands). Stock ponds, usually created behind small dams on streams, are another form of lacustrine wetland found in the watershed.

Lake Casitas

Lake Casitas Final Resource Management Plan Environmental Impact Statement (URS 2010) and its appendices, which contain comprehensive descriptions of Lake Casitas and its biological resources, provided the information for these highlights of the lake's wetland habitats and wildlife.

Lake Casitas is the largest inland body of water in Ventura County. Surrounded by wilderness, the lake has become a very important aquatic resource for a wide variety of wildlife, but most notably for birds. The California Audubon Society recognizes Lake Casitas as one of 147 "Important Bird Areas" in the state—areas that provide essential habitat for breeding, wintering, and migrating birds (Audubon 2014). Many birds have come to depend on the lake's open water, protected bays, vegetated shallows, and freshwater marsh habitats. The lake supports some species that occur nowhere else in inland Ventura County. Past bird counts have identified over 160 different species at Lake Casitas (CMWD 2014a).



Red-Winged Blackbird
Photo courtesy of Don DesJardin

Freshwater marshes occur along the shore of the lake, especially in coves and channels where the bottom slopes gradually into deeper water. The largest freshwater marsh consists primarily of California bulrush and is located along the edge of the lake near Coyote Creek. The lake's reedy marsh areas dry up when the lake level is low, but can provide important habitat for wildlife when the water from the lake reaches the bulrushes.

Virginia rails and soras inhabit some of the larger patches of cattails and bulrushes in the winter. The shoreline marshes also provide important habitat for grebes, least bitterns, red-winged blackbirds, and smaller passerines (such as common yellowthroat, song sparrow, and marsh wren). Some of the diving, dabbling, and wading birds found at the lake include western and Clark's grebes, doublecrested cormorants, herons, egrets, lesser scaups, ruddy ducks, and wood ducks. The mudflats and patches of wetland vegetation around the lake provide habitat for green herons, pied-billed grebes, American coots, plovers, avocets, stilts, phalaropes, killdeers, and spotted sandpipers.

Green Heron, Lake Casitas
Photo courtesy of Allen Bertke

Some of the raptors known to breed at the lake include white-tailed kites, red-shouldered hawks, red-tailed hawks, Cooper's hawks, American kestrels, and bald eagles. Visiting species include ospreys, northern harriers, sharp-shinned hawks, golden eagles, peregrine falcons, prairie falcons, zone-tailed hawks, ferruginous hawks, and merlins. Barn owls, great horned owls, northern pygmy owls, short-eared owls, and burrowing owls have been observed at the lake.

White-Faced Ibis, Lake Casitas. State Species of Special Concern
Photo courtesy of Allen Bertke

Wood Duck, Lake Casitas
Photo courtesy of Allen Bertke

Osprey, Lake Casitas. State Watch List
Photo courtesy of Allen Bertke

In addition to the many bird species at the lake, it is not uncommon for visitors to see deer, raccoons, rabbits, opossums, coyotes, skunks, and squirrels.

Lake Casitas is also known as a premier fishing lake in the region. Lake Casitas contains a warmwater fishery that includes bass (primarily largemouth), catfish, sunfish, and crappie. These species are non-native and were introduced when the lake was formed, but now have largely self-sustaining populations (Cardno-Entrix 2012).

The lake has historically been stocked with rainbow trout and other species of fish. Stocking was discontinued in 2013 because of concerns that non-native fish could escape and impact protected species if the Casitas dam spilled into downstream waters potentially used by protected aquatic species such as steelhead. The California Department of Fish and Wildlife, together with federal regulators, are currently evaluating each stocking situation to determine if stocking can be resumed in the future.

Steelhead (anadromous rainbow trout) are no longer present in Lake Casitas and its upstream tributaries, because Casitas dam precludes seaward and spawning migration. It is possible that residualized stocks of steelhead remain in Coyote and Santa Ana creeks in non-anadromous, resident form (URS 2010).

Matilija Reservoir

Matilija Reservoir, located on Matilija Creek, provides both lake and freshwater marsh wetland habitat. The reservoir is now largely full of sediment, and though there is still considerable surface area, water depth is very shallow.

Freshwater marsh wetlands surround part of the lake. Emergent wetland plants around the lake include bulrush, smartweed, nutsedge, and rush species (USACE 2004).

Like Lake Casitas, Matilija Reservoir's lake and marsh wetland habitats are used by a wide variety of migrating and resident birds. Southwestern pond turtles, a California species of special concern, have been found at Matilija Lake. The lake is also home to large numbers of non-native aquatic predators such as largemouth bass (USACE 2004), bullfrogs, and crayfish, which prey on juvenile turtles.

Matilija Reservoir, Lake and Marsh Wetlands

Photo courtesy of Mary Meyer

Coastal Wetlands

The watershed's coastal wetlands include intertidal habitats (marine wetlands), an estuary, and dune swales. As indicated on the Wetlands & Riparian Habitats map (Figure 3.6.1.2.1), coastal wetlands include 31 acres of marine wetlands and 16 acres of estuarine wetlands. Dune swales, a type of palustrine wetland, comprise about two acres (Ferren et al. 1990). Ferren et al. (1990) mapped estuarine habitats at a finer scale and estimated that the estuary contained 28 acres of estuarine wetlands surrounded by over 50 acres of palustrine wetlands. As with riverine and riparian wetlands, the boundaries of estuarine wetlands are in a regular state of flux.

Intertidal Wetlands

Intertidal (or marine) wetlands in the watershed include sandy and rocky intertidal habitats.

Ventura River Delta, Rocky Intertidal Wetland. Rocky intertidal wetland habitats consist of rock and cobble deposited by the Ventura River and distributed by ocean waves, tides, and currents. Rocky intertidal habitat is often battered by waves and is underwater during high tides and exposed to air during low tides.
Photo courtesy of Rick Wilborn

Intertidal Wetland Plant Species

The sand along exposed beaches is continually reworked and moved around by waves, making establishment by attached plants impossible at lower levels. However, plants such as beach saltbush and red sand verbena may become established higher on the beach.

Plants in the rocky intertidal zone attach themselves to rocks but must withstand intense wave action and the stress of drying out during low tides. A variety of algal species live in these habitats, possessing different levels of tolerance to flooding and desiccation. The lower intertidal area exhibits the greatest algal species diversity (Capelli 2010). Rockweed and feather boa kelp can be seen within the intertidal zone, and surfgrass grows at elevations only exposed on the lowest tides.

Marbled Godwits, Sanderlings, and Egrets Feeding in Sandy Intertidal Wetland. In sandy intertidal areas, waves bring food and oxygenated water to the organisms living within the sand. Additionally, freshwater aquifers along the coast drain to the ocean through beach sand, carrying nutrients and sometimes contaminants, to the shore.

Photo courtesy of Dave Hubbard

Invertebrate animals are extremely abundant on sandy beaches, but are not usually visible because they live under the sand. Sand crabs and bean clams live low on the beach. At night, beach-hoppers emerge from their burrows higher on the beach to eat kelp that has washed up at high tide. The abundance of invertebrate life provides important food for shorebirds. Sandy beaches provide nesting habitat for endangered California least terns and western snowy plovers. Some of the animals supported by rocky intertidal habitats include invertebrates, barnacles, striped shore crabs, shorebirds (especially black turnstones and ruddy turnstones), egrets, herons, and gulls.

Black Turnstone, Rocky Intertidal Wetland

Photo courtesy of Don DesJardin

Animals associated with the intertidal habitats include mole crabs, clams, and bristle worms, which bury themselves in the sand between cobbles and feed on particles brought in by the waves. These animals, in turn, are fed upon by shorebirds during low tides and by fish during high tides (USACE 2004).

Ventura River Estuary

The watershed is home to the Ventura River estuary. Estuaries occur along the coast where fresh water from rivers meets the salt water from the sea. Estuaries are complex ecosystems. Water can enter the system from river flows, tides, waves, groundwater, seeps, and springs; the amount and movement of this water can be quite variable. Estuaries trap nutrients from freshwater and saltwater sources and disperse them through tidal movement and currents. This brackish water environment and regular influx of nutrients supports a high diversity of life. Many species of birds, fish, and other wildlife depend upon estuarine habitats to live, feed, and reproduce.

Ventura River Estuary, February 2014. The estuary extends from the ocean to the area between the Highway 101 bridge and the Main Street bridge upstream (Ferren et al. 1990). It is a lagoon type of estuary, separated from the ocean by a sandbar that generally remains closed off from the ocean. Water periodically breaches the sandbar. The second mouth of the estuary, not shown in this photo, is further west.

Photo courtesy of Rick Wilborn

The following excerpt provides an overview of the Ventura River estuary wetland:

> The Ventura River Estuary is characterized by (1) short periods of tidal flushing when the mouth is open and longer periods of pending and lagoon formation when the mouth is closed by a sandbar; and, (2) a year-round inflow of fresh water that is the result of upstream surface flows, rising groundwater, and the discharge of effluent from the Ojai Valley Sanitary District. Because there is perennial freshwater runoff into the estuary, hypersaline conditions apparently are not reached at the surface of the estuary. The estuary is tidally flooded by brackish water when the mouth is open, and is flooded by slightly brackish or fresh surface water when the mouth is closed. Freshwater inflow also determines the depth of the estuary, the extent of areas flooded during ponding, and pattern of salinity and temperature stratification (J.J. Smith 1987).
>
> In addition to the main estuary, the Ventura River has [a] second mouth to the west which is flushed by runoff typically only during large flood events. This second mouth can also receive marine water when storm waves top the cobble and sand berm that blocks the mouth. Under these conditions, the second mouth is not a typical estuary.... The hydrology of the second mouth estuary and associated lagoons and isolated pools appears to be closely linked to the rise and fall of the water table in the delta. The primary influence on this rise and fall is whether mouth of the main estuary is closed and the system is experiencing lagoonal conditions. The higher the lagoon, the more hydrologically connected the entire system becomes.
>
> —*Wetlands of the Central and Southern California Coast and Coastal Watersheds: A Methodology for their Classification and Description* (Ferren et al. 1995)

Estuary Plant Species

The open water habitats of the Ventura River estuary contain a mixture of river and seawater and support algae and aquatic plants such as duckweed and pondweed. Near the river mouth, brackish marsh supports pickleweed, alkali heath, and California bulrush. Moving inland, this habitat transitions to freshwater marsh with cattails and bulrushes. Farther inland the habitat transitions to riparian scrub dominated by native willows.

Breached Sandbar, Ventura River Estuary, September 2014. The sandbar that impounds water at the mouth of the Ventura River opens and closes depending on the interactions between river flow and wave action. Winter storm flows often scour out the sandbar, allowing regular tidal flows into the estuary for a period of time. Occasionally the mouth opens during the summer (Ferren et al. 1995).

Photo copyright © 2002–2013 Kenneth & Gabrielle Adelman, California Coastal Records Project, www.Californiacoastline.org

Estuaries teem with an array of life including invertebrates (clams, shrimp, crabs, snails, and worms) and the vertebrates that prey on them (fish, birds, and mammals).

Pelicans, Ventura River Estuary

Photo courtesy Santa Barbara Channelkeeper

Ventura River Estuary Cove
Photo courtesy of Santa Barbara Channelkeeper

The Ventura River estuary supports many resident and migratory birds: waterbirds, including ducks, waders, and shorebirds, as well as songbirds and raptors. Bird surveys conducted in 1991/1992 identified 233 native bird species using the estuary and surrounding wetland habitats, six of which were special status species and 37 of which were water-associated species (Hunt & Lehman 1992). Belding's savannah sparrow, a state-listed endangered species, has been observed in Seaside Wilderness Park adjacent to the estuary (Ferren et al. 1990). This sparrow nests only in estuary salt marsh habitat.

> The estuary is used by [a] large number of waterbirds, whose densities vary seasonally and daily with fluctuating water levels. The largest numbers of birds are typically found when water levels in the estuary are relatively low, exposing mudflats and adjacent aquatic habitats. Moderate numbers of waterfowl are found on-site from mid-fall through early spring, gulls and terns use the area year-round for resting and bathing (as do a small number of Brown Pelicans (*Pelecanus occidentalis*), and large numbers of shorebirds are present when water levels are low, exposing mudflats utilized for feeding. Regionally declining and/or endangered species that frequent this site include the Osprey (*Pandion haliaetus*) and Peregrine Falcon (*Falco peregrinus*) (rare visitors), Snowy Plover (*Charadrius alexandrinus*) (small numbers are found on

the sandy shores and mudflats, primarily in late summer), and Least Tern (*Sternaantillarum*) (which utilize the estuary area for feeding, resting and bathing, often occurring for extended periods in late summer accompanied by fledged young).

—*Vertebrate Resources at Emma Wood State Beach and the Ventura River Estuary, Ventura County, California: Inventory and Management* (Hunt & Lehman 1992)

Cormorants and Coots, Ventura River Estuary

Photo courtesy of Stephanie Grumbeck, Brooks Institute of Photography

Ventura River Estuary History

The Ventura River estuary was once much larger than it is today. The following excerpts from a historical study of the watershed's habitats demonstrate the dynamic nature of the estuary before it was constrained by development:

> Historically, the estuary consisted of a large willow-cottonwood riparian forest with numerous distributary channels, a tidal lagoon and tidal flat, salt marsh, high marsh transition zone, and a number of small seasonal ponds within the marsh.
>
> The Ventura River mouth has shifted location numerous times over the past several hundred years, from the hills west of the river mouth to Figueroa Street in Ventura. Many of these former river mouth areas are still susceptible to flooding. A brackish lagoon, formerly at the site of what is now the Derby Club across from Seaside Park, marked the route of one of these former river mouths.
>
> One notable feature in the Ventura River delta was a brackish lake to the west of the end of Figueroa Street. The lake marked a former outlet of the river, and covered about 2.5 acres of open water and 9 acres of marsh. This lake and former river mouth were also the site of a Chumash village, Mitsqanaqan.
>
> At least three types of coastal estuarine systems are represented on the Ventura shoreline: seasonally or intermittently closing freshwater-brackish estuaries associated with the Santa Clara and Ventura river mouths, dune-dammed non-tidal lagoons associated with now-abandoned Santa Clara River mouths, and the large, more open wetland system at Mugu. These features formed a near-continuous sequence of coastal wetlands from Mugu Lagoon all the way to the Ventura River mouth: the eastern edge of the Ventura River floodplain was separated from the northwestern edge of the Santa Clara River floodplain (today's Ventura Marina area) by less than one mile.
>
> —*Historical Ecology of the lower Santa Clara River, Ventura River and Oxnard Plain: an analysis of terrestrial, riverine, and coastal habitats* (Beller et al. 2011)

The Ventura River estuary provides important primary and nursery habitat for several visiting and resident fish species, including topsmelt, prickly sculpin, and California killifish, as well as for sensitive species such as the southern California steelhead and tidewater goby.

> The sandbar at the mouth of the estuary is periodically breached by heavy outflows and high tides associated with storm events. Once opened, the river can receive adults of anadromous species attempting to spawn in the estuary (e.g., Topsmelt) as well as species that breed in fresh water upstream (e.g., Pacific Lamprey, Steelhead, California Killifish). Continuous freshwater inflows to the estuary are critical to maintaining the low salinity levels in the upper portions of the estuary favored by the Tidewater Goby. Preservation of these features and maintenance of good water quality are crucial to the continued survival of these resident anadromous and catadromous species in the Ventura River.
>
> —*Vertebrate Resources at Emma Wood State Beach and the Ventura River Estuary, Ventura County, California: Inventory and Management* (Hunt & Lehman 1992)

Dune Swales

Dune swales are low areas that occur between the crests of coastal dunes. Dune swales typically do not hold ponded water but are areas where the sand surface intersects the shallow groundwater table and the soil remains saturated with fresh water for most or all of the year. Wetland plants colonize these moist areas.

Dune swales can be found at Seaside Wilderness Park, located south of Emma Wood State Beach Group Camp and the railroad tracks.

Dune Swale Plant Species

Vegetation species characteristic of dune swales include beach-bur, whiteleaf saltbush, and evening primrose. Dune swales are threatened by non-native species such as iceplant, sea rocket, and European beach grass, which can alter the natural movement of sand.

Special status species present or once present in the area, such as least tern, western snowy plover, and the California legless lizard, commonly utilize coastal dune native vegetation. The dune swale wetlands provide habitat for numerous small mammals that rely on a relatively continuous cover of vegetation for protection from predators.

Vernal Ponds and Lakes

Vernal wetlands occur in small depressions underlain by impenetrable soils. Vernal means "spring," and these wetlands generally hold standing water, usually rainwater, for only part of the year. This seasonality is a defining feature of vernal wetlands, which usually go through four phases each year: 1) a dry phase during the summer and fall, 2) a wetting phase after rains begin, 3) a flooded phase in the winter, and 4) a drying phase. Vernal wetlands may remain without surface water for several years during droughts. They are mostly found in areas with a Mediterranean climate (wet winter/dry summer).

Today, only a small percentage of vernal wetlands remain in southern California. In the Ventura River watershed, vernal wetlands are closely related to geological features such as faults. These wetlands are often found in the depressions formed by synclines, the down-folded limbs of faults, and at geologic structural knots (the intersection of several faults). These wetlands occur where the subsurface is impermeable, typically in relatively level landscapes such as the floors of wide valleys, plains, or coastal mesas that are not connected to drainages, such that the water slowly evaporates after rainfall ends.

Vernal wetlands types are classified based on depth, duration of the flooding phase, and the types of plants and animals present. From wettest to driest, the types are known as vernal lakes, vernal ponds, and vernal pools.

Remains of Mirror Lake (Vernal Lake), Mira Monte. Mirror Lake, the only example of a vernal lake in Ventura County, had an incredibly rich plant community, supporting several rare and endemic species of plants. Cumulative development impacts have altered the natural processes of the wetland to such a degree that it no longer functions as a vernal lake. Mirror Lake is associated with the Oak View Fault Zone (Ferren et al. 1995).
Photo courtesy of Dave Hubbard

FINAL DRAFT

Vernal Pond and Lake Plant Species

Wide variation in the length of possible wet periods and isolation from similar habitats generates a highly variable plant community. Vernal wetlands may contain common species such as spike-rushes and toad rush, as well as vernal wetland specialists such as woolly marbles and California orcutt grass. The unique hydrology and geographic isolation of vernal wetlands tend to support rare and endemic species, making protection of these areas especially important for the preservation of local and regional biodiversity.

Vernal wetlands provide important breeding grounds for frogs, toads, and salamanders and act as stopover points for migratory waterfowl and shorebirds. Aquatic invertebrates tend to be plentiful and may include several types of small crustaceans (e.g., fairy shrimp and clam shrimp), as well as aquatic insects.

Because the plants and animals of vernal wetlands are very sensitive to even minor alterations in hydrology, the functioning of these wetlands can be drastically altered by minor changes in the surrounding landscape.

Vernal Pond, Besant Hill School

Photo courtesy of Michael McFadden

Freshwater Marshes

Freshwater marshes are wetlands that occur in areas with still or slow-moving shallow water and nutrient-rich mineral soils. Some freshwater marshes may be permanently flooded while others may have standing water for only part of the year. Freshwater marshes receive their water from rain, adjacent lakes, or rivers. Due to the rich mineral soil, these wetlands drain slowly. Freshwater marsh soils remain anaerobic (without oxygen) essentially year-round.

Ventura River by Casitas Springs Levee, Freshwater Marsh

In the Ventura River watershed, freshwater marshes are usually small and scattered. They can be found on the margins of ponds and lakes, in the floodplains of slow moving streams and the Ventura River, in geologic depressions and drainages, along the margins of the estuary, and in artificial impoundments such as stock ponds.

Freshwater Marsh Plant Species

Freshwater marshes tend to have non-woody vegetation. They are dominated by perennial grass-like plants such as common cattail and California bulrush. Other rushes, sedges, spike-rushes, and horsetails may also be common. Freshwater marshes also support plants such as willow-herbs, watercress, yerba mansa, pond lily, biennial sagewort, mosquito fern, and species of duckweed, and pondweed, and smartweed. The vegetation can grow very dense and quite tall.

The luxuriant, bright green growth of freshwater marshes in summer can show a strong contrast with neighboring, non-wetland, plant communities that may drop their leaves or turn brown during summer drought. The contrast reverses during the rainy season when other plants grow new leaves while freshwater marsh plants die back for the winter. In the spring, marsh plants re-sprout from their roots and produce large amounts of above-ground shoots and leaves. In addition to its important roles in nutrient recycling and soil conditioning, freshwater vegetation is an important source of nesting material for birds and small mammals.

Common Yellowthroat
Photo courtesy of Allen Bertke

Great Egret. State Special Animal
Photo courtesy of Allen Bertke

California Tree Frog
Photo courtesy of Chris Brown

Freshwater marshes support a wide diversity of wildlife. Birds associated with this habitat include red-winged blackbirds, song sparrows, common yellowthroats, and great egrets. Less common birds include least bitterns and sora rails. Amphibians such as tree frogs depend on the still water for breeding. The extended presence of surface water into the dry season is important for nesting birds and for mammals.

FINAL DRAFT

Ojai Meadows Preserve, Restored Freshwater Marsh
Photo courtesy of Rick Wilborn

Ojai Meadows Preserve

The Ojai Meadows Preserve, located at the northwest edge of the City of Ojai just west of Nordhoff High School, is the site of a significant wetlands restoration project. Historically, water naturally drained to the property, which once contained approximately five acres of freshwater marsh wetlands (Condor Environmental 2004). While surrounding developments altered drainage patterns, the site and the adjacent highway were still subject to flooding during big rain events.

The Ojai Valley Land Conservancy acquired the property in 2000 and, with considerable help from the community, began restoring the wetland. A central focus of the restoration was restoring the historical flood management function of the wetland thereby reducing flooding of adjacent properties and roads. A variety of other native habitat types are also being restored on the 57-acre preserve.

Seeps and Springs

Seeps and springs are wetlands found where groundwater is forced to the surface, typically by faults or bedrock layers. These widely scattered wetlands support diverse and often lush vegetation.

Springs are recognized by the presence of flowing surface water while seeps are areas of saturated soil with very little or no flowing water. While the amount of flowing water or area of saturated soil may vary during the year, these wetlands are typically wet year-round due to the subterranean nature of the water sources. Water from springs and seeps may support other types of wetlands; it is not uncommon to see ponds, freshwater marshes, wet meadows, or riparian wetlands downstream of these perennial water sources.

Springs and seeps may be found anywhere from high slopes in the interior mountains right down to sea level. Springs typically occur in steep rocky terrain where emerging water does not immediately percolate into the surrounding impermeable substrate. Seeps may be found on a variety of slopes, including rock faces. Soils associated with seeps tend to hold a great deal of water and be permanently saturated.

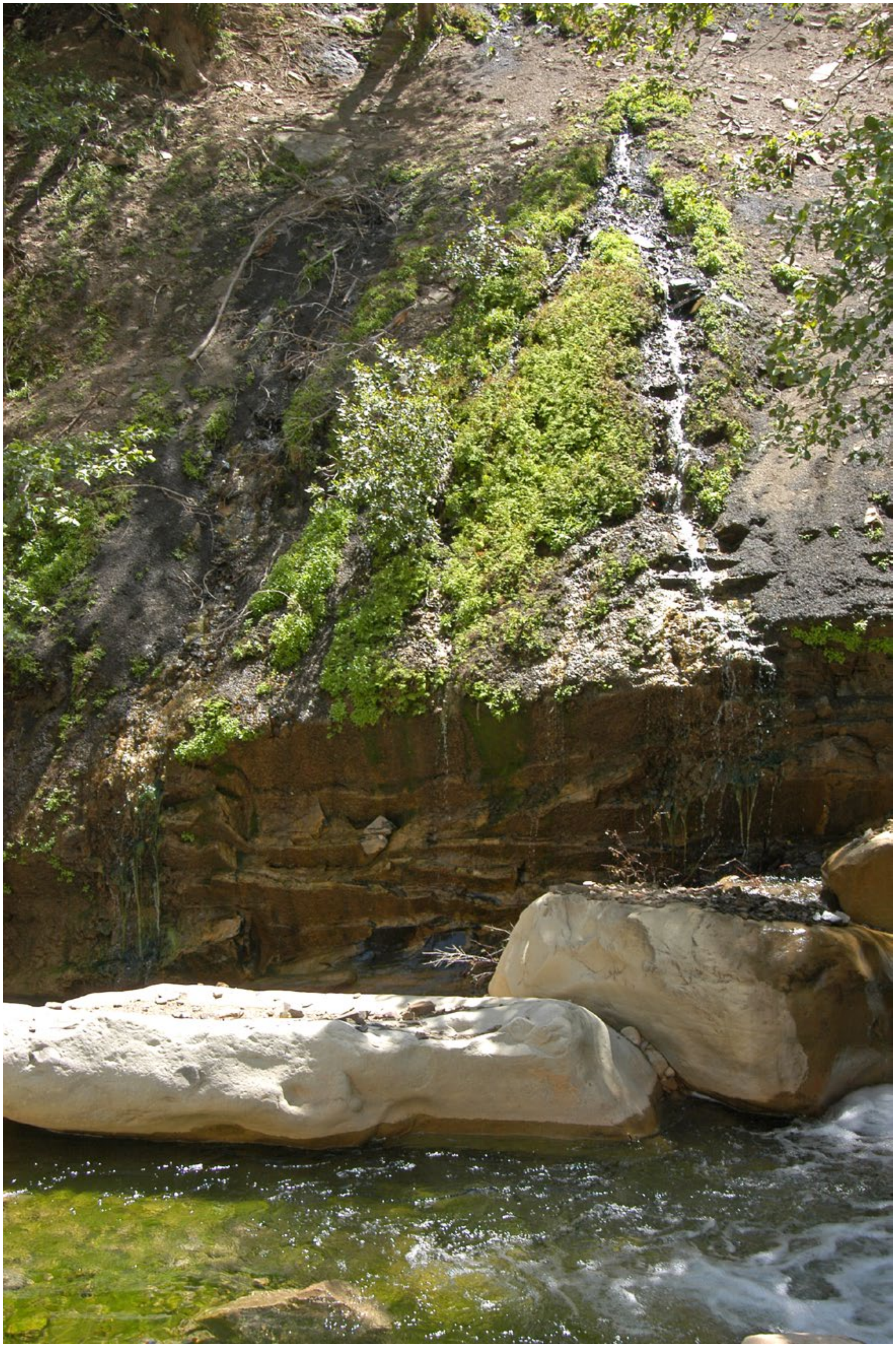
An excellent example of a forested seep may also be seen at Wheeler Gorge along Highway 33.

Seep and Spring Plant Species

Vegetation found in springs is limited by the steep rocky terrain characteristic of this wetland type. Rocks covered with flowing water support algae, mosses, liverworts, and lichens. When there is sufficient soil structure to support rooted plants, herbaceous species such as southern maidenhair fern, scarlet monkeyflower, Indian paintbrush, and rothrock lobelia, may be present.

Seeps vary widely in the vegetation they support. Some are meadow-like and dominated by low sedges (common spike-rush and *Carex* species) and rushes (Mexican rush, brown-headed rush and common rush). Others seeps may support California bay, willow, and bigleaf maple forests with an understory of species such as coastal wood fern, dense-flowered spike-primrose, California rose, creeping wild ryegrass, stream orchid, columbines, and woolly hedge nettle.

Bellyache Falls, Freshwater Spring, Highway 33, Ojai. Bellyache Falls is a freshwater spring located below Dry Lakes Ridge along Highway 33 in the upper watershed. A spigot used to fill water containers previously existed at the site.



Seep, Matilija Canyon

Photo courtesy of Michael McFadden

3.6.1.3 Sensitive/Special Status Habitat

Federal Critical Habitat

California Condor, Federal and State Endangered Species
Photo courtesy of Martin Fletcher

The federal Endangered Species Act requires designation of critical habitat when a species is listed as endangered or threatened. Critical habitat is a specific area that has the physical or biological features essential to conservation of the species. This may include areas not currently occupied by the species but that will be needed for its recovery. Critical habitat has been designated for five animal species in the Ventura River watershed: southern California steelhead, California red-legged frog, tidewater goby, southwestern willow flycatcher, and California condor. In total, these habitats comprise 25,397 acres and 48 miles of river and tributaries (see Figure 3.6.1.3.1 Critical Habitat map).

When activities that involve a federal permit, license, or funding are likely to adversely modify the area of critical habitat, the US Fish and Wildlife Service or the US National Marine Fisheries Service (depending which agency has jurisdiction over the species) can require amendments to those activities for the protection of the listed species.

State Sensitive Vegetation Communities

In addition to individual plant species (discussed later in this section), plant communities are also recognized as being sensitive and threatened. These vegetation communities, or "alliances," are ranked in California according to their degree of imperilment (as measured by rarity, trends, and threats), based on NatureServe's global (G) and state (S) status categories. (NatureServe, an international nonprofit conservation organization, is an authority on rare, endangered, and threatened ecosystems.) Vegetation alliances with state ranks of S1, S2, and S3 are considered to be highly imperiled in California. Though not associated directly with legal protections, vegetation communities with these rankings are recognized as important by local, state, and federal agencies (VCPD 2014a).

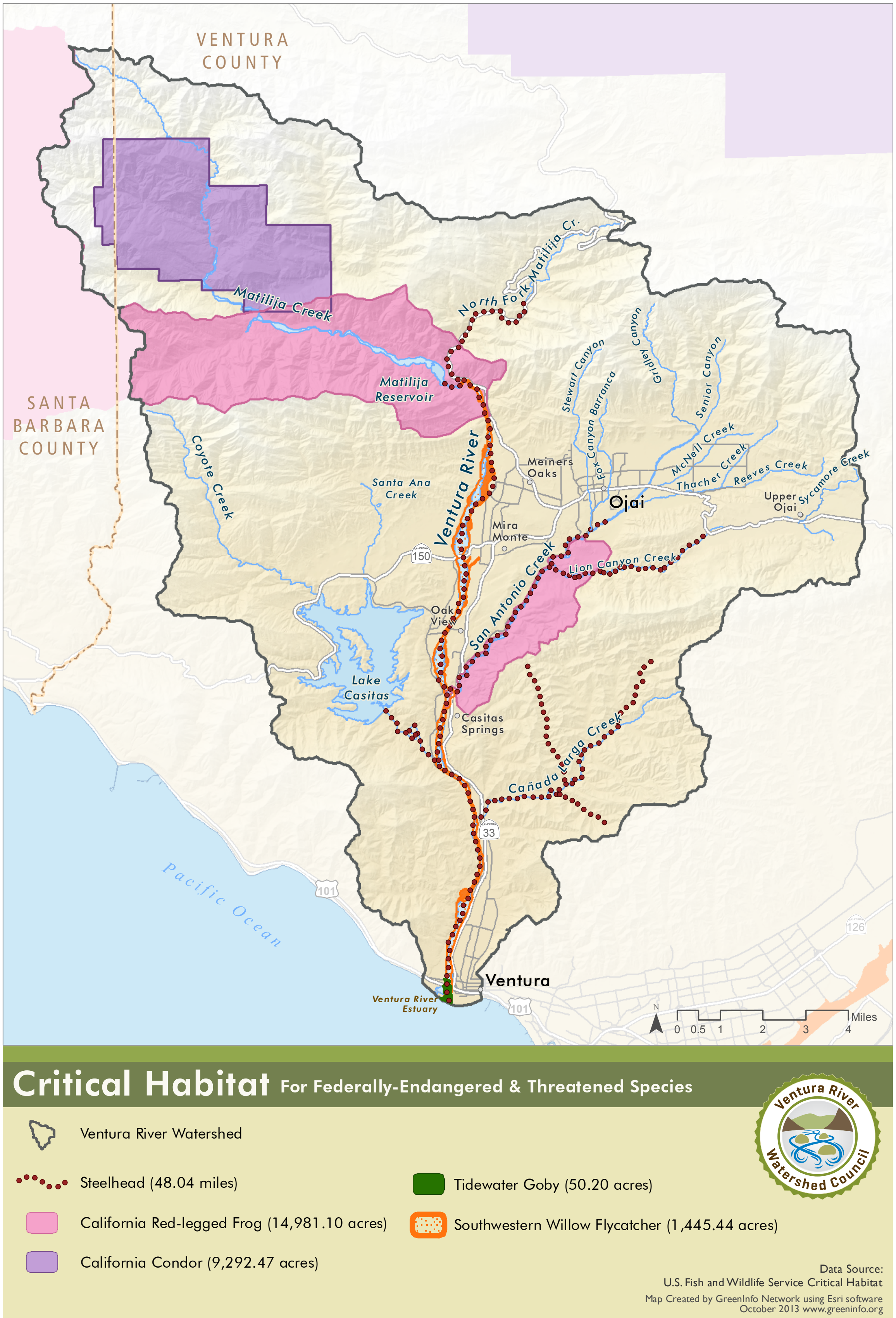


Figure 3.6.1.3.1 Critical Habitat Map

The state's mapping and ranking of alliances is still incomplete, however the following special status habitats are known to occur in the watershed (Meyer 2014):

Table 3.6.1.3.1 State Sensitive Vegetation Communities

Vegetation Community	Status[1]	Vegetation Community	Status[1]
Alluvial fan chaparral	G2 S2.1	Purple needle grass grassland	G3 S3?
Ashy buckwheat scrub	G3 S3	Red willow thickets	G3 S3
California bay forest	G4 S3	Scale broom scrub	G3 S3
California brittle bush scrub	G4 S3	Southern arroyo willow riparian forest	G2 S2.1
California sycamore woodlands	G3 S3	Southern coastal salt marsh	G2 S2.1
California walnut groves	G3 S3	Southern cottonwood willow riparian forest	G3 S3.2
California walnut woodland	G2 S2.1	Southern mixed riparian forest	G2 S2.1
Big pod ceanothus chaparral	G3 S3.2	Southern riparian scrub	G3 S3.2
Chamise - white sage chaparral	G3 S3	Southern willow scrub	G3 S2.1
Coastal and valley freshwater marsh	G3 S2.1	Sycamore alluvial woodland	G1 S1.1
Coastal brackish marsh	G2 S2.1	Thick leaf yerba santa scrub	G3 S3
Freshwater seep	G4 S3.2	Toyon chaparral	G5 S3
Giant wild rye grassland	G3 S3	Transmontane freshwater marsh	G3 S2.2
Hairy leaf ceanothus chaparral	G3 S3	Venturan coastal sage scrub	G3 S3.1
Hoary leaf ceanothus chaparral	G3 S3.2	Vernal marsh	G2 S2.1
Lemonade berry scrub	G3 S3	White sage scrub	G4 S3
Native grassland	G3 S3.1	Yellow willow thickets	G4 S3?

1. NatureServe Conservation Status Ranks:

G1 or S1 - Critically Imperiled

G2 or S2 – Imperiled

G3 or S3 - Vulnerable to extirpation or extinction

A question mark (?) denotes an inexact numeric rank due to insufficient samples over the full expected range of the type, but existing information points to this rank.

Locally Important Plant Communities

The Ventura County General Plan calls for protection of "significant biological resources" in Goal 1.1.5, which states: "Preserve and protect significant biological resources in Ventura County from incompatible land uses and development. Significant biological resources include endangered, threatened or rare species and their habitats, wetland habitats, coastal habitats, wildlife migration corridors, and *locally important species/communities.*" Whether or not a plant community qualifies as "locally important" is determined on a case-by-case basis as part of environmental review associated with a development, with the exception of oak woodlands. The Ventura County Board of Supervisors, as part of their adoption of an Oak Woodland Management Plan, explicitly deemed oak woodlands to be a locally important plant community (VCPD 2014a).

3.6.1.4 Habitat Connectivity/Wildlife Movement

Rivers and streams serve as an interconnected road and highway network for the natural world. In urban areas where habitats become fragmented by roads and development, the network of rivers and streams is critical for the movement of aquatic and terrestrial species. The connectivity of these vital habitats is important to animals not only for food availability, but also for reproduction and genetic vigor. These connections are especially important for species, such as mountain lions, that require extensive areas to survive.

Many species in the watershed are dependent upon the stream network to travel between habitats during part or all of the year. When streams and rivers flow during the rainy season, fish, frogs, turtles, and other aquatic species are able to travel through the water (unless impeded by a barrier). Terrestrial species such as bobcats, deer, coyotes, and fox are able to use the riparian habitat adjacent to streams and rivers to migrate throughout the year.

Bobcat using Ventura River Corridor, Steelhead Preserve, 2013
Photo courtesy of Rich Reid

The following excerpt from an environmental assessment of a project in the Ventura River floodplain provides a thorough overview of the role of the river in habitat connectivity:

> The Ventura River and its associated drainages provide important connections between wilderness areas of the Santa Ynez foothills, the Los Padres National Forest, Sulphur Mountain, and the Pacific Ocean. The broad diversity of vegetation and physical topography in this area provides a mechanism for dispersal, supports wildlife travel routes, and allows habitat connectivity for a range of species from steelhead to neo-tropical song birds. Carnivores and ungulates (i.e., coyote, bobcat, bear, and deer), in addition to small less mobile species, also utilize the river and adjacent uplands for movement and dispersal.

Bear Print, Oso Trail, October 2014

Wildlife movements can be classified into three basic categories: dispersal (e.g., juvenile animals moving from natal areas or individuals expanding ranges); seasonal migration; and movements related to home range activities (e.g., foraging for food or water, defending territories, or searching for mates, breeding areas, or cover).

Habitat fragmentation, whether natural or human-induced, can create a mosaic of habitat patches separated by barriers that may be permeable or impermeable to wildlife movement. How a species responds to a fragmented landscape largely depends on its body size. For example, large ground dwelling (i.e., flightless) animals, such as mountain lions, coyotes, grey fox, and badgers, routinely move large distances across extensive home ranges that encompass multiple habitat patches, compared to small ground-dwelling wildlife, such as brush rabbits, ornate shrews, pocket gophers, meadow voles, and Pacific tree frogs, whose relatively small home ranges may include only a portion of a single habitat patch.

Movement corridors are physical connections that allow wildlife to move between patches of suitable habitat. Simberloff et al. (1992) and Beier and Loe (1992) correctly state that, for most species, we do not know what corridor traits (length, width, adjacent land use, etc.) are required for a corridor to be useful. But, as Beier and Loe (1992) also note, the critical features of a movement corridor may not be its physical traits but rather how well a particular piece of land fulfills several functions, including allowing dispersal, plant propagation, genetic interchange, and recolonization following local extirpation.

The following terms are frequently used in discussing wildlife movement corridors:

- Dispersal Corridors - Corridors which are relatively narrow, linear landscape features embedded in a dissimilar matrix that links two or more areas of suitable habitat;
- Habitat Linkages - Linkages which are broader connections between two or more habitat areas;
- Travel Routes - Routes which are landscape features, such as ridgelines, drainages, canyons, or riparian corridors that are used frequently by animals because they provide the least topographic resistance to movement and provide access to water, food, cover, or other necessary resources;
- Wildlife Crossings - Crossings which are small, narrow, typically man-made features, such as tunnels, culverts,

underpasses, etc., that allow wildlife to bypass a barrier. The latter represent "choke points" along a movement corridor (Meffe and Carroll, 1997).

Undisturbed landscapes contain a variety of movement corridors, habitat linkages, travel routes, wildlife crossings and other habitat features that facilitate wildlife movement through the landscape and contribute to population stability. The relative size and characteristics of these features differ for species that use them. Wildlife use will depend on the ability of these features to provide adequate space, cover, food, and water, in the absence of obstacles or distractions (e.g., man-made noise, lighting) that could interfere with wildlife movements. Human-induced habitat fragmentation increases the number of wildlife crossings or choke points in a landscape.

California Tree Frog, Matiljia Creek
Photo courtesy of Mary Meyer

Long Tailed Weasel, Ojai Meadow Preserve
Photo courtesy of Martin Fletcher

Riparian corridors, streams, rivers, and other such linear landscape elements are generally assumed to function as wildlife movement "corridors" between habitat patches, however, as the movements of wildlife species are more intensively studied using radio-tracking devices, there is mounting evidence that many wildlife species do not necessarily restrict their movements to some obvious landscape element, such as a riparian corridor. For example, recent radio-tracking and tagging studies of Coast Range newts (Trenham, 2002), California red-legged frogs (Bulger et al., 2002), southwestern pond turtles (Hunt et al, 1993), and two-striped garter snakes (Rathbun et al., 1992) found that long-distance dispersal in these species involved radial or perpendicular movements away from a water source with little regard to the orientation of the actual riparian corridor. Similarly, carnivores do not necessarily use riparian corridors as movement corridors (Newmark, 1995; Beier, 1993, 1995; Noss, et al., 1996).

However, in the proposed project region many of the east-west linkages are limited and the north-south linkages between the coastal hills and the Santa Ynez mountains area and other open space areas are increasingly tenuous because of urban and agricultural development adjacent to the floodplain. One of the only unconstrained habitat linkages is the Ventura River floodplain which provides the critical feature of wildlife corridors in the region. Therefore, the Ventura River and floodplain provide both passage and dispersal corridors for a variety of both common and sensitive species.

—*California River Parkways Trailhead Project, Initial Study* (Aspen Environmental 2010)

Figure 3.6.1.4.1 Regional Wildlife Corridors Map

Mountain Lion Killed on Highway 33 near Foster Park, Dec. 2014.
Animals killed by cars are regularly seen on Highway 33 near Foster Park.
Photo courtesy of Kim Stroud

Collected data on roadkill reveal locations in the watershed where highly travelled roads intersect with well-travelled wildlife movement corridors. One such location is on Highway 33, just south of Foster Park. Roadkill in this area is unfortunately fairly common. Roadkill is also common on Highway 150 east of Lake Casitas (Anderson 2014).

Impediments to wildlife movement include not only roads and development, but also instream barriers that prevent the migration of fish and other aquatic organisms. See "3.6.2 Steelhead" for a discussion on barriers to fish passage in the watershed.

3.6.1.5 Species

Species richness is a hallmark of the Ventura River watershed. The watershed is located within the California Floristic Province (CFP), an area designated by Conservation International as one of the world's top 35 biodiversity hotspots—areas where species diversity, numbers of endemic species, and threats to diversity are all particularly high (CEPF 2014). Los Padres National Forest, which comprises half the land area in the watershed, is one of the more diverse national forests in California, supporting over 468 species of fish and wildlife (URS 2010).

One indicator of the health and productivity of the watershed's ecosystems is the number of large carnivores and other large mammals that it supports. It generally takes large areas of connected natural habitat to support the foraging and breeding needs of top predators and large mammals. These large animals, or their sign, are observed regularly in the watershed. Black bears, for example, are fairly regular visitors in local orchards, especially during drier years, and it is not unusual to see bear tracks on some local trails. Coyotes are commonly observed around some Ojai neighborhoods. Mountain lions, bobcats, and foxes are also occasionally seen in the area.

Mountain Lion Visits Sulphur Mountain Road Home, 2014
Photo courtesy of Fred Rothenberg

Black Bear Visits Ojai Orchard, 2013

Photo courtesy of Emily Ayala

Grey Fox on Fox Canyon Trail, Ojai, 2013

Photo courtesy of Bardley Smith

Coyote in Mira Monte, 2013

Photo courtesy of Tania Parker

Special Status Species

The Ventura River watershed is home to numerous special status plant and animal species. Over 130 species are protected at either the federal, state, or local level, including 16 species listed as endangered, threatened, or fully protected at the state or federal level.

Table 3.6.1.5.1 lists the special status plants and animals known to occur in the watershed, along with their federal, state, or local protection status. The federally endangered southern California steelhead is of particular significance, and is discussed at length in "3.6.2 Steelhead."

Locally Important Species

The Ventura County General Plan defines a *Locally Important Species* as a plant or animal species that is not an endangered, threatened, or rare species, but is considered by qualified biologists to be a quality example or unique species within the County and region. The following criteria further define what local qualified biologists have determined to be Locally Important Species (VCPD 2011b):

Locally Important Plants

Taxa that are declining throughout the extent of their range AND have five or fewer element occurrences in Ventura County.

Locally Important Animals

- Taxa for which habitat in Ventura County is crucial for their existence either globally or in Ventura County. This includes:
- Taxa for which the population(s) in Ventura County represents 10 percent or more of the known extant global distribution; or
- Taxa for which there are five or fewer element occurrences, or less than 1,000 individuals, or less than 2,000 acres of habitat that sustains populations in Ventura County; or,
- Native taxa that are generally declining throughout their range or are in danger of extirpation in Ventura County.

Table 3.6.1.5.1 Special Status Species

Scientific Name	Common Name	Status[2]	FE, FT, SE, ST, SFP[2]
Plants			
Alisma plantago-aquaticum	common water-plantain	LIS	
Allium praecox	early onion	LIS	
Allophyllum divaricatum (Nuttall) A.D. Grant & V. Grant	divaricate allophyllum	LIS	
Amaranthus californicus	California amaranth	LIS	
Ammannia coccinea	purple ammannia	LIS	
Aphanisma blitoides	aphanisma	S1.1, CNPS-1B.2, LIS	
Astragalus didymocarpus var. milesianus	Miles' milk-vetch	S2.2, CNPS-1B.2	
Astragalus pycnostachyus var. lanosissimus	Ventura marsh milk-vetch[1]	FE, SE/S1.1, CNPS-1B.1	x
Atriplex serenana var. davidsonii	Davidson's saltscale	S2?, CNPS-1B.2	
Baccharis plummerae var . plummerae	Plummer baccharis	CNPS-4.3	
Baccharis salicina	emory baccharis	LIS	
Calandrinia breweri	Brewer calandrinia	CNPS-4.2	
Calochortus catalinae	Catalina mariposa lily	CNPS-4.2	
Calochortus clavatus ssp. clavatus	club-haired mariposa lily	CNPS-4.3	
Calochortus fimbriatus	late-flowered mariposa-lily	S2.2, CNPS-1B.2	
Calochortus palmeri var. palmeri	Palmer's mariposa-lily	S2.1, CNPS-1B.2	
Calochortus plummerae	Plummer's mariposa-lily	S3.2, CNPS-1B.2	
Carex triquetra	triangluar-fruited sedge	LIS	
Castilleja attenuata	valley tassels	LIS	
Chorizanthe clevelandii	Cleveland spineflower	LIS	
Chorizanthe membranacea Benth.	pink spineflower	LIS	
Clinopodium douglasii	yerba buena	LIS	
Cornus sericea ssp . sericea	creek dogwood	LIS	
Crassula aquatica	water pigmy-weed	LIS	
Cryptantha torreyana	Torrey forget-me-not	LIS	
Delphinium parryi ssp . purpureum (F. Lewis & Epling) M.J. Warnock	Mount Piños larkspur	CNPS-4.3	
Delphinium umbraculorum	umbrella larkspur	S2S3.3, CNPS-1B.3	
Dudleya caespitosa	sea lettuce	LIS	
Elatine californica A. Gray	California waterwort[1]	LIS	
Eleocharis rostellata	beaked spikerush	LIS	
Eriodictyon traskiae Eastw. Trask	yerba santa[1]	LIS	
Fritillaria ojaiensis	Ojai fritillary	S1.2, CNPS-1B.2	
Heuchera caespitosa	urn-flowered alumroot	CNPS-4.3, LIS	

Table 3.6.1.5.1 Special Status Species *(continued)*

Scientific Name	Common Name	Status[2]	FE, FT, SE, ST, SFP[2]
Hordeum brachyantherum Nevski *ssp . brachyantherum*	meadow barley	LIS	
Horkelia cuneata var. puberula	mesa horkelia	S2.1, CNPS-1B.1	
Imperata brevifolia	California satintail	S2.1, CNPS-2.1	
Isoëtes howellii var. howellii	Howell quillwort	LIS	
Juglans californica var. californica	southern California black walnut	CNPS-4.2	
Juncus acutus ssp . leopoldii (Parl.) Snogerup	spiny rush	CNPS-4.2	
Juncus patens	spreading rush	LIS	
Lepidium virginicum var. robinsonii	Robinson's pepper-grass	CNPS-1B.2	
Lilium humboldtii ssp . ocellatum	ocellated Humboldt lily	CNPS-4.2	
Madia sativa Molina	coast tarplant	LIS	
Malacothrix glabrata A. Gray	desert dandelion	LIS	
Malacothrix saxatilis var . saxatilis	cliff-aster	CNPS-4.2	
Marsilea vestita Hooker & Greville *ssp. vestita*	hairy pepperwort[1]	LIS	
Meconella denticulata	tiny poppy	LIS	
Monardella hypoleuca spp. hypoleuca	thickleaf monardella	LIS	
Navarretia ojaiensis	Ojai navarretia	CNPS-1B.1	
Nolina cismontana	chaparral nolina	CNPS-1B.2	
Papaver californicum	wind poppy	LIS	
Pedicularis densiflora	indian warrior	LIS	
Phacelia cicutaria var. Hubbyi	caterpillar phacelia	CNPS-4.2	
Pilularia americana A. Braun	American pillwort[1]	LIS	
Piperia michaelii (E. Greene) Rydb.	Michael piperia	CNPS-4.2	
Plagiobothrys undulatus	undulate popcornflower	LIS	
Plectritis ciliosa ssp. insignis	petite long-spurred plectritus	LIS	
Plectritis macrocera	white plectritis	LIS	
Polygala cornuta	fish milkwort	CNPS-4.3	
Polystichum imbricans ssp. imbricans	sword fern	LIS	
Pseudognaphalium leucocephalum	white everlasting	CNPS-2.2	
Quercus dumosa	Nuttall scrub oak	CNPS-1B.1	
Ribes aureum var. gracillimum	slender golden currant	LIS	
Romneya coulteri Harvey	Coulter Matilija poppy	CNPS-4.2	
Sagittaria sanfordii	Sanford's arrowhead[1]	CNPS-1B.2	
Schoenoplectus saximontanus	RockyMountain bulrush	LIS	
Sidalcea neomexicana	Salt Spring checkerbloom	CNPS-2.2	
Streptanthus campestris	southern jewel-flower	LIS	

Table 3.6.1.5.1 Special Status Species *(continued)*

Scientific Name	Common Name	Status[2]	FE, FT, SE, ST, SFP[2]
Suaeda taxifolia	woolly seablite	CNPS-4.2	
Thermopsis californica var. argentata	silvery false-lupine	CNPS-4.3	
Thermopsis macrophylla var. macrophylla	Santa Ynez false-lupine	SR, SR, CNPS-1B.3	
Verbena bracteata	prostrate verbena	LIS	
Invertebrates			
Coelus globosus	globose dune beetle	S1	
Danaus plexippus	monarch butterfly	S3	
Haplotrema caelatum	slotted lancetooth snail	LIS	
Helminthoglypta phlyctaena	Zaca shoulderband snail	LIS	
Helminthoglypta willeti	Matilija shoulderband snail	LIS	
Fish			
Cottus asper	prickly sculpin	LIS	
Eucyclogobius newberryi	tidewater goby	FE, SSC	x
Gasterosteus aculeatus microcephalus	threespine stickleback	FSS, LIS	
Gila orcutti	arroyo chub	SSC	
Lampetra tridentata	pacific lamprey	LIS	
Oncorhynchus mykiss irideus	southern California steelhead	FE, SSC	x
Amphibians			
Anaxyrus californicus	arroyo toad	FE, SSC	x
Aneides lugubris	arboreal salamander	LIS	
Rana boylii	foothill yellow-legged frog	SSC	
Rana draytonii	California red-legged frog	FT, SSC	x
Scaphiopus hammodii	Western spadefoot toad	SSC	
Taricha torosa	Coast Range newt	SSC	
Reptiles			
Anniella pulchra pulchra	silvery legless lizard	SSC	
Arizona elegans occidentalis	California glossy snake	LIS	
Cnemidophorus tigris multiscutatus	coastal western whiptail	S2S3	
Emys marmorata (also Actinemys marmorata pallida)	western pond turtle (also Southwestern pond turtle)	SSC	
Phrynosoma blainvillii	coast horned lizard	SSC	
Thamnophis hammondii	two-striped garter snake	SSC	
Birds			
Accipiter cooperii	Cooper's hawk	G5 S3, SWL	
Agelaius tricolor	tricolored blackbird	SSC	

Table 3.6.1.5.1 Special Status Species *(continued)*

Scientific Name	Common Name	Status[2]	FE, FT, SE, ST, SFP[2]
Aimophila ruficeps canescens	southern California rufous-crowned sparrow	G5T2T4 S2 S3, SWL	
Aquila chrysaetos	golden eagle	SFP	x
Ardea alba	great egret	SSA	
Ardea herodias	great blue heron	SSA	
Athene cunicularia	burrowing owl	SSC	
Botaurus lentiginosus	American bittern	G4 S3	
Carduelis lawrencei	Lawrence's goldfinch	FBCC	
Chaetura vauxi	Vaux's swift	SSC	
Charadrius alexandrinus nivosus	western snowy plover	ST, SSC	x
Circus cyaneus	northern harrier	SSC	
Contopus copperi	olive-sided flycatcher	SSC, FBCC	
Cypseloides niger	black swift	SSC	
Dendrocia petechial brewsteri	Yellow warbler	SSC	
Elanus leucurus	white-tailed kite	SFP	x
Empidonax traillii extimus	southwestern willow flycatcher	FE, SE	x
Eremophila alpestris actia	California horned lark	G5T3Q S3, SWL	
Falco columbarius	merlin	G5 S3, SWL	
Falco peregrinus anatum	American peregrine falcon	SE, SFP	x
Gymnogyps californianus	California condor	FE, SE	x
Icteria virens	Yellow-breasted chat	SSC	
Lanius ludovicianus	loggerhead shrike	SSC	
Pandion haliaetus	osprey	G5 S3, SWL	
Passerculus sandwichensis beldingi	Belding's Savannah Sparrow	SE	x
Pelecanus occidentalis californicus	California brown pelican	FE, SE	x
Phalacrorax auritis	double-crested cormorant	SSC	
Picoides nuttallii	Nuttall's woodpecker	FBCC	
Plegadis chihi	white-faced ibis	SSC	
Selasphorus rufus	rufous hummingbird	FBCC	
Selasphorus sasin	Allen's hummingbird	FBCC	
Sterna antillarum browni	California least tern	FE, SE, SFP	x
Vireo bellii pusillus	least Bell's vireo	FE, SE	x
Xobrychus exilis	least bittern	SSC	
Xanthocephalus xanthocephalus	yellow-headed blackbird	SSC	
Mammals			
Antrozous pallidus	pallid bat	SSC	
Bassariscus astutus	ringtail	SFP	x

Table 3.6.1.5.1 Special Status Species *(continued)*

Scientific Name	Common Name	Status[2]	FE, FT, SE, ST, SFP[2]
Choeronycteris mexicana	Mexican long-tongued bat	SSC	
Eumops perotis californicus	western mastiff bat	SSC	
Lasiurus cinereus	hoary Bat	SSC	
Lepus californicus bennettii	San Diego Black-tailed jackrabbit	SSC	
Neotoma lepida intermedia	San Diego desert woodrat	SSC	
Taxidea taxus	American badger	SSC	

1. indicates species known to be or possibly extirpated (locally extinct)
2. **Federal Rankings:**
   FE = Federally listed as Endangered
   FT = Federal listed as Threatened
   FBCC= Federal Birds of Conservation Concern

   State Rankings:
   SE = State-listed as Endangered
   ST = State-listed as Threatened
   SFP = State Fully Protected Species
   SR = State Rare
   SSA = State Special Animal
   SSC = State Species of Special Concern
   SWL = State Watch List Species
   G1 or S1 = Natureserve Global or State Status Critically Imperiled Species
   G2 or S2 = Natureserve Global or State Status Imperiled Species
   G3 or S3 = Natureserve Global or State Status Vulnerable Species
   G4 or S4 = Natureserve Global or State Status Apparently Secure Species
   G5 or S5 = Natureserve Global or State Status Secure Species

   Local Ranking:
   LIS = Locally Important Species

   CNPS Rankings:
   CNPS-1B = Plants Rare, Threatened, or Endangered in California and Elsewhere
   .1 = Seriously endangered in California (over 80% of occurrences threatened)
   .2 = Fairly endangered in California (20–80% occurrences threatened)
   .3 = Not very endangered in California (<20% of occurrences threatened or no current threats known)
   CNPS-2= Rare or endangered in California, more common elsewhere

Data source: List compiled by local biologists based upon experience, knowledge, and data sources including Cal Flora, eBird, U.C. California Fish Website, California Natural Diversity Database, CNPS Inventory of Rare and Endangered Plants.

California Red-Legged Frog.
Federally Threatened, State Species of Special Concern
Photo courtesy of Chris Brown

Invasive Species

The watershed is also home to or at risk from a number of non-native species that are problematic because of their invasiveness. The term "invasive" is used for those non-native species that invade natural landscapes and establish self-sustaining populations that significantly degrade the value of native ecosystems.

Removal of Invasive Mexican Fan Palms, Stewart Creek

Photo courtesy of Brian Stark

Invasive Cape Ivy

Invasive plants share certain characteristics that contribute to their destructive spread across riparian habitats:

- They reproduce quickly—by producing large quantities of seed, resprouting from roots, or spreading by stem fragments.
- They often lack local competitors and predators, and may be unsusceptible to local diseases. Without these limitations, invasive plants can spread unchecked across a landscape, often resulting in an area dominated by a single weedy species. Some invasive plants produce chemicals that inhibit the growth of other plants. Certain species are also poisonous to humans and animals.
- They establish quickly, dominating disturbed sites before native plants have a chance to re-establish.
- They reduce biodiversity by overtaking the native plants that provide superior shelter, nest sites, and food for native animals. This disrupts and degrades the ecosystem and decreases the species richness of an area.
- They often consume considerably more water than native plants, which reduces water availability for native plants, wildlife, and people.
- They are hard to eradicate, requiring regular monitoring and treatment.

Invasive animal species also pose problems from a watershed management perspective. Potential invasion of exotic quagga and zebra mussels in Lake Casitas, for example, is a major concern because these invasive mussels would threaten the ecosystem and increase the management costs of Lake Casitas dramatically. See "3.5.4 Drinking Water Quality" for more information about this issue.

Table 3.6.1.5.2 lists some of the common invasive non-native plants and animals found in riparian and aquatic habitats in the watershed.

Table 3.6.1.5.2 Riparian and Aquatic Non-Native Invasive Species

Common Name	Scientific Name
Plants	
Trees:	
Mexican fan palm	*Washingtonia robusta*
Peruvian pepper tree	*Schinus molle*
tamarisk	*Tamarix ramosissima*
Tasmanian blue gum	*Eucalyptus globulus var. globulus*
tree of heaven	*Ailanthus altissima*
Shrubs:	
castor bean	*Ricinus communis*
giant reed	*Arundo donax*
myoporum	*Myoporum laetum*
pampas grass	*Cortaderia jubata*
poison hemlock	*Conium maculatum*
Spanish broom	*Spartium junceum*
sweet fennel	*Foeniculum vulgare*
tree tobacco	*Nicotiana glauca*
Groundcovers and Low Shrubs:	
Bermuda grass	*Cynodon dactylon*
black mustard	*Brassica nigra*
Cape ivy	*Delairea odorata and Senecio mikaniodides*
common iceplant	*Mesembryanthemum crystallimum*
field mustard	*Brassica rapa*
fountain grass	*Pennisetum setaceum*
German ivy	*Senecio mikanoides*
greater periwinkle	*Vinca major*
Himalayan blackberry	*Rubus discolor*
Hottentot fig	*Carpobrotus edulis*
Italian Thistle	*Carduus pycnocephalus*
Kikuyu grass	*Pennisetum clandestinum*
perennial pepperweed	*Lepidium latifolium*
summer mustard	*Hirschfeldia incana [Erucastrum incanum]*
tocalote	*Centaurea melitensis*
wild radish	*Raphanus raphanistrum*
Aquatic Plants:	
water primrose	*Ludwigia spp.*

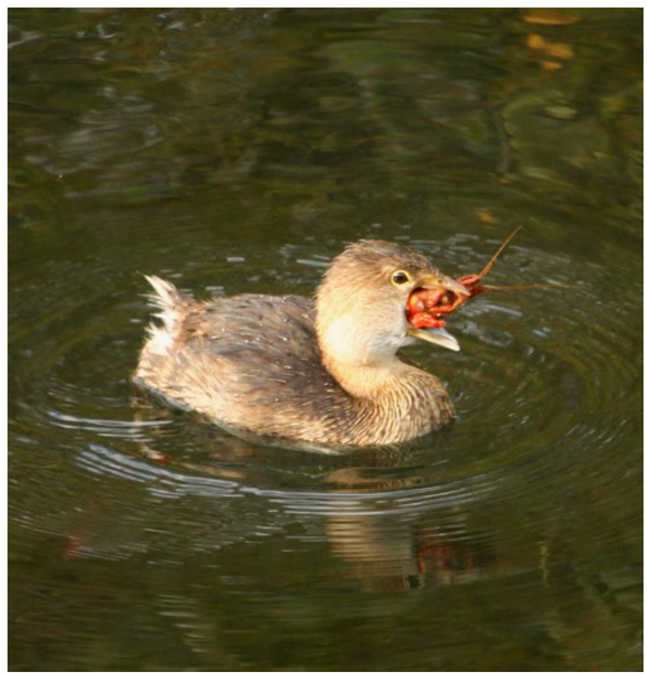
Table 3.6.1.5.2 Riparian and Aquatic Non-Native Invasive Species *(continued)*

Common Name	Scientific Name
Animals	
African clawed frog	*Xenopus laevis*
black bullhead	*Ameiurus melas*
brown-headed cowbird	*Molothrus ater*
bullfrog	*Rana catesbeiana*
carp	*Cyprinus carpio*
channel catfish	*Ictalurus punctatus*
green sunfish	*Lepomis cyanellus*
red swamp crayfish	*Procambarus clarkii*
green sunfish	*Lepomis cyanellus*
largemouth bass	*Micropterus salmoides*

Sources: VCPD 2006, Stark 2013, Magney 2005, Wetland Research Assoc. 1994, CMWD 2008

Bullfrog on Lion Creek. Invasive non-native predator of other frogs and wildlife.

Photo courtesy of Santa Barbara Channelkeeper



Pied-billed Grebe Eating Crayfish

Photo courtesy of Allen Bertke

Arundo

Arundo donax, or giant reed, is by far the most problematic non-native invasive plant species problem in the watershed. It is a large bamboo-like grass that can reach heights of up to 30 feet and is among the fastest growing terrestrial plants in the world—it can grow up to four inches a day in its early growth stages (CIPC 2011). *Arundo* has become established in and is spreading throughout riparian ecosystems in California.

Arundo can grow into massive thickets of vegetation that cover many acres, forming monocultures that virtually eliminate all other plant species, along with the rich biodiversity, structural diversity, and wildlife habitat of riparian ecosystems. Avian and fish species are the most impacted by *Arundo* infestations, and amphibians are also highly impacted (CIPC 2011).

***Arundo donax* Below Foster Park, 2012**

Photo courtesy of Santa Barbara Channelkeeper

Freshly Cut *Arundo,* Above Matilija Reservoir

Photo courtesy of Mary Meyer

Arundo has a thick, persistent underground stem system that looks like giant pieces of ginger. Like Bermuda grass, it grows by sending out underground vegetative shoots, called rhizomes, which readily take root and send up new stalks. *Arundo* spreads when pieces of cane or rhizome fragments break off, travel downstream, and take root in moist soil. The durability of these rhizomes is what makes eradication of *Arundo* so difficult. *Arundo* seeds appear to be almost always sterile in California (VCPD 2006).

Arundo consumes exceptionally large quantities of water: during the warm months, one acre of *Arundo* can use up to 39,000 gallons per day, three times the quantity of water used by the native streamside plants that it outcompetes. In one year, each acre infested with *Arundo* can consume 4.8 million gallons of water, or 3.2 million gallons more than native streamside plants (Dudley & Cole 2013). Hundreds of acres of *Arundo* have already been removed in the watershed, and (as of 2014) it is estimated that there are over 180 acres still infested.

Arundo is highly flammable, even when green, creating a significant fire threat to the environment and landowners. Fires also increase the dominance of *Arundo* in riparian ecosystems because it recovers more quickly than most native plant species after a burn (VCPD 2006).

> *Arundo* stands have two main effects on wildfires: 1) when a wildfire burns riparian habitat containing *Arundo,* it burns hotter than the habitat would have without the presence of *Arundo* and 2) *Arundo*-infested riparian habitat can act as a fire conveyor across the landscape. This can increase the size of riparian fires and may spread fires to upland areas that would normally have been separated by less flammable native riparian vegetation.
>
> —*Arundo donax Distribution and Impact Report* (CIPC 2011)

Arundo infestations can alter geomorphic and fluvial processes, by redirecting water against streambanks, undercutting them, and accelerating erosion that causes property damage. Large stands of *Arundo* have been found to functionally increase bed elevations and significantly reduce the flow capacity of streams (CIPC 2011). During floods, *Arundo* can also create hazards when uprooted plants clog flood control infrastructure.

Removing and managing the spread of *Arundo* is a watershed management priority. See "2.3.6 Arundo-Free Watershed Campaign" for more information on efforts to control *Arundo*.

3.6.1.6 Key Data and Information Sources/ Further Reading

Below is a summary of some of key documents that address habitats and species in the watershed. See "4.3 References" for complete reference citations.

Arundo donax Distribution and Impact Report (CIPC 2011)

Botanical Resources at Emma Wood State Beach and the Ventura River Estuary, California (Ferren et al. 1990)

California River Parkways Trailhead Project, Initial Study (Aspen Environmental 2010)

City of Ojai Urban Watershed Assessment and Restoration Plan (Magney 2005)

Designing Road Crossings for Safe Wildlife Passage: Ventura County Guidelines (Cavallaro et al. 2005)

Draft Ventura River Habitat Conservation Plan (Entrix & URS 2004)

Functions and Values of Wetlands (USEPA 2001)

Guide to Native and Invasive Streamside Plants: Restoring Riparian Habitats in Ventura County & along the Santa Clara River in Los Angeles County (VCPD 2006)

Habitat Restoration Options for the Lower Ventura River (Pitterle 2010)

Historical Ecology of the lower Santa Clara River, Ventura River and Oxnard Plain: an analysis of terrestrial, riverine, and coastal habitats (Beller et al. 2011)

Lake Casitas Final Resource Management Plan Environmental Impact Statement, & Appendices (URS 2010)

Land Management Plan: Part 2 Los Padres National Forest Strategy (USFS 2005a)

Locally Important Animals (VCPD 2014)

Locally Important Plant List (VCPD 2014b)

Matilija Dam Ecosystem Restoration Project, Draft Environmental Impact Statement/Environmental Impact Report (USACE 2004)

Ojai Meadow Preserve Habitat Restoration and Flood Control Plan (Condor Environmental 2004)

Oak Woodlands Management Plan (VCPD 2007)

Acronyms

CFP—California Floristic Province

LIS—Locally Important Species

NWI—National Wetlands Inventory

SIA—Special Interest Area

USFWS—Fish and Wildlife Service

Preliminary Comparison of Transpirational Water Use by Arundo donax and Replacement Riparian Vegetation Types in California (Dudley & Cole 2013)

San Antonio Creek Watershed Vegetation Mapping Project (Wildscape Restoration 2008)

South Coast Missing Linkages: A Wildland Network for the South Coast Ecoregion (South Coast Wildlands 2008)

Surfers' Point Managed Shoreline Retreat Environmental Impact Report (City of Ventura and Rincon Consultants 2003)

The Ecology of Riparian Habitats of the Southern California Coastal Region: A Community Profile (Faber et al. 1989)

Upper San Antonio Creek Watershed Giant Reed Removal Water Quality Monitoring Plan (VCWPD 2010c)

Ventura County General Plan, Resources Appendix (VCPD 2011)

Ventura County Initial Study Assessment Guidelines (VCPD 2011b)

Ventura River Delta Marine Algae Collection (Capelli 2010)

Ventura River Estuary Enhancement and Management Final Plan (Wetlands Research Associates & Philip Williams and Associates 1994)

Ventura River Multiple Species Habitat Conservation Plan, Draft, Technical Appendices (Entrix 2007)

Vertebrate Resources at Emma Wood State Beach and the Ventura River Estuary, Ventura County, California: Inventory and Management (Hunt & Lehman 1992)

Wetlands of the Central and Southern California Coast and Coastal Watersheds: A Methodology for their Classification and Description (Ferren et al. 1995)

3.6.2 Steelhead

In the Ventura River watershed, 48 miles of river and tributaries are designated as critical habitat for southern California steelhead trout (*Oncorhynchus mykiss* or *O. mykiss*), a federally listed endangered species. The presence of the endangered steelhead is a very significant concern for some stakeholders with regard to watershed management. The streamflow, pools, and associated food chain required for its survival are indicators of healthy aquatic ecosystems. Given the watershed's often dry and always variable climate, the availability of water to support that healthy aquatic ecosystem is a constant challenge and a continuing source of stakeholder controversy.

This section discusses the characteristics of the steelhead, its history, habitat needs, existing habitat conditions, and efforts to manage and recover the local population. A number of other sections of the plan address issues of importance to steelhead survivalh, including "3.3.1 Surface Water Hydrology," "3.3.3 Groundwater Hydrology," "3.5.1 Surface Water Quality," and "3.4.3 Water Demands."

Steelhead and Rainbow Trout. Steelhead and rainbow trout are the same species, *Oncorhynchus mykiss* (*O. mykiss*), from the salmon family. All *O. mykiss* hatch in gravel-bottomed rivers and streams. *O. mykiss* that stay in freshwater all their lives are called "resident rainbow trout," and those that spend part of their lives in the sea are called "steelhead." Steelhead develop a slimmer profile, become more silvery in color, and typically grow much larger than resident rainbow trout (NMFS 2014).
Drawings by Joseph Tomelleri

> Southern California steelhead were listed as endangered under the federal Endangered Species Act in 1997. The Endangered Species Act (ESA) allows listing of full taxonomic species, but also named subspecies and distinct population segments (DPSs) of vertebrates. The southern California steelhead DPS or Evolutionary Significant Unit (ESU) is a subset of *O. mykiss* classified based on location and life form—in this case anadromy, or the strategy of living in the sea and migrating to fresh water to spawn.
>
> Because of presumed evolutionary, ecological, genetic, and physiological differences from steelhead stocks in other parts of the range, the National Marine Fisheries Service (NMFS) has designated steelhead in California from the Santa Maria River south to the Mexican border as a DPS. Individuals within this DPS are referred to as southern California steelhead.
>
> —*The History of Steelhead and Rainbow Trout (Oncorhynchus mykiss) in the Santa Ynez River Watershed, Santa Barbara County, California* (Alagona 2012)

The southern California steelhead DPS encompasses all naturally-spawned anadromous *O. mykiss* populations in watersheds from Santa Maria to Mexico. These steelhead are believed to have adapted to the southern weather patterns and inconsistent streamflow conditions of these coastal watersheds. Steelhead in southern California migrate in and out of rivers during years with sufficient river flow. Extended freshwater sequestration (or isolation) of *O. mykiss* populations in streams and rivers during dry and extended drought years is a natural phenomenon.

The Endangered Species Act requires designation of critical habitat when a species is listed as endangered or threatened. Critical habitat is a specific area that has the physical or biological features essential to conservation and recovery of the species. In 2005, NMFS designated critical habitat for steelhead in many areas, including the Ventura River watershed (NMFS 2005). Forty-eight miles of river and tributaries in the watershed are included in the designation (see Figure 3.6.1.3 Critical Habitat Map, in "3.6.1 Habitats and Species").

Indicators of Watershed Health

Steelhead are often cited as an "indicator species," and this perspective is held by many watershed stakeholders. Because they are particularly sensitive to environmental degradation, steelhead are indicators of the watershed's overall ecological health. The conditions that support steelhead, such as sufficient clean streamflow, riparian vegetation, and a lack of fine sediment, also support life in other levels of the food chain and potentially other endangered species.

3.6.2.1 Life History Highlights

Steelhead have varied life histories that depend upon both freshwater and saltwater habitats. Highlights of their life history are provided below. This information was compiled from three sources: *Southern California Steelhead Recovery Plan Summary* (NMFS 2012a), *Draft Ventura River Habitat Conservation Plan* (Entrix & URS 2004), and *San Luis Obispo Creek Watershed Enhancement Plan* (Stark 2002).

Juveniles born and reared in freshwater undergo a physiological change (smoltification) that allows them to migrate to saltwater.

After maturing in the marine environment for typically one to four years, steelhead leave the marine environment to reproduce in the relatively sheltered and predator-free freshwater environment. Returning adults may migrate from several to hundreds of miles upstream to reach spawning grounds in their natal rivers or streams (streams where they were spawned). They can also spawn in non-natal streams and thus re-colonize watersheds whose populations have been extirpated (or gone extinct locally).

Steelhead typically migrate upstream when streamflows are receding after a storm and after the sandbar, present across the mouth of most southern California streams during the dry season, is breached.

Depending on rainfall, upstream migration and spawning typically occur from January to March in most southern California streams.

Once in spawning habitat, a female will excavate a nest, termed a "redd", in streambed gravels where she deposits her eggs, which a male then fertilizes. Steelhead produce more eggs per individual than typical resident rainbow trout.

O. mykiss **Eggs, North Fork Matilija Creek, 2012**
Photo courtesy of Paul Jenkin

The period between fertilization by the male and hatching varies, lasting from about three weeks to two months. Young fish emerge from the gravel two to six weeks after hatching.

During incubation, sufficient water must circulate through the interstitial space between gravels in the redd to supply embryos with oxygen and remove waste products.

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Juvenile Rainbow Trout, Matilija Creek, 2010
Photo courtesy of Tenkara USA

Steelhead do not necessarily die after spawning and may return to the ocean, sometimes repeating their spawning migration one or more times.

In the mainstem Ventura River, steelhead can have very high growth rates, growing to smolt size during their first year, especially when higher-than-normal flow conditions are present.

Within this basic life-history pattern, there can be great variation in the timing or age at which migration to and from the ocean occurs for individual *O. mykiss*. Some may never go to the sea; some may only go as far as the estuary where conditions are similar to the sea in that productivity and growth rates are higher. This plasticity allows *O. mykiss* to take advantage of different habitats and to persist in the highly variable and challenging southern California environment.

3.6.2.2 Current Populations and Conditions

Steelhead habitat requirements vary and are dictated by their life stage and seasonal behavior patterns—migration, spawning, and rearing. These habitat needs and conditions in the watershed are discussed in the following sections. Since steelhead spend a portion of their lives in the ocean, oceanic factors, such as ocean water conditions, food availability/productivity (which is higher when cold water upwelling occurs), fishery harvest rates, and predation, also play a significant role in steelhead survival.

Steelhead habitat requirements vary and are dictated by their life stage and seasonal behavior patterns—migration, spawning, and rearing.

Regular fish surveys, conducted fairly consistently since 2003, are helping to create a more detailed picture of current populations of *O. mykiss* and associated habitat conditions in much of the watershed. The data show that there is considerable variation in populations from year to year depending in part on rainfall and streamflow. The survey excerpts below describe some of these findings.

> The Lower North Fork of the Matilija [Creek] appeared to contain some of the best habitat for steelhead spawning and rearing within the upper basin. The majority of the channel was type B and was enclosed by riparian forest or, in Wheeler Gorge, by canyon walls. Spawning gravels were very abundant and in good condition, although there was some mineral cementation in areas. Rainbow trout were frequently observed, and several redds and spawning adults were also seen during the March survey. Potential access for steelhead was good throughout most of this reach, despite some steep cascades and falls in the lower end that were expected to be passable at higher flows.
>
> —*Assessment of Steelhead Habitat in Upper Matilija Creek Basin. Stage One: Qualitative Stream Survey* (Thomas R. Payne 2003)

Based on recent surveys, good quality rearing and/or spawning habitat currently occurs in Matilija Creek headwaters, North Fork Matilija and Murietta creeks, a portion of Matilija Creek downstream of Matilija Dam, Coyote and Santa Ana creeks above Casitas Dam, and portions of San Antonio Creek. Much of the mainstem Ventura River steelhead rearing habitat was of generally poor quality except in the Casitas Springs/Foster Park Reach. However, different reaches of the river offer diverse habitat conditions, and even within a given reach, habitat conditions can vary among years depending on flow conditions. The Ventura River Lagoon may also provide rearing habitat.

—*Ventura River Habitat Conservation Plan - Draft* (Entrix & URS 2004)

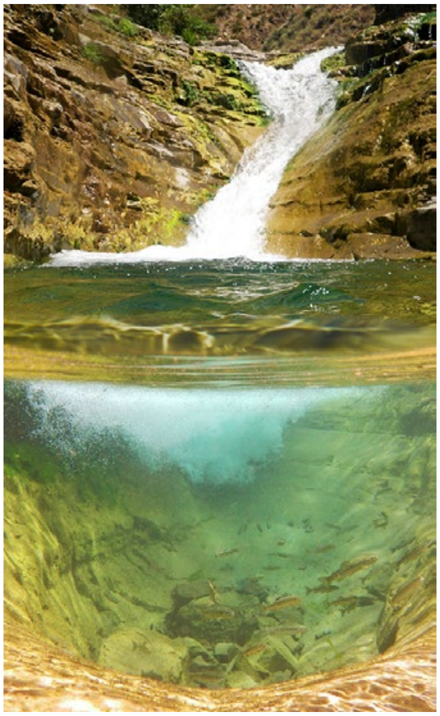
Estimating Historical Steelhead Populations

The extent to which native steelhead were found in the watershed historically is an important question for some stakeholders, in part because it is assumed that expectations for the species' recovery are based upon natural, historical population numbers. A related question is the role that the extensive stocking of steelhead in the past has played in the genetic makeup of the fish: Are the fish that are protected today actually the native fish historically adapted to this region? All of these issues—historical populations, expectations for recovery, and the role and impact of historic stocking—are complicated and controversial topics.

The first "hard" data on historical steelhead populations in the watershed that involved an actual count of observed adult steelhead occurred in 1947 (Evans 1947). Prior sources of information consist largely of newspaper references, estimates, and extrapolations. These often incomplete and anecdotal accounts are the sources that have been pieced together to describe the history of a species whose population is known to have large fluctuations over time and space in response to the highly variable climatic conditions.

The difficulty of estimating steelhead populations given the lack of objective data was summarized in the technical document that characterized the population of the southern California steelhead for the Southern California Steelhead Recovery Plan:

> The authors of this report are members of a Technical Recovery Team (TRT), convened to advise NMFS on technical aspects of recovery in the study area. This report has two goals: to describe the normal (reference) condition of each ESU; and to identify existing and potential populations of steelhead that could form the basis for recovery.
>
> It should be noted at the outset, however, that these two goals are burdened with numerous uncertainties and judgment calls on the part of the authors. The uncertainty stems from several interacting factors:
>
> 1) The extremely large and heterogeneous planning area, comprising the south-west range limit for the species. Environmental heterogeneity appears to constrain the distribution of the species at a number of spatial scales, making the task of describing this distribution somewhat complex.
>
> 2) Most of the information about the species in the study area comes from anecdotal reports (descriptive in nature) or from studies conducted at restricted spatial scales (individual reaches, or at best, large sections of individual watersheds).
>
> 3) The task of delineating populations and characterizing recovery potential is largely reliant on quantitative data samples from across the planning domain. Since such information is unavailable, we are confined to the less satisfactory exercise of A) applying simplistic yet uniform methods over large spatial extents, and B) describing existing small-extent studies, and making uncertain inferences of their implications for the larger ESU. For the most part, these two approaches lack the level of quantitative description that is necessary for making concrete recommendations.
>
> —*Steelhead of the South-Central/Southern California Coast: Population Characterization for Recovery Planning* (Boughton et al. 2006)



***O. mykiss* on Matilija Creek**
Photo compilation courtesy of Mark Allen/Normandeau

The Ven 3 [Casitas Springs "live reach"] data illustrates the high variability of *O. mykiss* distribution and abundance in this southern California basin; it reveals the potential significance of this mainstem reach in rearing juvenile steelhead (consistent with some historical data, such as Moore 1980); and it also shows the important role of San Antonio Creek for providing spawning and rearing habitat for steelhead.

—*Steelhead Population Assessment in the Ventura River/Matilija Creek Basin, 2008 Summary Report* (Thomas R. Payne 2009)

In most previous years and in 2011, overall abundance was highest in the upper basin segment above Matilija Dam, intermediate in the middle basin segment between Robles Diversion Dam and Matilija Dam, and lowest in the lower basin segment. The upper basin was estimated to contain 77% of *O. mykiss* fry [under one year of age], with only 1% in the lower basin. However, several important tributaries were not included in the basin-wide estimates, namely Murietta Creek in the upper basin and San Antonio Creek in the lower basin.

—*Steelhead Population Assessment in the Ventura River/Matilija Creek Basin, 2010 Data Summary* (Normandeau 2011)

Limiting Factors

The following summary of limiting factors for steelhead was compiled from the 1997 *Ventura River Steelhead Restoration and Recovery Plan* (Entrix & Woodward Clyde 1997) and the 2005 *City of Ojai Urban Watershed Assessment and Restoration Plan* (Magney 2005). Additional descriptions of southern California steelhead habitat requirements were taken from the *San Luis Obispo Creek Watershed Enhancement Plan* (Stark 2002). The 2004 *Draft Ventura River Habitat Conservation Plan* (Entrix & URS 2004) contains a more specific description of limiting factors for each creek in the watershed and the Ventura River.

Streamflow Variability

Steelhead in the Ventura River watershed are dependent upon a pattern of water flows in the mainstem of the river and significant tributaries, sufficient in time and place to provide for migration, spawning, rearing, and holding habitats. Peak storm flows typically break the estuary sand bar and entice adult steelhead into the river network. Once in the river network, insufficient streamflow is a critical limiting factor to the spawning and rearing activities of steelhead. Steelhead prefer to spawn in perennial streams since one to three years is generally required for offspring to mature and reach the ocean. Intermittent reaches in the watershed often lack riparian vegetation,

A Drying Ventura River

Photo courtesy of Ojai Valley Land Conservancy

have very high temperatures (when wetted), and are generally not very productive spawning habitat.

Deficient streamflow is often a limiting factor for steelhead survival in upper San Antonio Creek and parts of its tributaries (Thacher, Reeves, and Senior Canyon Creeks), parts of Matilija Creek upstream of Matilija Dam, Coyote Creek downstream of Casitas Reservoir, Cañada Larga and Cañada del Diablo Creeks, and the upper mainstem Ventura River downstream of Robles Diversion Dam. Figure 3.6.2.2.1 illustrates the extreme variability in streamflow in the watershed.

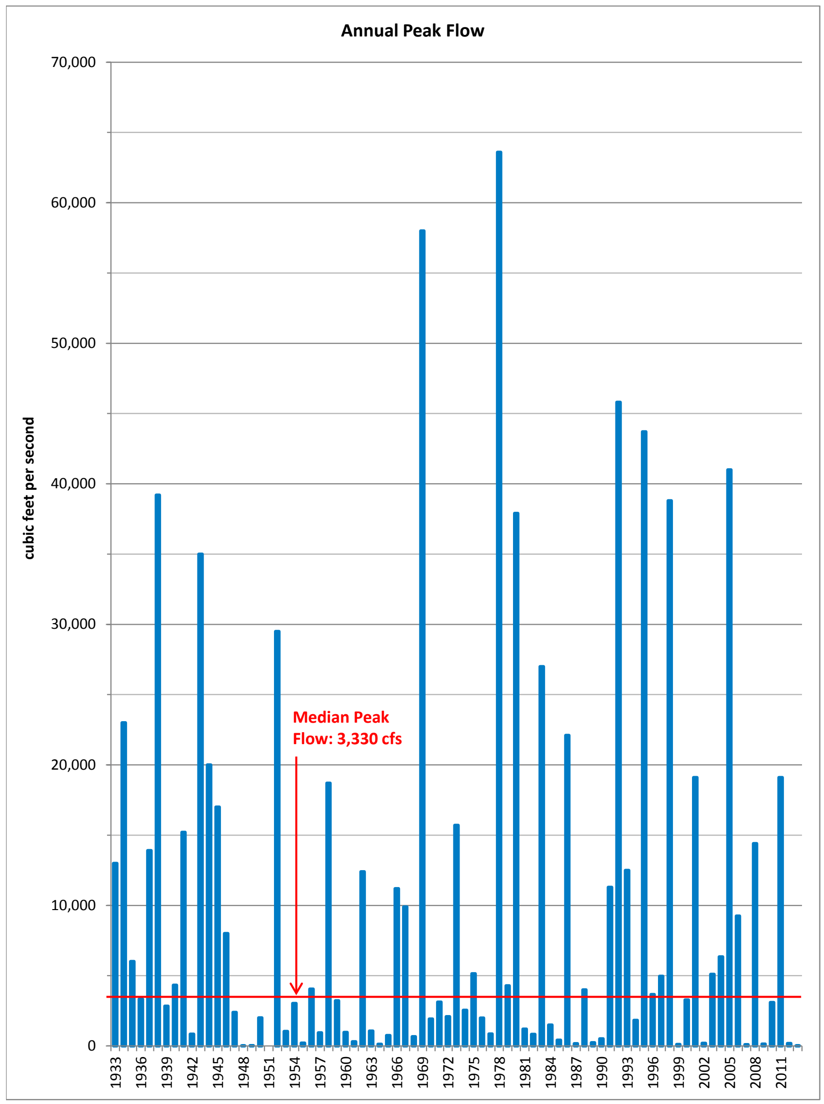


Figure 3.6.2.2.1 Annual Peak Flow at Foster Park, 1933–2013 (Water Years). Charting the highest peak flow in each water year (some years had many peaks) illustrates the variability of annual peak flows. The median annual peak flow year in the dataset (or the midpoint of the dataset) is 1936, with an annual peak flow of only 3,300 cubic feet per second (cfs). 1936 received 20.35 inches of rain in downtown Ojai (the median rainfall in Ojai is 19.20 inches). The largest annual peak flows are many orders of magnitude greater than the median.

Data Source: Ventura County Watershed Protection District's website (VCWPD 2013)

> Low flow barriers have a greater effect during the dry years, not only for limiting upstream spawning steelhead, but also for limiting movements of steelhead juveniles and wild resident trout into late summer refugia habitats.
>
> —*Draft Environmental Impact Statement/Environmental Impact Report for the Matilija Dam Ecosystem Restoration Project* (USACE 2004)

Poor Water Quality/Elevated Water Temperature

Steelhead require cool, clear, well-oxygenated fresh water flows for optimum growth and survival. Water temperature is a function of air temperature, stream depth, stream width, flow magnitude, overhead canopy density, and shading from surrounding terrain. Excessively warm water temperatures can retard steelhead growth, reduce rearing densities, increase susceptibility to disease, and impair the ability of young steelhead to compete with other species for food and avoid predation. Warmer water also retains less dissolved oxygen, which can stress steelhead trout and increase their vulnerability to disease.

In all of the reaches surveyed, water temperatures are likely to be higher than optimal during the summer months. Even during these May surveys, water temperatures in the afternoon ranged from 23 to 25°C.

Water quality problems that affect fish, such as high temperatures and low dissolved oxygen, are seen in many areas of the watershed when flows are low. Areas that tend to have perennial flow are the exception to this. Water quality is also adversely impacted by urban runoff.

> In all of the reaches surveyed, water temperatures are likely to be higher than optimal during the summer months. Even during these May surveys, water temperatures in the afternoon ranged from 23 to 25°C. These temperatures are stressful to steelhead, and it would be difficult for steelhead to maintain growth unless substantial amounts of food were available. Fortunately, the cobble gravel substrate and predominantly run habitat in the mainstem make excellent food producing areas. Moore (1980) found that steelhead in the Ventura River near Casitas Springs had growth rates similar to or higher than those observed in other populations. This indicates that there was sufficient food production during that study to offset the high water temperatures, even during the drought years of 1976 and 1977.
>
> —*Draft Ventura River Habitat Conservation Plan* (Entrix & URS 2004)

Fish Passage Barriers

Steelhead require unobstructed streams for migration to upper stream reaches where potential spawning and rearing habitat exists. Dams, road crossings, culverts, and other types of modifications to streams present barriers or impediments that can threaten steelhead survival by blocking their access to inland spawning habitat. In addition to presenting physical obstructions, channel modifications can concentrate flow such that velocities are too high for fish to negotiate.

Lower Wheeler Campground Crossing, Total Barrier, North Fork Matilija Creek

Photo courtesy of Mark Allen/Normandeau

Matilija Dam completely blocks access to most of Matilija Creek and its tributaries. Casitas Dam is a complete barrier, which blocks access to Coyote and Santa Ana Creeks. Other passage barriers and impediments, both natural and manmade, exist throughout the watershed, including on Matilija Creek and its tributaries, North Fork Matilija Creek, and upper San Antonio Creek and its tributaries.

Fraser Street Crossing, Partial Barrier, San Antonio Creek

Camp Comfort Bridge Apron, Partial Barrier, San Antonio Creek

Fish passage barriers can be total barriers, partial barriers, or temporary barriers (e.g., from construction), and some barriers are only problematic at low flows. Barriers can also change over time, as storms blow out pipes or other obstructions that had acted as barriers. An on-the-ground assessment of current barriers and their priority for removal is needed in the watershed. Based on existing information, the barriers listed in Table 3.6.2.2.1 were identified by a Ventura River Watershed Council technical advisory committee as priorities for removal or mitigation in the watershed.

Table 3.6.2.2.1 Priority Barriers to Fish Passage[1]

Subwatershed	Barrier Location	Barrier Type
Matilija Creek	Matilija Dam	Total
Matilija Creek	USGS Gauge Weir	Partial
North Fork Matilija Creek	Lower Wheeler Campground crossing	Total
North Fork Matilija Creek	Upper Wheeler Campground crossing	Partial
North Fork Matilija Creek	Bear Creek, Lower Wheeler Campground crossing	Partial
North Fork Matilija Creek	Bear Creek, Upper Wheeler Campground crossing	Partial
North Fork Matilija Creek	Ojai Quarry	Partial
San Antonio Creek	Camp Comfort bridge apron	Partial
San Antonio Creek	Fraser St. crossing	Partial
Coyote Creek	Casitas Dam[2]	Total

1. This is only a partial list intended to highlight known barriers that are a priority for removal. Many other partial barriers exist. A formal on-the-ground assessment of current barriers in the watershed is needed.

2. It is not expected that Casitas Dam will be removed, however NMFS would like this barrier mitigated to allow for fish passage.

Priority Barriers to Fish Passage

ID#	Stream & Location
1	Coyote Creek, Casitas Dam*
2	San Antonio Creek, Fraser Street
3	San Antonio Creek, Camp Comfort
4	Matilija Creek, USGS Gauge Weir
5	Matilija Creek, Matilija Dam
6	North Fork Matilija Creek, Ojai Quarry
7	North Fork Matilija Creek, Lower Wheeler Campground Crossing
8	Bear Creek, Upper Wheeler Campground Crossing
9	Bear Creek, Lower Wheeler Campground Crossing
10	North Fork Matilija Creek, Upper Wheeler Campground Crossing

* It is not expected that Casitas Dam will be removed, however regulators would like this barrier mitigated to allow for fish passage.

Ventura River Watershed

Points indicate partial fish passage barriers, based on the preliminary estimate of local experts. Many other partial barriers exist. A formal on-the-ground assessment of barriers is needed.

Points indicate full fish passage barriers.

Data Source:
California Fish Passage Assessment Database (PAD), Spring 2014
Map Created by GreenInfo Network using Esri software, Oct. 2014
www.greeninfo.org

Figure 3.6.2.2.2 Priority Barriers to Fish Passage Map

Matilija Dam

Matilija Dam is the watershed's most significant fish passage barrier because it blocks access to a large area of primary spawning and rearing habitat in the upper reaches of Matilija Creek and its tributaries (USACE 2004). The dam is located one-half mile above the Matilija Creek/North Fork Matilija Creek confluence, which is also the beginning of the Ventura River. Dam removal efforts started in the 1990s and continue today. Removing the dam is considered the highest priority issue for steelhead recovery in the watershed in the long term. The major effort to remove the dam, which also addresses sediment transport issues, is addressed in a separate section, "3.6.3 Matilija Dam."

Matilija Dam

Since its construction in 1947, Matilija Dam has blocked Ventura River adult steelhead access to roughly 13 miles of this watershed's most valuable steelhead spawning and rearing habitat (NMFS 2003). Dam removal would restore access to this vital habitat.

Robles Diversion

The Robles Diversion was built on the Ventura River in 1958 to divert water to the Lake Casitas reservoir. The diversion was initially constructed without provisions for passage of fish migrating upstream or downstream. Without fish passage, the Robles Diversion cut off approximately eight miles of prime steelhead spawning and rearing habitat, and reduced flows in the lower 14 miles of the Ventura River (NMFS 2003a).

The Robles Fish Passage Facility was completed in 2006 to reestablish access to upstream steelhead spawning and rearing habitat. The project was designed to provide an accessible route over the Robles Diversion and restore a portion of the flows necessary for fish to reach the Robles Fish Passage Facility. The Fish Passage Facility also allows passage of juvenile steelhead migrating downstream to pass to the ocean.

Additionally, requirements to allow a minimum amount of water to bypass the facility during steelhead spawning and migration season (January through June) may improve spawning and rearing habitat in the lower mainstem of the Ventura River (NMFS 2003a).

The cost to build the Fish Passage Facility was $8.1 million (Lewis 2014).

Robles Diversion and Fish Passage Facility

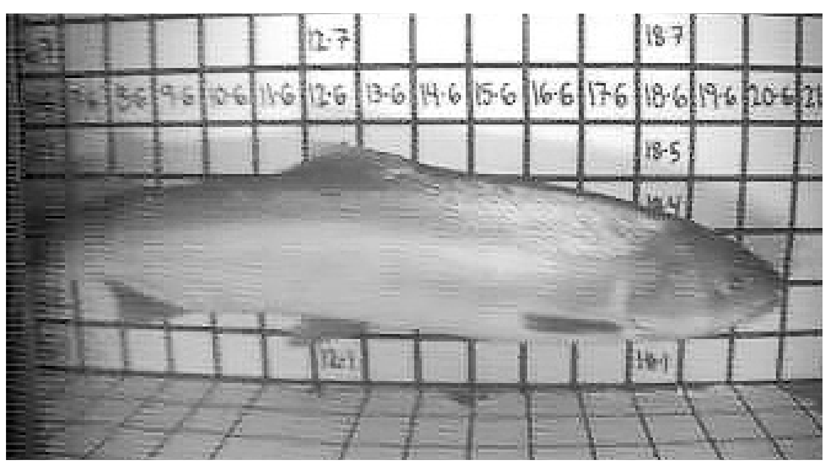
Robles Fish Passage Facility Ladder. The Robles fish ladder (vertical slot design) works well in systems with variable flows and high levels of debris. Principal components include: 1) boulders arranged to create a series of pools to improve passage over the road crossing/flow measurement gauge; 2) a vertical slot fish ladder to provide fish passage over a 15-foot elevation change; 3) an auxiliary water supply pipeline to provide additional fish ladder "attraction water" and to supplement downstream release flow; 4) a fish counting device to determine number of fish migrating through the fish ladder; 5) a fish screen to prevent upstream and downstream migrants from entering the diversion canal; 6) a guidance device and high flow fish channel exiting upstream of the facility to prevent upstream migrant fallback through the spillway gates (NMFS 2003a; Lewis 2014).

Photo courtesy of Casitas Municipal Water District

The Robles Fish Passage Facility operates when there is sufficient natural streamflow to allow migration of fish upriver from the ocean past the Robles Diversion Dam, and downstream to the Ventura River estuary. The number of days each year that the facility operates depends upon the timing and duration of winter storms (NMFS 2003a).

Adult Steelhead in Robles Fish Counter

Photo courtesy of Casitas Municipal Water District



Surveying for Steelhead on San Antonio Creek. Lack of deep pool habitat limits steelhead rearing potential in parts of the watershed.

Lack of Deep Pools

Steelhead rely on a diverse assemblage of instream habitats: pools, runs, riffles, and flatwater. The distribution of these habitats, their quality, ease of access, and degree of shelter determine the health of instream habitat. Deep pools are important because they provide cover for fish to avoid predation.

Juvenile steelhead generally prefer to inhabit riffles and pools, and as stated above, pool size is also important to steelhead for jumping over barriers. Large woody debris, large cobble or boulders, and geomorphic features help support instream pools.

> Deep water (greater than half of the vertical jump) is necessary to gain the leaping momentum. Resting pools are necessary in long sections of high velocity flows. During low flows, boulder cascades, bedrock slides, and low gradient riffles may become barriers to upstream fish movement. Steelhead may become stranded on their upstream migration if flows rapidly decline. The presence of good deep pools is essential during this period, as fish may need to wait out the period between storms.
>
> —*Draft Environmental Impact Statement/Environmental Impact Report for the Matilija Dam Ecosystem Restoration Project* (USACE 2004)

Lack of pool habitat limits steelhead rearing potential in parts of the watershed, such as portions of San Antonio Creek.

Lack of Spawning Substrate

Adult steelhead have been reported to spawn in substrates from 0.2 to 4.0 inches in diameter. Steelhead utilize mostly gravel-sized material for spawning; however, they will also use mixtures of sand-gravel and gravel-cobble. The gravel must be highly permeable to keep incubating eggs well oxygenated, and should contain < 5% sand and silt. Creek reaches that contain no gravel or cobbles, or that contain gravels or cobbles embedded with silt or sand, are a limiting factor for steelhead spawning.

A factor that limits spawning substrate in the watershed is the tendency of substrate materials in some areas to become cemented together, at least temporarily, by mineral deposits (calcification).

> The surfaces of gravel, cobbles, and boulders were physically gritty due to the deposits, which effectively "cemented" the particles together. These deposits appeared to significantly reduce substrate quality for spawning, and benthic invertebrate production appeared to be very low. However, it is unknown to what degree

these depositions are removed or if gravels are significantly loosened during winter and spring high-flow events. Several gravel deposits were revisited in April following the March 15th storm event, but such deposits showed little evidence of becoming significantly loosened following that event.

—*Assessment of Steelhead Habitat in Upper Matilija Creek Basin. Stage One: Qualitative Stream Survey* (Thomas R. Payne 2003)

Cemented Gravels, North Fork Matilija Creek. Calcification cements gravels together and limits the availability of gravels needed for fish spawning.
Photo courtesy of California Department of Fish and Wildlife

Steelhead Vocabulary

Anadromous – Anadromous fish are born in fresh water, migrate to the ocean to grow into adults, and then return to fresh water to spawn.

DPS or Distinct Population Segment – An ecologically discrete subset of *O. mykiss.* A population segment is considered distinct if it is discrete from and significant to the remainder of its species based on factors such as physical, behavioral, or genetic characteristics; or if it occupies an unusual or unique ecological setting; or if its loss would represent a significant gap in the species' range. A DPS is the smallest division of a taxonomic species that can be protected under the U.S. Endangered Species Act.

ESU or Evolutionary Significant Unit – A population (or group of populations) which exhibits two biological characteristics: 1) it is substantially reproductively isolated from other conspecific (of the same taxonomic species) population units; and 2) it represents an important component of the evolutionary legacy of the species.

Fry – Refers to fish in their first year of life (e.g., from spring emergence until the following spring).

Migration Season – January through June. Most smolts will emigrate between February and June.

Redd – The nest constructed by steelhead. Fertilized eggs are deposited in an excavated depression and covered by gravel.

Resident Rainbow Trout – *O. mykiss* that remain in freshwater throughout their life.

Smolt – Juvenile *O. mykiss* that is physiologically adapted to seawater and emigrates to the ocean.

Steelhead – *O. mykiss* that rears to maturity in the ocean before entering freshwater to spawn.

Lack of Shade. Lack of shady riparian vegetation adjacent to stream channels limits steelhead rearing potential on parts of the Ventura River.
Photo courtesy of Santa Barbara Channelkeeper

Lack of Riparian Vegetation and Shade

Riparian vegetation is a vital factor for steelhead habitat. Riparian buffers reduce flood water velocity, sort sediment loads for creation of spawning habitats, and mitigate contaminants associated with nearby roads and agricultural, industrial, and residential activities. Riparian vegetation also stabilizes channel banks, thereby reducing erosion and preventing excessive sedimentation into the creeks. The overhead canopy provided by mature riparian trees maintains cooler water temperatures and serves as a source of woody debris that contributes to pool and instream cover habitat formation. In addition, leaf litter from trees is an important input into the stream that supports the aquatic food chain. The roots of these trees can also contribute to other instream shelter types such as undercut banks. Robust canopy may also reduce algal blooms that can cause dissolved oxygen depletion in creek waters by reducing solar exposure.

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Shade reduces heating of water. As temperatures rise, fish experience increasing difficulty extracting oxygen from water, while at the same time the amount of oxygen in the water decreases.

Lack of riparian vegetation adjacent to low flow channel limits steelhead rearing potential in parts of the watershed, especially along intermittent reaches.

Excessive Sediment

Over the long term, sediment settles and fills the spaces between streambed gravels and rocks, spoiling fish spawning habitat by reducing oxygen-rich water flow to trout eggs that are buried in the gravel beds. Accumulated sediment also reduces the habitat required by smaller organisms (aquatic insects), which are a vital source of food for fish.

Sediment settles and fills the spaces between streambed gravels and rocks, spoiling fish spawning habitat by reducing oxygen-rich water flow to trout eggs

Streambank stability is very important for minimizing excess sedimentation. Excess sediment from eroding streambanks accumulates in the stream channel downstream of erosion sources and increases the instability of the channel system. The accumulated sediment can divert water into adjacent banks and create new areas of erosion.

Excess fine sediments severely limit steelhead spawning and juvenile rearing in Coyote Creek downstream of Casitas Reservoir, Cañada Larga Creek, and Cañada del Diablo Creek. Fine sediments are also a problem in upper Matilija Canyon, in the Ventura River just below North Fork Matilija Creek, and in parts of the Ventura River mainstem. Ground disturbing activities and dirt roads can be sources of fine sediment during rain events. Fine sediments are also attributable to natural causes.

Lack of Instream Cover

Instream cover is composed of elements within a stream channel that provide fish with protection from predation, reduce water velocities so as to provide resting and feeding areas, and reduce competition through increased living space and visual isolation within the stream. Instream cover includes objects under water that provide shade and resting areas, such as over-hanging vegetation, submerged cobbles and boulders, logs, root wads, submerged vegetation, and undercut banks. Lack of riparian vegetation is the primary factor contributing to a lack of instream cover.

Current Populations

Determining how many steelhead are spawning under existing conditions in the Ventura River watershed is fraught with challenges. Until a steelhead reaches a large adult size, it is not easy to distinguish it from a resident rainbow trout just by sight. The flexibility that the species exhibits in terms of which life form it takes on (residency or anadromy) presents another challenge. For example, fish that have clearly started to smolt (undergo changes necessary to go to sea) can reverse that physiological process if conditions warrant it—they can revert to being a resident. Fish also move around, making definitive counts challenging. Fish radio-tagged by Casitas Municipal Water District (CMWD) staff have been tracked moving downstream and back upstream through the Robles Fish Passage Facility. This has occurred with other radio-tagged smolts in lower portions of the Ventura River.

25-Inch Steelhead at Shell Road Bridge, 2007

Photo courtesy of Mark Capelli

> The present number of adult steelhead returning annually to spawn is difficult to determine, in part because there are so few fish, but the present run of steelhead is probably less than 100 fish annually.
>
> —*Robles Fish Passage Facilities Biological Opinion, Q & A* (NMFS 2003a)

Annual Watershed-Wide Survey Data

Annual *O. mykiss* distribution and abundance surveys have been conducted in the watershed by Normandeau Associates since 2006. "3.6.2.5 Current Steelhead Surveys and Monitoring" describes this program in more detail. The combined data from these surveys over time (Tables 3.6.2.2.2 and 3.6.2.2.3) provide a good description of fry, juvenile, and adult *O. mykiss* abundance in the Ventura River watershed, including the dramatic range of population abundance, reflective of the highly variable flow characteristics in the watershed.

Table 3.6.2.2.2 ***O. mykiss*** **Abundance Data by Study Site, 2006 to 2012**

Zone[1]	Study Segment	Study Site	Years of Data	Study Site: Length (Mile)	Study Site: Flow (Avg.) (cfs)	Abundance Estimates: # O. mykiss <10 cm Min	# O. mykiss <10 cm Max	# O. mykiss ≥10 cm Min	# O. mykiss ≥10 cm Max
Anadromous	**Lower** *Below Robles Diversion Dam*	Ventura River (101 Bridge)	6	0.96	20.3	0	0	0	9
		Ventura River (Shell Rd.)	6	1.00	18.4	0	50	0	150
		Ventura River (Casitas Springs)	7	0.90	13.8	0	843	4	1400
		San Antonio Creek (mid)	5	0.40	3.4	0	0	0	33
		San Antonio Creek (up)	3	0.48	3.0	6	26	15	167
		Ventura River (Preserve)	3	0.55	0.5	0	10	0	19
Anadromous	**Middle** *Between dams*	Ventura River (Camino Cielo Rd.)	7	0.51	11.0	119	207	10	328
		North Fork Matilija Creek (low)	7	0.41	1.7	70	410	23	263
		North Fork Matilija Creek (mid)	7	0.41	1.6	133	847	90	243
Resident	**Upper** *Above Matilija Dam*	Matilija Creek (low)	6	0.50	7.3	0	421	7	94
		Matilija Creek (mid)	6	0.44	4.9	92	517	69	272
		Matilija Creek (up)	5	0.44	3.4	118	515	58	561
		Upper North Fork Matilija Creek	6	0.50	1.3	186	802	77	207
		Murrieta Creek	1	0.45	0.5	340	340	169	169

1. Zones are distinct areas that support either the anadromous or resident life form of *O. mykiss*.

Data for each study site include both minimum and maximum estimates of fish abundance over the number of years studied. The number of observed/captured fish within each study site is extrapolated to produce an estimate for the entire length of the study site.

Source: Normandeau 2014

Table 3.6.2.2.3 ***O. mykiss*** **Abundance Data by Study Segment and Year, 2006 to 2012**

Year	# Fry <10 cm: Lower	# Fry <10 cm: Middle	# Fry <10 cm: Upper	# Juvenile/Adult >10 cm: Lower	# Juvenile/Adult >10 cm: Middle	# Juvenile/Adult >10 cm: Upper	Total
2006	5	1,759	3,878	22	2,269	4,703	12,636
2007	0	4,250	6,294	11	524	1,192	12,271
2008	326	2,413	5,003	3,739	3,555	2,641	17,677
2009	0	3,867	n/a	494	1,415	n/a	—
2010	709	3,357	4,428	1,328	2,240	2,785	14,847
2011	16	1,522	5,263	1,639	1,942	3,435	13,817
2012	2,348	6,637	10,033	967	1,149	3,000	24,134

Data represent annual abundance estimates extrapolated for each *entire* study segment (upper, lower, or middle), not just the representative study sites shown in Table 3.6.2.2.2. San Antonio and Murrieta creeks were not included because they had fewer years of data.

Source: Normandeau 2014

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Robles Fish Passage Facility Data

The Robles Fish Passage Facility includes equipment to count the fish passing through the facility. Since 2006, when the facility first became operational, this equipment has been modified to improve its effectiveness at detecting fish. Counting fish with automated equipment will always have limitations however, so snorkeling or bank surveys are conducted in the area above and below the Robles Fish Passage Facility every week during the migration season. The snorkel count data are as important as count data from the facility in providing indices of relative abundance of *O. mykiss* upstream and downstream of the facility. Tables 3.6.2.2.4 and 3.6.2.2.5 summarize CMWD's fish count data since 2006, as well as the important limitations of these data.

Table 3.6.2.2.4 *O. mykiss* Observations at Robles Fish Passage Facility

	Peak Weekly Counts	
Year	**Adults Counted in Fish Detector[1]**	**Fish Counted via Snorkeling and Bank Surveys[2]**
2006	4	5
2007	0	10
2008	6	13
2009	0	131
2010	1	30
2011	0	94
2012	0	36
2013	0	7
2014	0	0
Total	**11**	**326**

1. Numbers represent only the fish that swam through the detector pictured on page 80.

2. Fish (adult and juvenile) counted above and below the Robles Fish Passage Facility via snorkeling or streambank surveys conducted weekly during the fish migration season. The peak data represent the weekly count that was highest during the period. These one-day counts avoid double counting fish that may meander back and forth.

Data Source: Lewis 2014

Fish Detection Equipment Limitations

The fish detecting equipment at the Robles Fish Passage Facility has limitations that are important to understand.

- Fish detection equipment is generally designed for larger fish and larger flows. The operators of the Robles facility have had to make modifications over the years as they have learned about these limitations. The equipment now has much better detection efficiencies.
- It appears that the equipment still underestimates the number of smaller fish. The larger the fish the better the detection efficiency.
- Two pieces of information collected by the detector, a silhouette captured by a scanner plate and a video clip, are used to confirm that an object passing through is an *O. mykiss*. If conditions are turbid, the video is often unusable and the object cannot be confirmed.
- Once a data validation and calibration analysis that takes into account the above limitations has been done on the existing data, the operators of the Robles Facility may be able to adjust earlier data such that year-to-year comparisons can be made. Until then, year-to-year comparisons of the data in Table 3.6.2.2.5 provide only relative abundance information.

Table 3.6.2.2.5 Total Annual *O. mykiss* Detections in Robles Fish Ladder

Year	Upstream	Downstream	Total
2006[1]	14	19	33
2007[1]	0	0	0
2008[2]	112	94	206
2009[2]	84	84	168
2010[3]	54	40	94
2011[3]	101	49	150
2012[3]	396	263	659
2013[3]	0	0	0
2014[3]	1	0	1

1. Detections by the original crowder (fish detector) operational at flows >35cfs with no downstream camera, including probable but unconfirmed *O. mykiss*.

2. Detections by new crowder operational at all flows with limited downstream camera, including probable but unconfirmed *O. mykiss*.

3. Detections by crowder operational at all flow with functional downstream camera, including only confirmed *O. mykiss*

Data Source: Lewis 2014. All data are provisional.

3.6.2.3 Recovery and Management

Lion Creek Bridge Improves Fish Passage. In 2010, a "fair weather crossing" on Lion Creek, a major tributary of San Antonio Creek, was replaced with this bridge, which improved steelhead access to over nine miles of upstream habitat.
Photo courtesy of South Coast Habitat Restoration

Federal and state agencies and local nonprofits are actively involved in efforts to recover a viable population of steelhead in the watershed. These efforts include monitoring and studying fish abundance and distribution (described above), prioritizing efforts in recovery plans, improving the condition of existing fish habitat, expanding habitat through stream restoration and barrier removal, protecting land through acquisition, and educating the public about the importance of protecting this endangered species.

Recovery Plans

The Southern Steelhead Recovery Plan, released in 2012, is the current operating recovery plan for steelhead in the watershed. This section provides details on this plan and briefly describes several prior efforts to develop recovery plans, as well as a recovery plan focused on the stream reaches that drain through the City of Ojai.

2012 Southern Steelhead Recovery Plan

The federal Endangered Species Act directs the NMFS to develop and implement recovery plans for threatened and endangered species. Recovery plans identify actions necessary for the protection and recovery of listed species based upon the best scientific and commercial data available. NMFS's recovery plans are considered guidance documents, not regulatory documents.

Southern California Steelhead Recovery Planning Area

"The Southern California Steelhead (SCS) Recovery Planning Area extends from the Santa Maria River to the Tijuana River at the U.S.-Mexico border. It includes both those portions of coastal watersheds that are at least seasonally accessible to steelhead entering from the ocean, and the upstream portions of watersheds that are currently inaccessible to steelhead due to man-made barriers but were historically used by steelhead. Major steelhead watersheds in the northern portion of the SCS Recovery Planning Area include the Santa Maria, Santa Ynez, Ventura, and Santa Clara Rivers, and Malibu and Topanga Creeks. Major steelhead watersheds in the southern portion of the SCS Recovery Planning Area include the San Gabriel, Santa Margarita, San Luis Rey, San Dieguito, and Sweetwater Rivers, and San Juan and San Mateo Creeks.

"The Southern California Steelhead DPS encompasses all naturally-spawned anadromous *O. mykiss* between the Santa Maria River (inclusive) and the U.S.-Mexico border, whose freshwater habitat occurs below artificial or natural impassible upstream barriers, as well as *O. mykiss* residing above impassible barriers that are able to emigrate into waters below barriers and exhibit an anadromous life-history.

"The SCS Recovery Planning Area is divided into five Biogeographic Population Groups (BPGs): Monte Arido Highlands, Conception Coast, Santa Monica Mountains, Mojave Rim and Santa Catalina Gulf Coast. Each BPG is characterized by a unique combination of physical and ecological characteristics that present differing natural selective regimes for steelhead populations utilizing the individual watersheds.

"The separate watersheds comprising each BPG are generally considered to support individual *O. mykiss* populations (*i.e.*, one watershed = one steelhead population). Thus, single BPGs encompass multiple watersheds and multiple *O. mykiss* populations."

—*Southern California Steelhead Recovery Plan Summary* (NMFS 2012a)

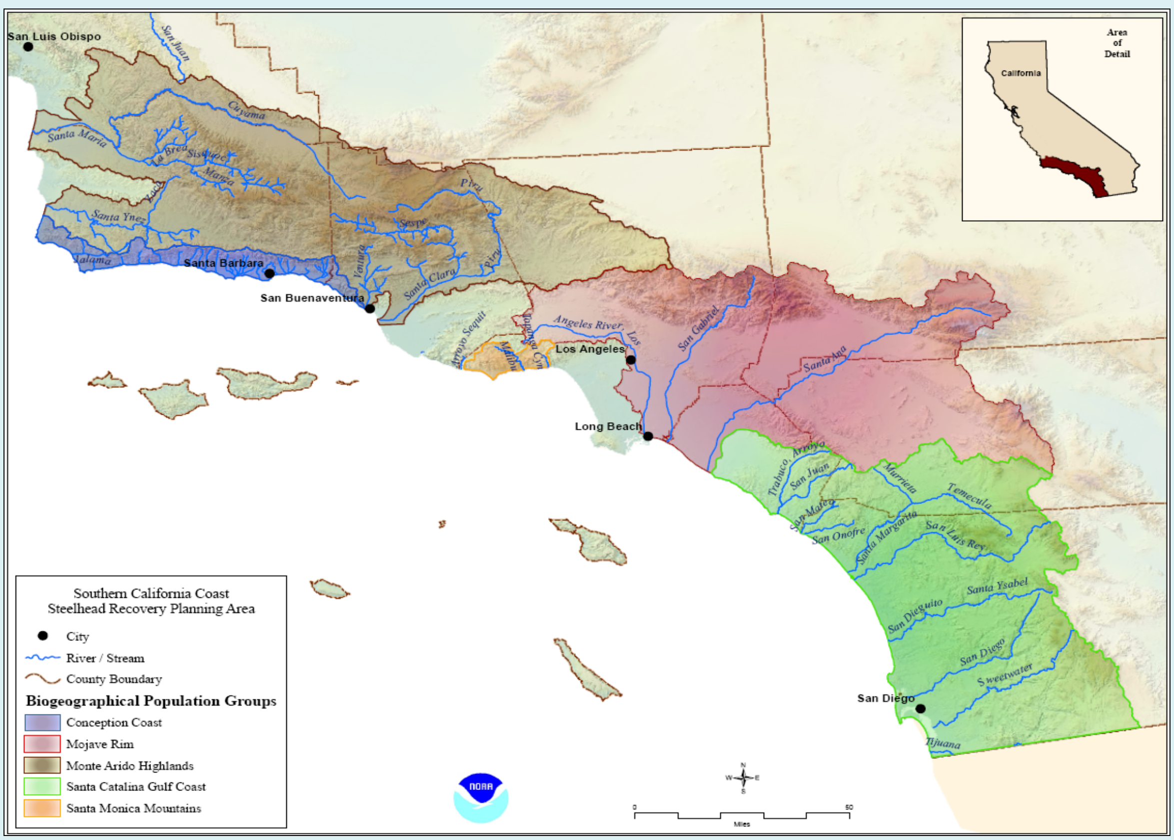


Figure 3.6.2.3.1 Steelhead Recovery Planning Area Map, Southern California Coast. The Ventura River watershed is in the Recovery Plan's Monte Arido Highlands biogeographic population group.

The Ventura River watershed is one of the major steelhead watersheds in the SCS Recovery Planning Area, and Ventura River steelhead are considered a "Core 1" population—the highest priority for recovery actions.

Recovery is defined by NMFS as "the process by which listed species and their ecosystems are restored and their future is safeguarded to the point that protections under the Endangered Species Act are no longer needed" (NMFS 2012). Such restoration first requires a description of the normal condition to which the species is to be restored (Boughton et al. 2006). Attempts to quantify historical or existing populations of steelhead are fraught with uncertainties and lack of reliable, quantitative data. Thus, the recovery goals in recovery plans are based not on historic steelhead run sizes, but upon conceptual models that develop viability criteria applicable across the region. As the technical advisors to the SCS Recovery Plan stated: "The task of delineating populations and characterizing recovery potential is largely reliant on quantitative data samples from across the planning domain. Since such information is unavailable, we are confined to the less satisfactory exercise of A) applying simplistic yet uniform methods over large spatial extents, and B) describing existing small-extent studies, and making uncertain inferences of their implications for the larger ESU." (Boughton et al. 2006)

Definition: Viable Population

A viable population is defined as a population having a negligible risk (< 5%) of extinction due to threats from demographic variation, natural environmental variation, and genetic diversity changes over a 100-year time frame. A viable DPS is comprised of a sufficient number of viable populations spatially dispersed, but proximate enough to maintain long-term (1,000-year) persistence and evolutionary potential (McElhany et al. 2000). The viability criteria are intended to describe characteristics of the species, within its natural environment, necessary for both individual populations and the DPS as a whole to be viable, i.e., persist over a specific period of time, regardless of other ongoing effects caused by human actions (NMFS 2012).

The difference in the time-frames considered for individual populations vs. the DPS as a whole reflects the recognition that individual populations may periodically, but temporarily, go extinct within the longer, 1,000-year time-frame; however, the populations are re-established through natural processes (re-colonization through dispersal from other watersheds, or from native, non-anadromous *O. mykiss* producing progeny that assume an anadromous life-history in sufficient numbers) to re-initiate an anadromous run in the extirpated watershed (Capelli 2014).

Priority Recovery Actions

Priority recovery actions identified in the SCS Recovery Plan for the Monte Arido Highlands Biogeographic Population Group, and applicable to the Ventura River watershed, are summarized below (NMFS 2012a).

- Develop and implement operating criteria to ensure the pattern and magnitude of water releases from dams, including Casitas, Matilija, and Robles Diversion dams, provide the essential habitat functions to support the life-history and habitat requirements of adult and juvenile *O. mykiss*.
- Develop and implement plans to physically modify Casitas, Matilija, and Robles Diversion dams to allow natural rates of adult and juvenile *O. mykiss* migration between the estuary and upstream spawning and rearing habitats, and passage of smolts and kelts downstream to the estuary and ocean.
- Develop and implement a groundwater monitoring program to guide management of groundwater extractions within steelhead-bearing watersheds to ensure surface flows provide essential support for all *O. mykiss* life-history stages, including adult and juvenile *O. mykiss* migration, spawning, incubation, and rearing.
- Develop and implement restoration and management plans for the estuaries associated with steelhead-bearing watersheds. To the maximum extent feasible, planned actions should restore the physical configuration, size, and diversity of the wetland habitats, eliminate exotic species, control artificial breaching of the sand bar, and establish effective buffers to restore estuarine functions and promote *O. mykiss* use (including rearing and acclimation) of the estuaries.

Other Recovery Plans

1997 Ventura River Steelhead Restoration and Recovery Plan

In 1997, a Ventura River Steelhead Restoration and Recovery Plan (Entrix & Woodward Clyde 1997) was prepared on behalf of 10 different agencies with water supply, flood control, or public works responsibilities in the watershed. These agencies included Casitas Municipal Water District, City of San Buenaventura, Ventura County Flood Control District, Ventura County Transportation Department, Ventura County Solid Waste Management Department, Ojai Valley Sanitary District, Ventura River County Water District, Ojai Basin Ground Water Management Agency, Meiners Oaks County Water Districts, and Southern California Water Company. The plan was intended to assist the agencies in addressing steelhead issues and possible permitting requirements.

Several of the restoration and enhancement measures identified in the plan are now being implemented by the agencies. Much of the information developed for this plan was incorporated into the 2004 Draft Habitat Conservation Plan discussed next.

2004 Draft Habitat Conservation Plan

Habitat Conservation Plans (HCPs) are planning documents required as part of an application for an "incidental take" permit under section 10 of the federal Endangered Species Act. HCPs describe the anticipated effects of the proposed taking and how those impacts will be minimized or mitigated.

Definition: Take

"Take" is defined in the Endangered Species Act as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect any threatened or endangered species. Incidental take permits authorize the incidental take (i.e., take that occurs incidentally during an otherwise lawful activity) of a listed species, such as steelhead.

In 2004, a draft HCP (Entrix & URS 2004) was prepared on behalf of 11 different cooperating agencies that operate or maintain facilities that could affect listed species or their habitats in the Ventura River watershed. These 11 agencies included: Casitas Municipal Water District, City of San Burenaventura, Meiners Oaks Water District, Ojai Basin Ground Water Management Agency, Ojai Valley Sanitary District, Southern California Water Company, Ventura County Environmental and Energy Resources Department, Ventura County Parks Department, Ventura County Transportation Department, Ventura County Watershed Protection District, and Ventura River County Water District.

The preparation of the HCP was to serve as the basis for an incidental take permit. The agencies anticipated that together the HCP and take permit would outline the limits within which they could continue to provide their services to the community in the watershed (Entrix & URS 2004). The 2004 draft HCP provides an extensive assessment of many different aspects of the Ventura River watershed. However, the HCP process was never completed. A series of factors caused the project to stall: key staff moved on, CMWD received and needed to respond to a separate Biological Opinion related to steelhead, and there were challenges working out the plan details with regulators (Karen Waln, 2014).

> Eleven different agencies within the Ventura River watershed were previously involved in a HCP planning process to address adverse environmental impacts to native species listed within the Federal Endangered Species Act (FESA). The HCP was to include individual environmental impact analyses for each of the eleven member agencies that would determine what mitigation efforts

and associated funding (as required per future Federal and State legislature), would be required by each entity.

The HCP has not progressed further than a 2004 Draft Report and was never released to the public.

—*2010 Ventura River and San Antonio Creek Watershed Sanitary Survey Update* (Kennedy/Jenks 2011)

2005 City of Ojai Urban Watershed Assessment and Restoration Plan

In 2005, the City of Ojai prepared a comprehensive assessment and restoration plan focused on steelhead habitat for the subwatersheds that drain through the city limits. The document provides a detailed characterization of streams, habitat conditions, and limiting factors, and identifies actions that can be taken to restore and enhance steelhead habitat conditions.

Provision of Water

Because steelhead are an endangered species, regulators have certain authorities to require that their needs be provided for, including the provision of water.

Any project in the watershed that requires a federal permit or involves federal funding has a "federal nexus," which grants NMFS the authority to place conditions on the project on behalf of steelhead. The Robles Diversion Facility is an example of a facility that has been so conditioned.

***O. mykiss* Mortality From Receding Flows, Ventura River**

Photo courtesy of Ojai Valley Land Conservancy

The need to provide water for steelhead has also been addressed in water quality regulations, which are structured to protect "beneficial uses" of state waters—the use of water by fish is considered a protected beneficial use.

Two reaches of the Ventura River—stretching from Camino Cielo Road below Matilija Dam to the river's confluence with Weldon Canyon, just north of Cañada Larga Creek—are on the Clean Water Act's Section 303(d) list of impaired waterbodies for pumping and water diversion because the lack of water in these reaches is believed to interfere with the migration of steelhead.

Regulators administering water rights in the state are also charged with protecting water as a "public trust" resource, and protecting the environment is included in this mandate.

On a case-by-case basis, water projects in the watershed have been required to reduce the amount of water withdrawn in order to provide for steelhead. See the discussion of "environmental water" in "3.4.3 Water Demands" for more details.

Removal of Barriers

A number of partial fish passage barriers have been removed in recent years.

- In 2006, the Robles Fish Passage Facility (described previously in this section) was completed to reestablish access to upstream steelhead habitat by providing access over the Robles Diversion Facility and restoring a portion of the flows necessary for fish to reach the Robles Fish Passage Facility.
- In 2010, a "fair weather crossing" (a road crossing that allows a waterway to run over a road) on Lion Canyon Creek, a major tributary of San Antonio Creek, was replaced with a bridge. This improved steelhead access to over nine miles of upstream habitat.
- In 2012, a bridge for pedestrians and bicyclists using the Ojai Valley Bike Trail was installed at the very end of San Antonio Creek, just before it merges with the Ventura River. The bridge replaced an old concrete crossing over some box culverts that frequently became plugged with woody debris during storms.
- In 2012, a fair weather crossing in lower San Antonio Creek at Old Creek Road was replaced with a multi-span bridge.
- In 2013, a clear span bridge was constructed on San Antonio Creek near the confluence with Stewart Canyon Creek, just south of the City of Ojai. The bridge replaced a fair weather crossing on private property.

The last four barrier removals are illustrated in "2.3.7 Healthy San Antonio Creek Campaign."

A major effort to remove Matilija Dam, which also addresses sediment transport issues, has been underway since the 1990s and is addressed in a separate section, "3.6.3 Matilija Dam."

Protection of Land

In addition to the considerable lands already protected by government agencies, the watershed is fortunate to have two land conservancies that continue to actively purchase and accept donations of land for protection in and adjacent to the Ventura River. Lands owned by these conservancies are held for conservation in perpetuity.

The Ojai Valley Land Conservancy (OVLC) owns four preserves on the Ventura River that together comprise 737 acres in the river or its floodplain and span a total of four miles of the river. Three of their preserves—the Steelhead Preserve, the Confluence Preserve, and the Rio Vista Preserve—are located around the river's confluence with San Antonio Creek, one of the most consistently wet locations on the river and very important habitat for steelhead. OVLC also owns a preserve near Camp Comfort on San Antonio Creek, another key location for steelhead.

Ojai Valley Land Conservancy owns three preserves—the Steelhead Preserve, the Confluence Preserve, and the Rio Vista Preserve—located around the river's confluence with San Antonio Creek, one of the most consistently wet locations on the river and very important habitat for steelhead.

Two preserves owned by the Ventura Hillsides Conservancy—the Willougby Preserve and Big Rock Preserve—are located in the lower Ventura River or its floodplain. These preserves together comprise 25 acres.

Habitat Restoration

Removal of the invasive plant *Arundo donax*, revegetation of streambanks, and removal of passage barriers (discussed previously in this section) are the primary steelhead habitat restoration efforts that have been implemented in the watershed. *Arundo*, or giant reed, limits steelhead habitat potential by reducing available surface water and thereby displacing beneficial native streamside vegetation and wildlife (VCWPD 2009a). About 270 acres of *Arundo* have been removed thus far. With the *Arundo* removed, native plants are able to return and provide shade and other ecosystem benefits. See "2.3.6 Arundo-Free Watershed Campaign" for more details on these projects.

A Special Opportunity in San Antonio Creek

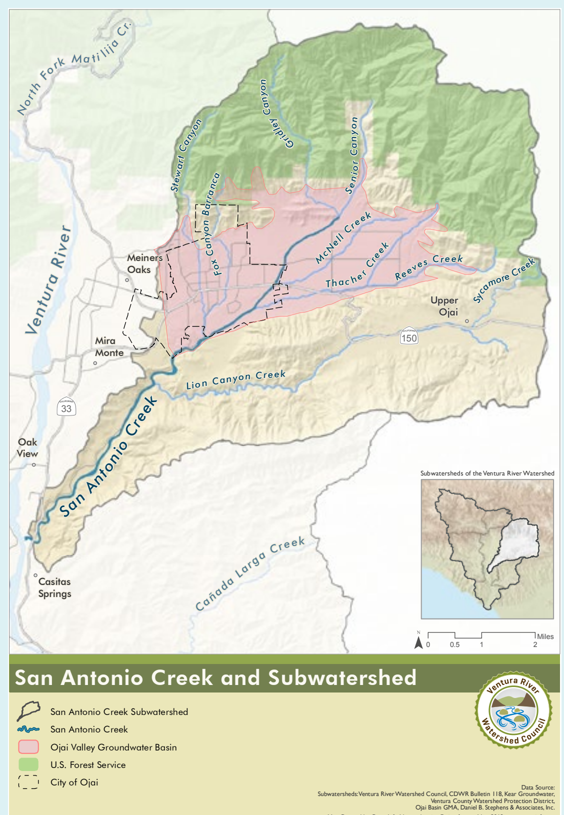
San Antonio Creek provides some of the most important habitat currently accessible to steelhead, and steelhead surveys show that the lower reaches of the creek are being used. There is potential to expand and improve the quality of existing habitats with the addition of more rearing habitats, such as deep pools, removal of invasive plants, and revegetation of bare stream banks.

Scott Lewis, a CMWD fisheries biologist, made the following assessment (in an email correspondence) after studying steelhead throughout the watershed for over six years (Lewis 2013).

Based on our data collection over numerous years, San Antonio Creek appears to be the key spawning and rearing tributary for the steelhead population of the Ventura River basin. This is likely due to several reasons that I have discussed below.

Spawning Habitat: We conducted a stream habitat survey and documented that San Antonio Creek had significant amounts of spawning gravel. This is obvious even with a quick walk of the stream. The percentage of spawning gravel in San Antonio Creek is much greater than other parts of the basin. The percentage of total habitat with spawning gravel in San Antonio Creek was 33%, North Fork Matilija was 13%, and the mainstem Ventura River was 16%. It seems clear that no additional spawning gravel would be needed in San Antonio Creek. Additional data that we have collected supports this conclusion as well. The number of redds that we have counted over the last 5 years has shown that

(continues on next page)



A Special Opportunity in San Antonio Creek *(continued)*

San Antonio Creek is the primary spawning area in the basin; as high as 90% and a mean of about 70% during the two peak years of total redds.

Good Juvenile Growth Rates: Based on our snorkeling surveys over several years, the growth rate of steelhead in San Antonio Creek is better than else where in the basin. The warmer water and better primary production of San Antonio Creek provide abundant food resources that enables steelhead to grow faster and smolt primarily as 1+ [one year or older] fish. In North Fork Matilija for example, I think the majority of smolts are 2+ [two years or older] due to the lower water temperatures and primary production, and therefore lower growth rates. This faster growth rate in San Antonio Creek allows large numbers of smolts to migrate to the ocean following a wet year when adults (anadromous and resident) have successfully spawned.

Location of San Antonio Creek in Ventura Basin: The location of San Antonio Creek in the Ventura River basin has given steelhead a suitable spawning tributary for a large portion of each migration year. This is due to the confluence of San Antonio Creek being located at the downstream end of the Robles Reach. The Robles Reach is a wide alluvial section of the Ventura River that is composed of active wash deposits of unconsolidated silt, sand, gravel, and boulders (Tan and Jones 2006). Due to this type of channel morphology and geology, alluvial channels like the Robles Reach have high infiltration rates that cause channel surface flow to rapidly recede and cease shortly after storm events (Cooke et al. 1992). During a "wetter" year when steelhead adults have access to the upper basin and choose to migrate upstream to North Fork Matilija Creek, their passage window may be limited because of upstream channel characteristics. Probably most important though, during a "drier" year, the passage window can be nonexistent and San Antonio Creek or the mainstem Ventura River downstream of San Antonio Creek are the only spawning options. Smolts the following year many times will still have downstream passage, even in a dry year. The aforementioned faster growth rates then allows 1+ juveniles to smolt and leave for the ocean.

Hydrologic Characteristics: The San Antonio Creek drainage is one of the largest subbasins of the Ventura River, and given that the headwaters of San Antonio Creek has some of the higher elevations in the basin, it produces a significant amount of the total runoff (24% of total basin runoff at Foster Park). Much of this runoff infiltrates into the Ojai Valley groundwater basin that then sustains the lower 10 km of San Antonio Creek through dryer periods. The combination of San Antonio Creek's confluence location with more sustained stream flow gives steelhead adults and juveniles greater opportunity for success.

The Bottleneck: The limiting factor in San Antonio Creek is dry season rearing habitat. During a wet year, and especially after two back-to-back wet years, the rearing habitat can sustain good numbers of *O. mykiss*. However, during a dry year, and especially after back-to-back dry years, rearing habitat is diminished dramatically. From our recent electrofishing surveys over the last three months, most of the remaining fish have been found in pool habitat. The problem is that San Antonio Creek does not have very many pools relative to other tributaries like North Fork Matilija Creek. Based on our habitat surveys, the number of pools in San Antonio Creek was only 8/km and North Fork Matilija Creek had 29/km. Of those pools, the number that were deeper than 1 m was only 1/km for San Antonio Creek and 6/km in North Fork Matilija Creek. Our snorkel and electrofishing surveys have yielded proportionally higher numbers of *O. mykiss* in North Fork Matilija Creek after longer dry periods and supports the conclusion for the lack of pools in San Antonio Creek. During dry years, significant mortality occurs that diminishes the population of resident and juvenile *O. mykiss* that are producing, or will become, smolts to maintain the anadromous life history of adult steelhead.

3.6.2.4 Steelhead Surveys and Monitoring

This section summarizes some of the most significant recent or ongoing steelhead surveys and monitoring programs in the Ventura River watershed. There have been many other limited-term, or focused, monitoring efforts in the past. Some of these are referenced in "3.6.2.6 Key Data and Information Sources/Further Reading." Given the wide variation in streamflow and associated conditions from year to year, a considerable, long-term data set is needed to evaluate how those variations affect steelhead.

Casitas Municipal Water District

Steelhead Snorkel Survey, Casitas Municipal Water District, 2014

Photo courtesy of Lisa Brenneis

Casitas Municipal Water District (CMWD) conducts comprehensive annual steelhead monitoring and evaluation in conjunction with their operation of the Robles Fish Passage Facility. The facility became operational in 2006, and CMWD monitoring began in 2005. The specific monitoring and evaluation requirements are outlined in the Biological Opinion (BO) prepared by NMFS. The monitoring and evaluation are intended to achieve the objectives outlined in the BO. Some aspects of the annual monitoring could be discontinued in the future if it is determined that these objectives have been addressed.

CMWD's annual steelhead monitoring and evaluation include the following:

Robles Biological Opinion Monitoring and Evaluations

- **Upstream Fish Migration Impediment Evaluation.** Physical instream measurements are collected at selected channel features to evaluate flow releases from the Robles Fish Passage Facility.
- **Downstream Fish Passage Evaluation.** During smolt migration, when flows are sufficient, *O. mykiss* are trapped to collect biological and physical information to determine the success of migration through the Facility.
- **Downstream Fish Migration through the Robles Reach.** *O. mykiss* smolts with radio transmitters are monitored through the Robles Reach to determine rate and the success of migration.
- **Fish Attraction Evaluation.** Bank and snorkel surveys are conducted near the Robles Fish Passage Facility to evaluate the effectiveness of the facility in attracting steelhead to the fish ladder.
- **Fish Passage Monitoring.** The fish detector passively detects *O. mykiss* migrating through the Robles Fish Facility to monitor long-term migration trends.

Other *O. mykiss* and Environmental Studies

- ***O. mykiss* Presence/Absence Surveys.** Watershed-wide snorkel surveys are conducted year-round to provide relative abundance index counts of *O. mykiss* and long-term population trends.
- **Adult Index Spawning Surveys.** During the spawning season, bi-weekly surveys are conducted watershed-wide to identify redds and collect physical data to help understand spawning habitat selection characteristics and monitor long-term population trends.
- **Habitat Survey.** Stream habitat surveys have been completed within the watershed to provide baseline statistical data on the quantity and quality of habitat vital for monitoring and evaluation. Future repeated surveys will provide data on the environmental effects of the morphological changes to the stream channels.
- **Ventura River Estuary Monitoring.** Water quality, surface area, and sandbar status are monitored throughout the year to provide environmental and physical data to understand the function of the estuary for various life-history stages of steelhead.
- **Sub-surface Flow Monitoring.** Year-round monitoring of surface flow and groundwater interactions in key reaches of the watershed, including anadromous and resident locations, provides information on seasonal and long-term trends of perennial and ephemeral stream habitat.
- **Photographic Index Sites.** Stream channels throughout the watershed are photographed twice per year to document general changes in stream channel morphology, streamflow, and riparian zones.
- **Ambient Water Quality Monitoring.** Water quality data are collected watershed-wide by monthly grab samples and continuous water temperature and turbidity probes. These environmental data are integrated into the analysis of other aspects of the monitoring program. Parameters monitored on a monthly basis are temperature, pH, oxidation-reduction potential, dissolved oxygen, conductivity, total dissolved solids, salinity, and turbidity.

Post-Spawn Adult Steelhead, Casitas Springs Levee Pool

Photo courtesy of Mark Allen/Normandeau

O. mykiss Research

- **Population Structure.** Genetic information from rainbow trout and steelhead of the entire watershed is being analyzed to understand physical, environmental, and biological effects on the genetic structure of *O. mykiss* in the watershed.
- **Smoltfication Patterns.** Juvenile *O. mykiss* of varying life-history stages are being analyzed to determine the physical and physiological changes associated with smolting.

- **Juvenile Migration.** RFID (radio frequency identification) technology (or "tagging") is being utilized to determine smolt migration patterns of juvenile rainbow trout and steelhead.

CMWD's annual reports are available on the district's website at www.casitaswater.org/lower.php?url=annual-robles-monitoring-and-evaluation-reports.

Annual *O. mykiss* Distribution and Abundance Surveys

Steelhead Snorkeling Survey, Ventura River, 2008
Photo courtesy of Mark Allen/Normandeau

As part of the effort to remove Matilija Dam, steelhead habitat assessments were conducted in 2003 and 2004 on the Ventura River and Matilija Creek and its tributaries. These assessments were intended to assess the quantity and quality of habitat that could be made available to steelhead if the dam were removed.

To build on this dataset, and to assess the relationship between habitat quality and actual abundance of *O. mykiss*, annual *O. mykiss* distribution and abundance surveys were conducted from 2006 to 2012. These surveys were originally initiated and administered by the Ventura County Flood Control District (now the Ventura County Watershed Protection District), and have been initiated/administered by the Matilija Coalition and Surfrider Foundation in recent years.

The surveys focused primarily on the Ventura River mainstem, Matilija Creek and its tributaries, and North Fork Matilija Creek. Sites below the dam are in the "anadromous zone" and sites above are in the "resident zone." Sampling in 2012 consisted of snorkel surveys and electrofishing at 14 study sites, as well as the Ventura River estuary. By sampling at the same locations over time these surveys helped to assess the natural variation in *O. mykiss* population characteristics (Tables 3.6.2.2.2 and 3.6.2.2.3), and to establish a more robust assessment of baseline population conditions prior to the anticipated removal of Matilija Dam.

The surveys, conducted by Normandeau Associates (formerly Thomas R. Payne & Associates) utilized a randomized survey design for assessing uncertainty in abundance estimates.

Fish were counted, measured (captured fish only), and categorized by size. Trends in fish size over time and space were analyzed and fish densities were correlated with habitat type (e.g., pools, riffles, flatwaters) and habitat characteristics (e.g., depth, velocity, cover). Habitat conditions such as streamflow and temperature were also recorded.

The habitat data collected in 2006, 2007, 2011, and 2012 were used to evaluate how well Habitat Suitability Index (HSI) scores produced by an existing Fish and Wildlife Service model (Raleigh et al. 1984) correlated with observed densities of *O. mykiss*. This led to the development of a revised model that better fit the observed fish densities and was more representative of conditions in the watershed, called the Southern Steelhead HSI model.

Abundance estimates over the years have displayed significant spatial and temporal variation in *O. mykiss* populations, with the highest abundance and densities consistently observed in the upper segment above Matilija Dam (resident rainbow trout only) and in the middle segment between Robles Diversion Dam and Matilija Dam (mixture of resident and anadromous *O. mykiss*). High densities of *O. mykiss* have been routinely observed in the upper North Fork and lower North Fork Matilija Creek study sites each summer (between 2006 and 2012), while *O. mykiss* have been absent or at very low densities in the lowermost Ventura River study sites and in regularly intermittent reaches (e.g., the Ventura River Preserve pools below the Robles Diversion and portions of San Antonio Creek).

These surveys have begun to reveal the dynamic nature of this fish population, which is constantly adapting to the extreme variability in rainfall from year to year.

The surveys are available at the www.matilijadam.org website.

California Department of Fish and Wildlife Surveys

The California Department of Fish and Wildlife began steelhead survey work in the watershed in 2013. This work involves counting steelhead adults and smolts and conducting spring spawning, rearing, and habitat surveys.

National Marine Fisheries Service Spawning Surveys

To better understand the ecology of spawning southern California steelhead, NMFS initiated the use of a standard spawning ground survey protocol in 2009/2010 to conduct redd counts in southern California coastal drainages where endangered steelhead populations exist. Surveys were conducted in the Ventura River watersheds after the first measurable precipitation on Dec 19, 2009, through May 28, 2010. Index reaches in the Ventura River watershed below Matilija Dam were surveyed twice a month. The findings from these early studies indicate that spawning is patchily distributed throughout the watershed and that the timing of redd construction is related to periods of elevated streamflow. The spawning surveys continued in 2011 and 2012. The data have not yet been published.

3.6.2.5 History of Steelhead and Fish Stocking

A comprehensive technical report on the history of steelhead and rainbow trout (going back to the Chumash era) in Santa Ynez River watershed in Santa Barbara County summarized the difficulties in describing the steelhead's past distribution and abundance in the area:

The dynamic nature of southern California aquatic ecosystems poses a challenge to reconstructions of past steelhead distributions and abundance.

> Although historical observations can provide important information on the historical geographic distributions of a species, they can suffer from limitations due to the resolution of the data (Hamilton et al. 2005; Adams et al. 2007). Some sources give precise locations, but these are relatively few in number and distributed unevenly throughout the historical record. Many sources offer only general impressions of areas where steelhead or rainbow trout were found, and are based on second-hand or inexpert observations.
>
> The dynamic nature of southern California aquatic ecosystems poses another challenge to reconstructions of past steelhead distributions and abundance. Habitat conditions in southern California's coastal streams may vary widely due to multiple factors, such as severe winter storms, droughts, the seasonal formation and breaching of river mouth sandbars, sediment inputs from post-wildfire erosion or debris flows, variable oceanographic conditions, climatic oscillations, and long-term climate changes (Davis et al. 1988; Florsheim et al. 1991; Keller et al. 1997; Spina and Tormey 2000). All of these perturbations and processes affect steelhead populations, which may have varied by two orders of magnitude annually owing to natural changes alone (Titus 1995a; Titus 2010).
>
> —*The History of Steelhead and Rainbow Trout (Oncorhynchus mykiss) in the Santa Ynez River Watershed, Santa Barbara County, California* (Alagona 2012)

Fish Stocking History

Records indicate that stocking of trout or steelhead took place in the watershed starting around 1882, reaching a peak around the 1920s, and continued into the 1970s (Bowers 2008; Entrix & URS 2004).

Another thorough source of information is *History of Steelhead and Rainbow Trout in Ventura County, Newsprint Accounts from 1870 to 1955* (Bowers 2008), compiled by a historian on behalf of United Water Conservation District, a water supplier in the neighboring Santa Clara River watershed. These newspaper accounts include many reports of fine trout fishing in the Ventura River going back to the 1870s. Below are several such reports.

> May 10, 1873 – *Ventura Signal*
> PERSONAL – On Saturday last our fellow townsmen, J.A. Corey and C.C. Wing, bade adieu to mackerel and molasses, harness leather and saddles, and in company with two or three others, took a trip to Wilcox's hot springs, in the Matiliha [*sic*] canon, returning Monday. They report Mr. Robert Lyon comfortably quartered in his new house, from which he expects to reach the springs as soon as his men get the road cleared—only a two or three day job. Kenneth Grant, of the firm of Grant & Bickford, has swung his hammock under the boughs of a live-oak, and idly swings all day in utter forgetfulness of furnace and wagon tires, gathering health and strength in the balmy air of that delightful place. The party caught some sixty fine trout in the Ventura River, in an hour's fishing.

> November 27, 1875 – *Ventura Free Press*
> Mountain trout are so plentiful in the San Buenaventura River that the water ditches leading from that stream are full of them. The reservoir on the hill back of town is full of these beautiful fish.

According to these newspaper accounts, the stocking of streams in California with hatchery fish started around 1878.

> February 23, 1878 – *Ventura Free Press*
> The Fish Commissioner of this State will in a week or two have some young trout from New Hampshire and fresh-water salmon from Maine, for distribution. …The fish are to be devoted to stocking public waters only. …This fish (salmon) is probably too large to thrive in our small streams, but some one ought to secure some of the trout.

The newspaper accounts also document early stocking of fish in the watershed in 1882:

December 31, 1881 – *Ventura Free Press*
FISH FOR ALL – A letter from Fish Commissioner Redding was sent to the San Jose Sportsman's Club and reprinted in the newspaper. The Fish Commissioner has ordered "a large quantity of Eastern trout eggs, land-locked salmon and white fish from the East…and will be ready for distribution the last of February or the first of March. …The Fish Commissioners are always very glad to assist in filling the streams in any county where there are sportsmen's clubs, who are giving some attention to the enforcement of the game laws, and who are doing what is equally important, creating public opinion in favor of preserving fish and game in the State." The editor of the Press inserted the comment, "Now, cannot the Ventura Sportsman's Club take steps to secure some of these fish for our two streams? What do you say, Mr. Secretary Granger? The price of transportation is the only expense in the matter."

January 4, 1882 – *Ventura Free Press*
The Ventura Rod and Gun Club bit at our suggestion like a hungry trout at a fly. Secretary Granger talked the matter up among the members, and the Club will secure from the Fish Commissioners enough young trout and white fish to thoroughly stock the head waters of our streams. It might be well to try a few land-locked salmon, though the rivers are probably too small for them. After procuring the fish, the next duty of the Club will be to see that they are protected during the close[d] season.

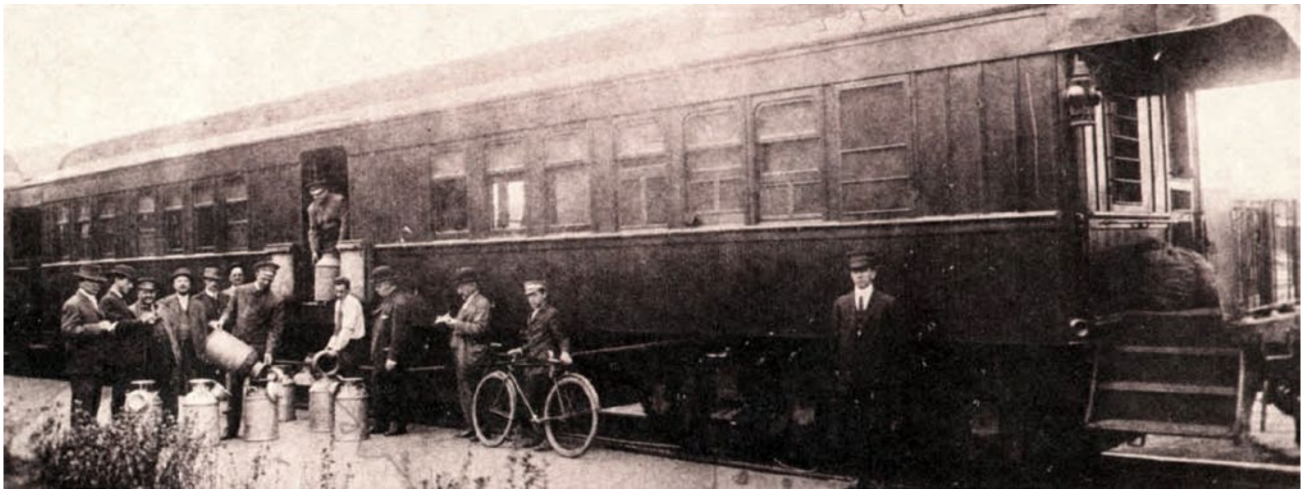
July 1, 1910 – *Ventura Free Press*
STREAMS TO BE WELL-STOCKED – Three-Quarter Million Trout for Southland. Allotment of Young Fish for Southland Waters Doubled by Fish Commission—Special Car to Be Sent Here in September to Supply Forty-seven Creeks.

About 775,000 rainbow, Loch Leven and eastern brook trout are to be distributed in the streams of Southern California in September. M.J. Connell, Fish and Game Commissioner for the Southern District, has been notified that the fish will be shipped from the Sisson hatchery in the special fish car the latter part of August.

The allotment made to the south this year is nearly twice as large as that of last year. Three years ago 250,000 small fish were sent south and last season the number was slightly over 400,000.

R.W. Requa is in charge of the fish car. The fish allotted to Southern California are to be distributed in forth [forty]-seven streams, as follows:

…Ventura county: Ventura River, Coyote Creek, San Antonio, Matilija and north fork, See-Saw [Sisar], Santa Paula, Santa Clara and Sespe.



Fish Car Train Delivers Hatchery Fish in Milk Cans

Photo courtesy of US Fish & Wildlife Service

Since stocking first began in the 1880s, more than one million *O. mykiss* have been stocked in the Ventura River watershed (Lewis 2014). Similar stocking took place in the Santa Clara River, Santa Ynez River, and other southern California coastal streams. Table 3.6.2.5.1 provides a perspective on the number of steelhead fry produced by state fisheries in the early years of stocking.

Since stocking first began in the 1880s, more than one million O. mykiss *have been stocked in the Ventura River watershed (Lewis 2014). Similar stocking took place in the Santa Clara River, Santa Ynez River, and other southern California coastal streams.*

October 15, 1915 – *Ventura Free Press*

ANOTHER BIG TROUT SHIPMENT COMING –The second big shipment of young trout for the Ventura county streams will arrive on October 21st and 22nd at which time Game Warden Barnet will received [receive] from the state hatcheries 100,000 steelhead, 75,000 of which he will place in the Ventura river and the remaining 25,000 will be planted in the Sespe.

Table 3.6.2.5.1 Output of State Hatcheries before 1911

Year[1]	No. of Steelhead Trout Fry Produced by State Hatcheries
1902	301,000
1903	120,000
1904	90,00
1905	108,000
1906	243,000
1907	352,000
1908	170,000
1909	517,000
1910	667,880

1. Prior to 1902 eggs and fry were produced by the U.S. Fish Commission.

This table includes only steelhead and does not include rainbow trout produced in hatcheries.

Source: Kentosh, 2008.

The *Draft Ventura River Habitat Conservation Plan* (Entrix & URS 2004) provides a summary of stocking in the watershed and known numbers of fish; this summary is replicated in "4.4 Appendices." Based on this summary, the peak stocking occurred in the 1930s and 1940s, with most of the fish coming from hatcheries in northern California, and some coming from neighboring watersheds. Stocking of fish in the watershed, except for in Lake Casitas, was discontinued in the 1990s.

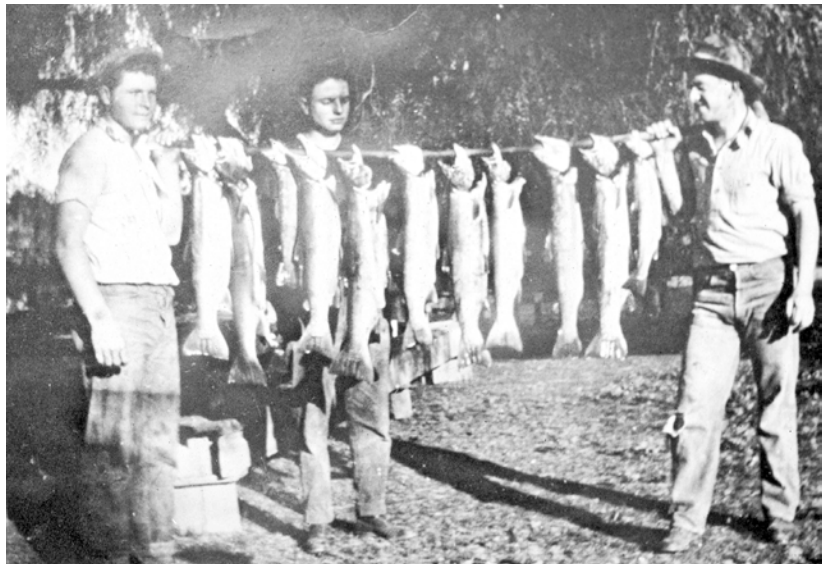
Native Steelhead—From the Hatchery?

The extent to which fish stocking influenced the number of fish returning to spawn in the watershed in the past is a point of controversy, which cannot now be definitively settled.

On the one side, it is argued that estimates of the historical numbers of spawning fish were significantly exaggerated because fish stocking resulted in unnaturally high populations. One of the most often cited "population estimates" was based on a one-day field trip report where no adult steelhead were even observed or counted. If the reported populations never existed naturally, however, would recovery have been initiated?

On the other side, it is argued that the rate of survival of a naturally spawned and reared *O. mykiss* to an adult returning mature steelhead is quite low (about 2–3%). Even if the survival rate of hatchery steelhead was comparable—which would not be the case because of the trauma of capture, transport, and stocking, not to mention the competition from native fish—the number of fish surviving to adulthood would not likely increase the natural run-size appreciably. Furthermore, recent genetic research seems to indicate that hatchery fish genes have not appreciably influenced the native fish stock: present day populations are dominated by ancestry of indigenous southern coastal steelhead (Capelli 2014; Girman & Garza 2006).

Ventura River Steelhead, Tico Crossing, 1920
Photo courtesy of Mark Capelli



Sport fishing was an important local industry in the Ventura River watershed until the late 1940s:

> Welch, writing in *California Fish and Game* (1929) reports that prior to the establishment of a daily limit, it was not unusual for a fisherman to take from 100 to 300 trout from a California coastal stream. The *Ventura Signal* (1878) reported three fishermen taking 463 trout in the lower reaches of the Ventura River in a single day.
>
> A number of hotels on Santa Clara Street in San Buenaventura catered to out-of-town fishermen, while the elaborate Anacapa Hotel, formerly situated on the corner of Main and Palm Streets, reserved the ground floor during the trout season for fishing guests. Post cards depicting local fishermen with their steelhead catches were printed in the hopes of attracting tourists. Several sporting goods stores (*Star-Free Press*, 1948; Marcus, 1973) sponsored annual steelhead fishing contests as late as 1948. Census checks have shown 259 fishermen on the opening day of the winter steelhead fishing season along the five mile stretch open to steelhead fishing between Foster Park and the ocean.
>
> —*The Ventura River Recreational Area and Fishery: A Preliminary Report and Proposal* (VCFGC 1973)

On May 8, 1946, staff from the California Division of Fish and Game made a field inspection to the watershed to assess steelhead spawning areas and sport trout fishing in association with the proposed construction of Matilija Dam. The field inspection report does not document actual observations of adult steelhead, but does offer a population estimate based on personal observations and interviews with long-time residents. The report states that "at least 50 percent of the fish entering the Ventura River eventually enter the main Matilija to spawn. In normal years this represents a minimum of 2000 and 2500 adult spawning steelhead in the 12 mile area." (Clanton & Jarvis 1946) From this report comes the commonly cited statistic that the watershed historically supported 4,000 to 5,000 adult steelhead.

A year later, in March of 1947, a fisheries biologist with the California Department of Fish and Game, Bureau of Fish Conservation, walked the Ventura River and counted adult steelhead. "The river was checked from the mouth to the Foster Park bridge, which seems to be the upper limit of steelhead movement this season, due to low water conditions." (Evans 1947) The biologist counted 250 to 300 adult steelhead in this reach. He noted, "In a dry year, such as this, there is an estimated maximum of 2 miles of fairly suitable spawning area below Foster Park bridge. This might support a maximum total of 1000 spawning adult steelhead."

An extended dry period began in the watershed in 1945. Although intermixed with some wet years, the 20-year period from 1945 to 1965 is considered the longest dry period on record. These dry conditions spurred development of water supply projects. Matilija Dam was completed in 1947 and the Casitas Dam was completed in 1959. Similar dams and diversions were constructed during this period throughout the region. The dry conditions, together with the construction of water supply projects that altered natural flow regimes and restricted access to upstream spawning and rearing habitats, are credited with causing a dramatic decline in steelhead numbers in the area.

Young Fisherman with String of Trout, Foster Park, 1979. When steelhead became endangered in 1997, it became illegal to fish for or otherwise harm any *O. mykiss* below impassible upstream barriers, such as Matilija Dam.
Photo courtesy of Mark Capelli

FINAL DRAFT

3.6.2.6 Key Data and Information Sources/ Further Reading

Below is a summary of some of key documents that address steelhead in the watershed. See "4.3 References" for complete reference citations.

Assessment of Steelhead Habitat in Upper Matilija Creek Basin. Stage One: Qualitative Stream Survey (Thomas R. Payne 2003)

Assessment of Steelhead Habitat in the Ventura River/Matilija Creek Basin. Stage Two: Quantitative Stream Survey (Thomas R. Payne 2004)

City of Ojai Urban Watershed Assessment and Restoration Plan (Magney 2005)

Draft Biological Opinion for US Army Corps of Engineers Permitting of the City of Ventura's Foster Park Well Facility Repairs on the Ventura River (NMFS 2007)

Draft Environmental Impact Statement/Environmental Impact Report for the Matilija Dam Ecosystem Restoration Project (USACE 2004)

Field Inspection Trip to the Matilija-Ventura Watershed In Relation to the Construction of the Proposed Matilija Dam (Clanton & Jarvis 1946)

History and Status of Steelhead in California Coastal Drainages South of San Francisco Bay (Titus et al. 2010)

History of Steelhead and Rainbow Trout in Ventura County: Newsprint from 1872 to 1954, Volume I (Bowers 2008)

History of Steelhead and Rainbow Trout in Ventura County, Volume II (Kentosh 2008)

Matilija Dam Ecosystem Restoration Feasibility Study Final Report (USACE 2004b)

Population Structure and Ancestry of *O. mykiss* Populations in South-Central California Based on Genetic Analysis of Microsatellite Data (Girman and Garza 2006)

Preliminary Hydrogeological Study, Surface Water/Groundwater Interaction Study, Foster Park (Includes steelhead habitat assessment) (Hopkins 2010)

Preliminary Hydrogeological Study, Surface Water/Groundwater Interaction Study, Foster Park (Includes steelhead habitat assessment) (Hopkins 2013)

Progress Report for the Robles Diversion Fish Passage Facility (CMWD 2008, CMWD 2010). Progress reports are also available on CMWD's website for the years 2005, 2006, 2007, 2009, 2010, 2011, 2012, and 2013.

Acronyms

BO—Biological Opinion

BPG—Biogeographic Population Groups

cfs—cubic feet per second

CMWD—Casitas Municipal Water District

DPS—distinct population segment

ESA—Endangered Species Act

ESU—Evolutionary Significant Unit

HCP—Habitat Conservation Plan

HIS—Habitat Suitability Index

NMFS—National Marine Fisheries Service

OVLC—Ojai Valley Land Conservancy

SCS—Southern California Steelhead

TRT—Technical Recovery Team

Removing Matilija Dam: Opportunities and Challenges for Ventura River Restoration (Capelli 2004)

Report on the Environmental Impacts of the Proposed Agreement Between Casitas Municipal Water District and the City of San Buenaventura for Conjunctive Use of the Ventura River – Casitas Reservoir System (Includes steelhead habitat assessment) (EDAW 1978)

Robles Fish Passage Facility Biological Opinion (NMFS 2003)

Robles Fish Passage Facilities Biological Opinion, Q & A (NMFS 2003a)

Senior and Gridley Canyons Steelhead Habitat Assessment -2007 Reconnaissance Level Survey (CMWD 2007)

Southern California Steelhead Recovery Plan (NMFS 2012)

Southern Steelhead Resources Evaluation: Identifying Promising Locations for Steelhead Restoration in Watersheds South of the Golden Gate (Becker et al. 2010)

Steelhead (*Oncorhynchus mykiss*) Habitat Characterization of Portions of Upper San Antonio Creek, Senior Creek, Gridley Creek and Ladera Creek, Ventura County, California (Padre 2010)

Steelhead of the South-Central/Southern California Coast: Population Characterization for Recovery Planning (Boughton et al. 2006)

Steelhead Population and Habitat Assessment in the Ventura River/Matilija Creek Basin, 2006 (Thomas R. Payne 2007)

Steelhead Population and Habitat Assessment in the Ventura River/Matilija Creek Basin, 2007 (Thomas R. Payne 2008)

Steelhead Population Assessment in the Ventura River/Matilija Creek Basin, 2008 Summary Report (Thomas R. Payne 2009)

Steelhead Population Assessment in the Ventura River/Matilija Creek Basin, 2009 Data Summary (Thomas R. Payne 2010)

Steelhead Population Assessment in the Ventura River/Matilija Creek Basin, 2010 Data Summary (Normandeau 2011)

Steelhead Population Assessment in the Ventura River/Matilija Creek Basin, 2011 Data Summary (Normandeau 2012)

Steelhead/Rainbow Trout Resources of Ventura County (CEMAR 2014)

The History of Steelhead and Rainbow Trout (*Oncorhynchus mykiss*) in the Santa Ynez River Watershed, Santa Barbara County, California (Alagona 2012)

The San Antonio Creek Watershed: An Agricultural and Rural Residential Land Protection Study (NRCS 2010)

The Ventura River Recreational Area and Fishery: A Preliminary Report and Proposal (VCFGC 1973)

Ventura County, Ventura River, Steelhead Situation (Evans 1947)

Ventura River Habitat Conservation Plan - Draft (Entrix & URS 2004)

Ventura River Steelhead Restoration and Recovery Plan (Entrix & Woodward Clyde 1997)

Ventura River Steelhead Survey (Capelli 1997)

Ventura Watershed Analysis (Chubb 1997)

Gaps in Data/Information

A formal on-the-ground assessment of current barriers in the watershed is needed.

3.6.3 Matilija Dam Ecosystem Restoration Project

"Is the Matilija Dam ever going to come down?" may be the most common question raised in public discussions about the Ventura River watershed. The short answer is: We're working on it.

Taking down a dam is no small undertaking. The effort to remove Matilija Dam—now called the Matilija Dam Ecosystem Restoration Project (MDERP)—is a complex, multi-stakeholder undertaking that started in the 1990s and continues today.

This section provides a brief overview of the MDERP effort. The MDERP's website, www.Matilijadam.org, contains current information, along with comprehensive background and historical information, meeting presentations, photos, and more. See also "3.2.3 Geomorphology and Sediment Transport" and "3.6.2 Steelhead" for discussions on topics relevant to the Matilija Dam.

Aerial View of Matilija Dam and Reservoir

Photo courtesy of Ventura County Watershed Protection District

In 1947, Matilija Dam was constructed at the lower end of Matilija Creek to provide water storage and flood control. The reservoir was originally built to hold 7,000 acre-feet of water; but sediment from the highly erosive mountains along Matilija Creek rapidly accumulated behind the dam. The reservoir's capacity, as of 2004, was estimated at less than 500 acre-feet—7% of its original capacity. The reservoir's capacity was displaced by almost seven million cubic yards of sediment. If the dam still stands in 2040, the reservoir will likely be completely full of sediment (USACE 2004a).

Matilija Dam no longer provides significant water storage or flood control functions, and blocks the passage of endangered southern California steelhead to prime spawning habitat above the dam. The dam has altered the flow of sediment downstream, diminishing the amount of sand replenishing local beaches.

The dam, which has been plagued with structural integrity issues since construction began, also poses a safety risk. The dam height has been lowered twice to address safety concerns.

Matilija Dam Notches. The top of the dam was notched in 1965 and again in 1978 to address safety concerns, including strain on the dam from water stored behind the dam and deteriorating concrete. The original dam height was 198 feet and is now 168 feet (USACE 2004). In 2011, someone painted a huge pair of scissors and a long dotted line on the face of the dam.

Sampling Barge on Matilija Reservoir, 2001. Drilling, coring, and sample collection was conducted from a barge on the reservoir to obtain subsurface data and sediment samples.

Photo courtesy of US Bureau of Reclamation

Methane Gas Eruption During Drilling, 2001. During sampling, some drill holes encountered methane gas pockets below the water, which caused sediment "geysers" and turbulent boils in the water. The methane is produced by rotting vegetation.

Photo courtesy of US Bureau of Reclamation

The following excerpt from a 2014 report summarizes the overall project and its current status:

> Since its construction in 1947, the 168-foot high, arched concrete Matilija Dam has blocked the transport of an estimated 6,800,000 cubic yards (cy) of fine and coarse sediment from naturally moving downstream to the ocean. This has resulted in loss of the reservoir's original function of water storage for agricultural needs, and limited flood control, loss of downstream sand and gravel sized materials necessary to promoting habitat for a variety of wildlife species, loss of sediment needed to maintain beaches at Surfer's Point, and increased erosion of the Ventura River streambed. The dam, with its non-functioning fish ladder, also prevents southern steelhead from reaching upper Matilija Creek, which prior to dam construction, was the most productive spawning and rearing habitat in the Ventura River system. Without dam removal, an estimated total of 9,000,000 cubic yards of sediment will be trapped behind the dam before the natural full annual sediment load of Matilija Creek begins to be carried over the dam in approximately 2040. While such a scenario would eventually begin to address sediment deprivation of the downstream reaches, leaving the dam in place would not address fish passage beyond the dam and impacts to upstream habitat.
>
> In the early 2000's, Ventura County Watershed Protection District (VCWPD) and the US Army Corps of Engineers (USACE), evaluated several alternatives for dam removal and published a Final Environmental Impact Statement/Environmental Impact Report (EIS/R, USACE 2014 [2004]). They arrived at a preferred alternative (Alternative 4b) that involved slurrying an estimated 2,100,000 cy of fine sediment from the reservoir area just upstream of the dam to a downstream disposal location, removing the dam in one season, excavating a channel through the remaining coarse sediment, and protecting the lower seven feet of the channel banks with soil cement to allow 10-year and greater storm events to remove the accumulated sediments above the seven-foot level. At some future date, the soil cement would be removed, allowing the remaining accumulated sediment to be flushed through the river system.
>
> Subsequently, in 2009 and 2010, the Matilija Dam Fine Sediment Study Group (FSSG) was convened and temporary upstream disposal of the fine sediment was considered to address concerns over cost and constructability of the downstream disposal options for the fine sediment.

> VCWPD has since contracted with URS and Stillwater Sciences (the Consultant Team) to evaluate a range of concepts including those documented in previous documents, concepts developed by the FSSG, and new concepts. A short list of six initial options was identified and is screened (in this report) based on selected key criteria. Following the screening process, up to four alternatives will move forward into the evaluation phase, which would use a wide range of criteria to compare the selected alternatives.
>
> —*Matilija Dam Removal, Sediment Transport, and Robles Diversion Mitigation Project: Draft Initial Options Screening Report* (URS and Stillwater 2014)

Surfrider Foundation Bumpersticker Advocating for Matilija Dam Removal, 1995. In the 1990s, Surfrider Foundation's Ventura chapter began urging the County of Ventura to remove the dam.

3.6.3.1 Matilija Dam Ecosystem Restoration Project Highlights

When the Matilija Dam Ecosystem Restoration Feasibility Study was completed in 2004, it was one of the largest dam removal studies in the country. The study presented a number of alternative approaches to removing the dam and restoring the habitat, and selected a recommended approach.

The ecosystem restoration objectives of the study were to:

- Improve aquatic and terrestrial habitat along Matilija Creek and Ventura River and restore fish passage.
- Restore natural processes to support beach sand replenishment.
- Enhance recreational opportunities.

The study identified several key constraints that later influenced the formulation and evaluation of various alternatives, including:

- Maintaining the current level of flood protection along the Ventura River downstream of Matilija Dam.
- Limiting adverse impacts to normal water supply quantity, quality, and timing of delivery to Casitas Reservoir via Robles Diversion Dam.
- Limiting impacts to water quality in Lake Casitas resulting from the release of the fine sediments trapped behind Matilija Dam (USACE 2004b).

The most challenging dam removal issue is management of the 6.8 million cubic yards of sediment behind the dam.

The most challenging dam removal issue is management of the 6.8 million cubic yards of sediment behind the dam. The preferred alternative in the MDERP feasibility study outlined a two-part strategy for managing the sediments: four million cubic yards of mixed fine and coarse sediments would be contoured within the dam basin area to allow for natural transport to the ocean and beaches in flood events; and the two million cubic yards of fine silts and clay closest to the dam would be slurried in a pipe to various locations downstream of the Robles Diversion to avoid impacting water diversions to Lake Casitas.

After years of effort and lobbying by the County of Ventura, the MDERP was officially authorized by Congress in 2007, with a budget of $144.5 million. In addition to the federal government's contribution, the project was expected to require about $55 million from state and local sources, primarily from bonds issued by the state.

The Players

The Matilija Dam Ecosystem Restoration Project (MDERP) is a joint effort between the Ventura County Watershed Protection District (VCWPD), which is the owner of the dam, and the U.S. Army Corps of Engineers (USACE). The MDERP is a federal project under the authority of the USACE, and VCWPD is the local sponsor. The California Coastal Conservancy and the U.S. Bureau of Reclamation are also key players on the management team. The Bureau of Reclamation has technical responsibility for project hydrology, hydraulics, and sediment modeling; the California Coastal Conservancy has been the primary local funding agency. The MDERP has a large stakeholder group—including many federal, state, and local agencies and organizations—that has guided the project from the beginning. The main stakeholder group is now called the Design Oversight Group (DOG).

Matilija Dam Design Oversight Group

Photo courtesy of Paul Jenkin

Table 3.6.3.1.1 Matilija Dam History

Year	Event
1946	June 18 – Dam construction began. The original reservoir was designed to hold 7,000 acre-feet of water.
1947	Mr. Harold E. Burket, architect, warned County Supervisors of alkali-reactive aggregate.
1947	Dam construction was completed at a cost of $682,000. A report estimated that it would be 39 years before siltation would eliminate capacity. The County sued the engineers for cost overruns and lost.
1949	A major fish kill occurred behind dam due to stagnant, hot water conditions in the reservoir.
1952	The reservoir filled.
1959	Casitas Municipal Water District assumed responsibility of dam operations.
1964	Dam removal was proposed. Bechtel Corp. Safety study condemned dam and presented removal as an option.
1965	Bechtel Corp. estimated dam removal cost at $300,000. To address safety concerns, the County elected instead to notch dam (remove a section 30 feet deep and 285 feet wide) to reduce reservoir capacity to 65%, relieving strain while allowing the dam to remain in place.
1973	A study on littoral processes highlighted the impact of the dam to beaches. The United States Forest Service estimated the sediment contribution of Matilija's dammed watershed to be 116,000 cubic yards per year—sediment that should be contributed to beaches, but is not.
1970s	Ed Henke, who'd grown up along the Ventura River, began to lobby for the dam's demolition.
1978	The dam was notched a second time (358 feet wide).
1995	The local chapter of the Surfrider Foundation began campaign promoting dam's removal.
1997	The southern California steelhead was designated as an endangered species in California.
1998	The County resolved to remove the dam. A study on dam removal began.
2000	A Bureau of Reclamation Appraisal Study was completed. Secretary of the Interior Bruce Babbitt visited a demonstration project at the dam.
2000	Matilija Coalition was formed to bring together the interests of local non-government organizations.
2001	The Matilija Dam Ecosystem Restoration Study was initiated by the Ventura County Watershed Protection District (owner of the dam) and the US Army Corps of Engineers.
2004	Consensus was reached by all stakeholders on preferred project points.
2004	The Matilija Dam Ecosystem Restoration Feasibility Study was completed. At the time, it was one of the largest dam removal studies in the country. The reservoir's capacity was estimated at 500 acre-feet, 7% of its original capacity. The study presented a number of alternative approaches to removing the dam and restoring the habitat, and selected a recommended approach.
2004	Ventura County Board of Supervisors approved the Final EIR/EIS.
2004	US Army Corps of Engineers Chief's Report sent to Assistant Secretary of the Army.
2005	The Design Phase of the Matilija Dam Ecosystem Restoration Project was initiated by the Ventura County Watershed Protection District and the US Army Corps of Engineers.
2007	After years of effort and lobbying by the County of Ventura, the MDERP was officially authorized by Congress, with a budget of $144.5 million. In addition to the federal government's contribution, the project was expected to require about $55 million from state and local sources, primarily from bonds issued by the state.
2007	MDERP Project Component: *Arundo donax* removal was initiated on 1,200 acres above and below dam. Retreatments are scheduled through 2025.
2010	The Design Oversight Group formed a Fine Sediment Study Group.

Table 3.6.3.1.1 Matilija Dam History *(continued)*

Year	Event
2011	MDERP Project Component: Ventura River Parkway Trailhead was installed on the Ventura River Preserve at Old Baldwin Rd. Included new trailhead parking areas, trail enhancement, and public outreach. Fulfilled MDERP recreation goals.
2011	The Fine Sediment Study Group Final Report was completed. (August)
2011	A Technical Advisory Committee (TAC) was formed to address the data and research needs related to the sediment management issue. (October)
2013	A consultant team was selected to complete several studies the TAC deemed necessary to resolve the sediment management issue and reduce the cost of the project. (June)
2014	The consultant contract started. (February)
2015	The consultant studies are due early in 2015.

Source: Matilijadam.org; VCWPD 2014f; Jenkin 2013

Problems: Costs and Stakeholder Acceptability

After project design was underway, the USACE calculated that slurrying the 2 million cubic yards of sediment would cost about twice as much as the estimate from the feasibility study. Local residents adjacent to certain proposed storage areas expressed concern about the impacts from the downstream storage areas.

These issues led to the concept of the upstream storage area (USA) alternative, wherein the fine sediment would be permanently sequestered within Matilija Canyon. However, a number of stakeholders found the USA alternative unacceptable due to the permanent impacts to the canyon.

Stakeholder support of the approach to managing fine sediments was essential, so the project team orchestrated a facilitated group called the Fine Sediment Study Group, which met several times in 2010 and 2011. From this effort, a Technical Advisory Committee (TAC) formed to address the data and research needs related to the sediment management issue.

The TAC began work in 2011. In February 2014, a consultant team began work on several studies the TAC deemed necessary to move forward. These studies will focus on methods to remove the dam that will allow for the natural transport of all sediment from behind the dam, while minimizing impacts to Robles Diversion. The studies will develop methods to offset any residual impacts to Robles Diversion.

In February 2014, a consultant team began work on several studies deemed necessary to move forward. These studies will focus on methods to remove the dam that will allow for the natural transport of all sediment from behind the dam, while minimizing impacts to Robles Diversion.

Mitigation

Before Matilija Dam can be removed, several projects must be implemented to accommodate changes downstream expected to result from the dam's removal. Much of this mitigation is related to flooding. Projects include the redesign and improvement of two bridges to increase hydraulic capacity, improvements to the Robles Diversion and Fish Passage Facility, installation of two contingency water wells in the City of Ventura's Foster Park well field, and the redesign of two existing levees as well as a new levee. Figure 3.6.3.1.1 shows the location of key MDERP design features, most of which are mitigation measures. Table 3.6.3.1.2 summarizes the project's flood-related mitigation measures.

Figure 3.6.3.1.1 Matilija Dam Ecosystem Restoration Project Design Features Map
Source: USACE 2004b

Table 3.6.3.1.2 Matilija Dam Removal Downstream Flood Mitigation Measures

Location	Mitigation	Justification
Matilija Hot Springs	Buy-out	Proximity of Hot Springs site to dam and channel, narrowness of Matilija Canyon, and limited flood conveyance area create high risk from sediment-laden flows in event of a very large storm event and limit the effectiveness of any structural protection.
Camino Cielo	Properties buy-out	Proximity of six residential tracts to dam and channel, and narrowness of canyon create high risk from sediment-laden flows in event of a very large storm event and limit the effectiveness of any structural protection.
Camino Cielo Bridge	Improve conveyance Remove and replace at new location; restore channel width at original location	Existing low flow crossing (concrete box culvert) exacerbates constricted channel. Removal of bridge and restoration to original channel width will improve conveyance and prevent backwater effects. New bridge with higher deck at a wider channel section is justified because bridge is sole ingress\egress for remaining Camino Cielo residential tracts not impacted by potential flooding.
Meiners Oaks	Construct new (east) levee/floodwall	Flood protection less costly than real estate acquisition. Number of structures already prone to flooding under existing conditions would increase. Dam removal would result in a water depth increase of at least 2 ft. Confinement by levee at lower end necessitates continuation of protection upstream.
Live Oak	Raise existing (west) levee	Flood protection less costly than real estate acquisition. Constricted nature of channel and expected rise in water surface in high flow events upstream of Santa Ana bridge necessitates levee raising. Confinement by levee at lower end necessitates continuation of protection upstream.
Santa Ana Bridge	Improve conveyance by widening channel and extending bridge length	Existing bridge creates severe constriction and channel is incapable of passing a 100-yr discharge with additional sediment-laden flows. Due to constricted channel upstream of bridge, current sediment removal maintenance efforts will need to continue in addition to channel widening for a limited distance (500 ft) upstream of bridge.
Casitas Springs	Raise existing (east) levee	Flood protection less costly than real estate acquisition. Number of structures already prone to flooding under existing conditions would increase. After dam removal, water depth would increase by at least 2 ft.

Source: Matilija Dam Ecosystem Restoration Feasibility Study, Section 4 (USACE 2004b)

Arundo donax control in Matilija Creek and the Ventura River was identified as a key component of ecosystem restoration in the MDERP. *Arundo*, also called giant reed, is a highly invasive non-native riparian plant. As part of the MDERP, the watershed's largest *Arundo* removal project started in 2008 on Matilija Creek and the upper Ventura River. The VCWPD removed 200 acres of *Arundo* in a 1,200-acre area. Other invasive plants were also removed as part of this project, including Peruvian pepper tree, tamarisk, Spanish broom and castor bean.

Figure 3.6.3.1.2 shows the areas of *Arundo* infestation above and below Matilija Dam prior to removal. This project has been very successfully implemented, as witnessed by the numbers and variety of native animals returning to the treated areas. Ongoing treatment and monitoring is planned for many years to come.

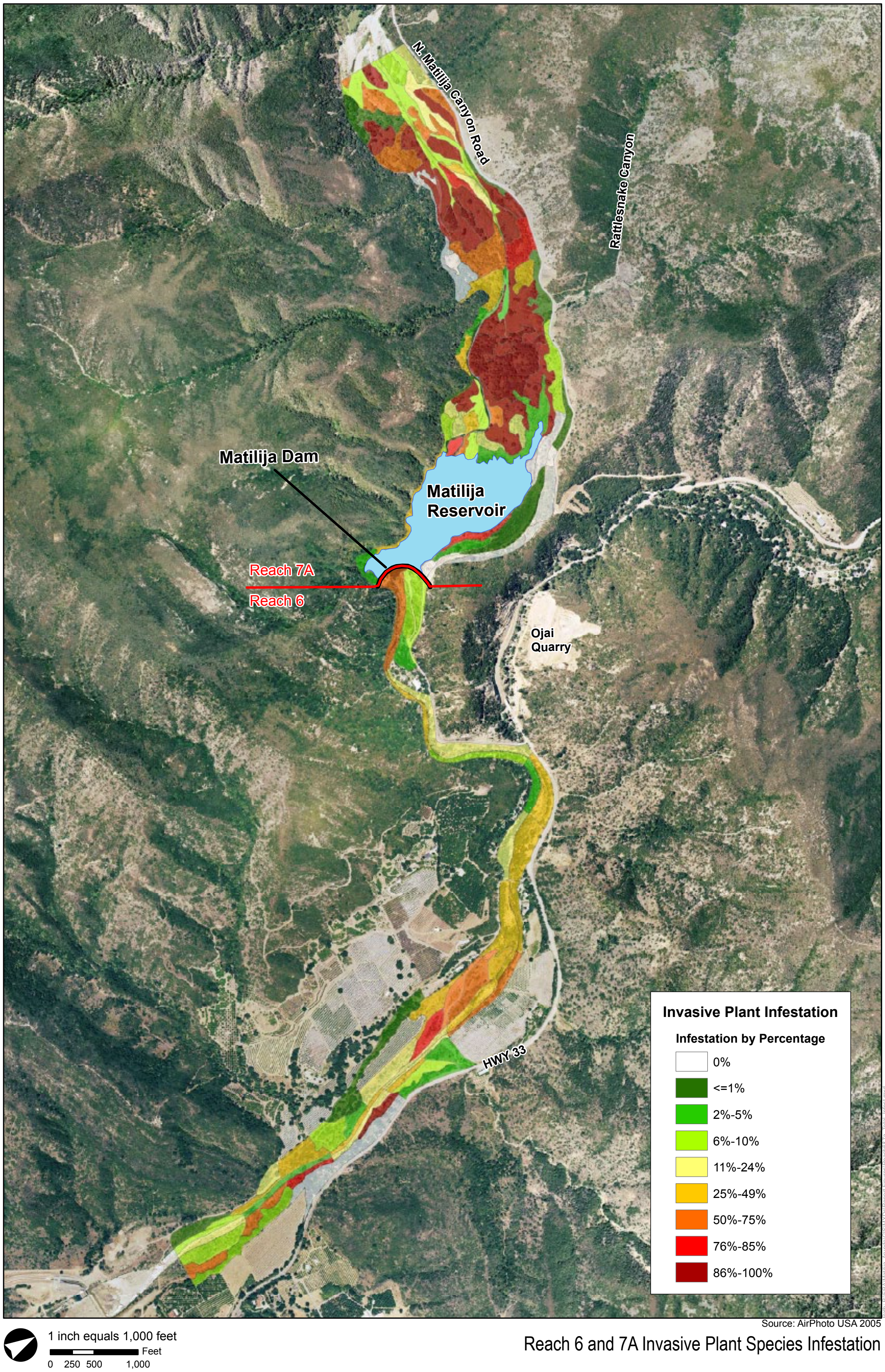


Figure 3.6.3.1.2 Map of *Arundo donax* Infested Areas Prior to Removal Efforts

Source: VCWPD and Ecosystems Restoration 2007

3.6.3.2 Key Data and Information Sources/ Further Reading

Below is a summary of some of key documents that address the Matilija Dam Ecosystem Restoration Project. See "4.3 References" for complete reference citations. See also www.matilijadam.org.

Draft Environmental Impact Statement/Environmental Impact Report for the Matilija Dam Ecosystem Restoration Project (USACE 2004)

Hydrology, Hydraulics and Sediment Studies of Alternatives for the Matilija Dam Ecosystem Restoration Project (USBR 2007)

Matilija Dam Ecosystem Restoration Feasibility Study Final Report (USACE 2004b)

Matilija Dam Ecosystem Restoration Project brochure (VCWPD 2014f)

Matilija Dam Ecosystem Restoration Project: Fine Sediment Study Group Final Report (Selkirk 2011)

Matilija Dam Removal, Sediment Transport, and Robles Diversion Mitigation Project: Draft Initial Options Screening Report (URS and Stillwater 2014)

Matilija Dam Giant Reed Removal Plan (VCWPD and Ecosystems Restoration 2007)

California River Parkways Trailhead Project, Initial Study (Aspen 2010)

Acronyms

cy—cubic yards

DOG—Design Oversight Committee

FSSG—Fine Sediment Study Group

MDERP—Matilija Dam Ecosystem Restoration Project

TAC—Technical Advisory Committee

USA—Upstream Storage Area

USACE—United States Army Corps of Engineers

VCWPD – Ventura County Watershed Protection District

3.6.4 Access to Nature

Healthy natural landscapes provide important ecosystem services, but these landscapes also provide equally important social and cultural benefits. The opportunity to spend time in nature adds value to life in ways that may be difficult to quantify—aesthetic, recreational, therapeutic, and spiritual—but are no less real. The Ventura River watershed's natural landscapes have long been valued by residents and visitors for such reasons.

Everybody needs beauty as well as bread, places to play in and pray in, where nature may heal and give strength to body and soul. —John Muir

The opportunity for people to enjoy natural landscapes firsthand can also serve to help protect those landscapes. People tend to protect what they enjoy, care about, and feel a connection with. Understanding the natural environment, and its important ecosystem services (e.g., cleaning water, cycling nutrients, controlling floods), provides further motivation to support and protect natural landscapes.

Mom and Daughter Enjoying Ventura River
Photo courtesy of Lynn Malone

People tend to protect what they enjoy, care about, and feel a connection with.

There are numerous opportunities for people come into contact with natural landscapes in the watershed, as over half of the land is in protected status—much of it in a relatively natural state. It is a recreation destination for hikers, walkers, bikers, surfers, campers, fishermen, boaters, backpackers, equestrians, and birders, as well as artists, spiritual seekers, and students of natural history.

The Ventura River watershed has three distinct landform zones: the mountains and foothills of the Transverse Ranges, the broad valley floors, and the coastal zone. The natural habitats and terrain, and the ways that people interact with them, are different in each zone.

The watershed's steep mountains are largely contained within Los Padres National Forest, where the trails are often steep, the views always spectacular, and most of the camping opportunities are backcountry. Aquatic habitats here are riparian corridors of young tributaries of the Ventura River—a number of which flow year round in many years.

The flatter foothills and valley floors have more easily accessible, family-oriented recreation opportunities. Trails are generally flatter, camping opportunities are car-accessible, and parks and preserves are available in some areas for convenient daily use. Aquatic habitats here are larger and include key drainages like San Antonio Creek and the Ventura River, man-made Lake Casitas, and natural and restored wetland habitats. Many of these habitats offer excellent birding and wildlife viewing.

Native Plant Viewing, Matilija Wilderness
Photo courtesy of Michael McFadden

Ventura's Westside community, located near the bottom of the Ventura River, has the highest population density and lowest median household income in the watershed. In this area, Highway 33 freeway and Ventura Levee block both access to and views of the river.

The coastal zone also has readily accessible recreation opportunities. Trails are paved along the beachfront and estuary and unpaved on the sandy and cobble-strewn delta, camping is car-accessible, parks and preserves provide access and amenities, and the vast Pacific Ocean offers spectacular views and a playground for a host of sports. In addition to habitats in coastal waters, aquatic habitats here include the Ventura River estuary—an exceptional biological resource and a great location for birding and wildlife viewing.

The watershed provides many opportunities for people of all ages to enjoy the outdoor environment; however, one area in particular is underserved: the City of Ventura's Westside. This community, located near the bottom of the Ventura River, has the highest population density and lowest median household income in the watershed. In this area, Highway 33 freeway and Ventura Levee block both access to and views of the river. Much of the river bottom, floodplain, and adjacent lands in the stretch of river below Foster Park is privately owned, and few people have the opportunity to experience it. The lower end of this stretch, near the estuary, has had a long history of heavy use by transient individuals for camping. This has further dissuaded community members in this area from utilizing the river for recreation (though this situation is now getting better). Improving the limited access to the river in this area is a priority for many stakeholders.

In providing access to nature, another consideration is the means by which people are able to get access. Is a car required? Is parking available? Is there a bus stop nearby? Bike racks? Are there access options for those using wheelchairs or who are otherwise less mobile? Are the needs of young and old considered? Is there a staging area for horse trailers? Access opportunities that serve all sectors of the community and all means of mobility are desired. In this regard, access opportunities for those traveling by bus or bicycle have been identified as deficient.

This section catalogs and describes the watershed's nature-based recreation facilities and activities in two sections:

- "3.6.4.1 Inventory of Nature-Based Recreation Facilities and Activities," organizes and describes facilities and activities by type; key data are summarized in tables.
- "3.6.4.2 Nature Access by Area," organizes and describes facilities and activities by location; the watershed is divided into seven different detail maps for a closer look at opportunities by area.

It should be noted that the information presented in this section is limited to those opportunities provided by public agencies and nonprofit organizations. There are also many nature-based recreation opportunities provided by privately owned facilities.

3.6.4.1 Inventory of Nature-Based Recreation Facilities and Activities

The watershed benefits from the many organizations committed to providing the public with access to nature and nature-based recreation opportunities. Federal, state, and local agencies, along with land conservancies, maintain and make available to the public significant natural land resources. Public recreational facilities are provided by six public agencies and two nonprofit organizations: the United States Forest Service, California State Parks, County of Ventura, City of Ojai, City of Ventura, Casitas Municipal Water District, Ojai Valley Land Conservancy, and Ventura Hillsides Conservancy.

Increased public access to natural landscapes provides many benefits, but also brings increased trash, erosion, animal waste, vandalism, fires, and other impacts to natural resources. The costs to monitor and correct these impacts are an ongoing consideration for organizations providing nature-based public access.

Los Padres National Forest Sign, Highway 33

Most of the public access opportunities in the watershed are free, so data quantifying public use of trails and recreation areas are limited. This makes it hard to track recreation use patterns such as use of recreational facilities by residents versus tourists. Facilities with fees include Lake Casitas, campgrounds, and county parks.

Nature Appreciation

Although not explicitly described in this section as an "activity," nature appreciation—connecting with the beauty and wonder of the natural world—may be at the heart of the instinct to spend time in nature for many people. The approach to nature appreciation is personal—some do it with silence, some paint or write poetry, some observe birds. Nature appreciation is also intangible—its value cannot be quantified in a table in this plan. Nonetheless, few question the deep value of the opportunity to appreciate nature.

Los Padres National Forest

Los Padres National Forest (LPNF) covers 69,062 acres within the watershed—most of the northern half. The Matilija Wilderness, a federally designated wilderness area, covers 23,477 acres of this land. Sixteen miles of Matilija Creek have been nominated for Wild and Scenic River designation (USACE 2004). The National Forest System lands within the watershed are located in the Ojai Ranger District.

Recreation opportunities in Los Padres National Forest include hiking, car camping, backpacking, fishing, hunting, bicycling, horseback riding, paragliding, hang-gliding, and wildlife viewing

Much of the LPNF land in the watershed comprises relatively undisturbed natural habitat. Recreation opportunities include hiking, car camping, backpacking, fishing, hunting, bicycling, horseback riding, paragliding, hang-gliding, and wildlife viewing.

The LPNF has many access points that allow visitors to explore its different landscapes. There are nine different trailheads within or leading to the LPNF. Fire breaks and other "unofficial" trails are also commonly used for recreation. Many of these trails provide relatively easy access to a wilderness experience close to urban areas. Highway 33 travels through the LPNF providing for scenic automobile, motorcycle, and bicycle touring.

The LPNF has two car-accessible campgrounds. Wheeler Gorge and Holiday Group Campgrounds are operated by a concessionaire and fees are collected by a campground host. (See "Campgrounds and Recreation Areas" below.) The Wheeler Gorge Visitor Center is located across the highway from Wheeler Gorge Campground. A number of backcountry campgrounds are also located in the LPNF within the watershed.

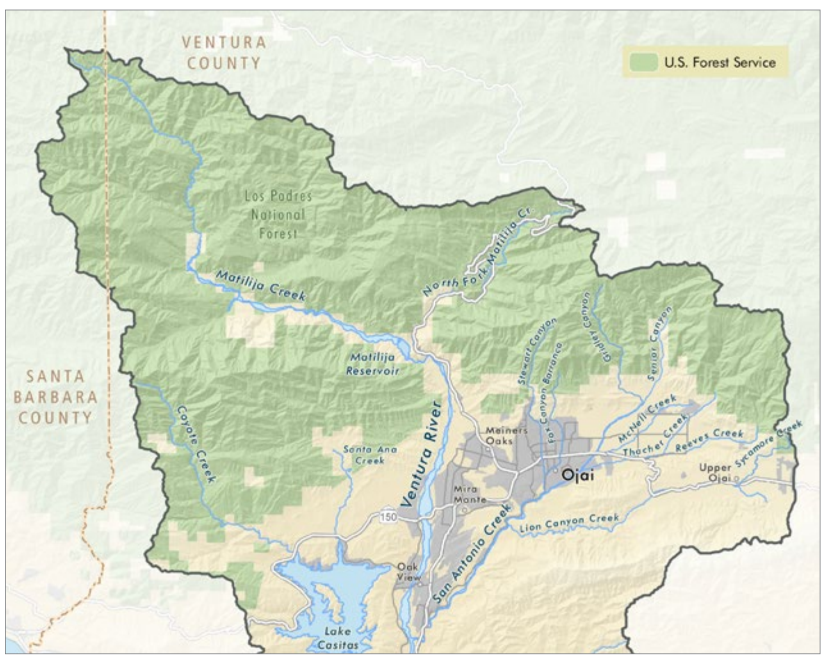


Figure 3.6.4.1.1 Los Padres National Forest Area Map

Except for Wheeler and Holiday Gorge Campgrounds, admission to the LPNF within the watershed is free. Purchase of a United States Forest Service (USFS) Adventure Pass is not required, except for car access to Nordhoff Ridge Road. Management of the LPNF is directed by the Los Padres Land Management Plan, which was revised in 2005 (USFS 2005a).

Recreation facilities at Lake Casitas include over 400 campsites including RV sites, showers, restrooms, 10 picnic areas, 11 playgrounds, special event areas, a water park, two boat ramps, boat rentals plus boat and trailer storage, a hiking/biking trail, a store, a café, and a radio-controlled airplane landing strip.

Lake Casitas Recreation Area

Aside from the LPNF, Lake Casitas Recreation Area (LCRA) is the largest outdoor recreational facility in the watershed. The LCRA includes Lake Casitas (2,700 acres) and the surrounding parkland (almost 400 acres). It is surrounded by thousands of acres of protected open space. All of the recreation area land lies along the north shore of the lake. No body contact with lake water is allowed as a water quality protection measure.

The LCRA provides a variety of recreation opportunities. Facilities include over 400 campsites including RV sites, showers, restrooms, 10 picnic areas, 11 playgrounds, special event areas, a water park, two boat ramps, boat rentals plus boat and trailer storage, a hiking/biking trail, a store, a café, and a radio-controlled airplane landing strip (CMWD 2005; URS 2010).

Lake Casitas Recreation Area Sign

Rowing is popular on the lake. The Lake Casitas Rowing Association provides recreational and competitive rowing training to youth and adults in the community.

The lake provides excellent opportunities for viewing wildlife, especially birds, which have come to depend on the lake's open water, protected bays, vegetated shallows, and freshwater marsh habitats. Lake Casitas is used by many resident and migratory birds, and is a very popular birding destination. The California Audubon Society recognizes Lake Casitas as one of 147 "Important Bird Areas" in the state—areas that provide essential habitat for breeding, wintering, and migrating birds (Audubon 2014). The lake hosts some species that occur nowhere else inland in Ventura County.

Fishing from a Dock, Lake Casitas
Photo courtesy of Fred Rothenberg

The lake is also well-known for its fishing, which takes place from docks, boats, and the shore. Lake Casitas is a warm water fishery that includes bass (primarily largemouth), catfish, sunfish, and crappie. These non-native species, introduced when the lake was formed, now have self-sustaining populations (Cardno-Entrix 2012).

Local land conservancies own and manage 1,953 acres of publicly accessible natural open space lands, with the Ventura River Preserve comprising 1,583 of these acres.

Management of the LCRA is guided by the Lake Casitas Final Resource Management Plan/Environmental Impact Statement (URS 2010).

Preserves

The Ojai Valley Land Conservancy (OVLC) and Ventura Hillsides Conservancy (VHC) are both actively acquiring and managing land, providing educational information and interpretive opportunities, and establishing new trails and access points in the watershed. Together, these conservancies own and manage 1,953 acres of publicly accessible natural open space lands, with the Ventura River Preserve comprising 1,583 of these acres. These lands are located close to urban population centers, providing convenient access to natural landscapes.

Ojai Meadow Preserve Sign

Recreation opportunities on these lands include hiking, bicycling, horseback riding, wildlife viewing, swimming, and wading.

OVLC's properties have over 22 miles of marked trails. Establishment of marked trails on VHC's properties is under development. Both conservancies' properties are well-used as field trip locations for local schools and youth groups.

Table 3.6.4.1.1 provides an overview of the seven publicly-accessible land preserves in the watershed.

Table 3.6.4.1.1 Public Preserves in the Ventura River Watershed

Preserve	Managed By[1]	Acres	Aquatic/Watershed Amenities
Ventura River Preserve	OVLC	1,583	Trail access to Ventura River, Wills Creek, Rice Creek
Ojai Meadow Preserve	OVLC	57	Trail access to freshwater marsh habitat
Valley View Preserve	OVLC	195	Trail access to watershed views
Ilvento Preserve	OVLC	80	Trail access to watershed views
Confluence Preserve	OVLC	13	Protects riparian habitat at the Ventura River/San Antonio Creek confluence; access is provided only by the adjacent Ojai Valley Trail
Big Rock Preserve (Upper and Lower)	VHC	17	Access to Ventura River, though trails unmarked
Willoughby Preserve	VHC	8	Access to Ventura River, though trails unmarked
	Total:	**1,963**	

1. OVLC – Ojai Valley Land Conservancy; VHC – Ventura Hillsides Conservancy

Camping at Lake Casitas

Campgrounds

There are seven public, car-accessible campgrounds in the watershed, several of which also serve as day use parks. There are eight established backcountry camps in the LPNF. Fees are charged only for the car-accessible campgrounds. Backcountry campsites are on a first-come first-served basis. A free California Campfire Permit is required to build a campfire in a backcountry camp. No fires are allowed during fire restrictions. The Los Padres National Forest website has information of fire restrictions. Table 3.6.4.1.2 lists the campgrounds in the watershed.

Table 3.6.4.1.2 Campgrounds

Detail Map #[1]	Facility	Type[2]	# of Camp Sites	Managed By[3]	Aquatic/Watershed Amenities
4	Camp Comfort	CC	15	County of Ventura	Next to San Antonio Creek
4	Dennison Park	CC	32	County of Ventura	Views of Ojai Valley
5	Emma Wood State Beach Group Campground	CC	4 group sites; 30 people per	State of California	Next to coast and Ventura River estuary
4	Foster Park Campground	CC	16	County of Ventura	Next to Ventura River
–	Gridley Springs Camp	BC	1	USFS	Off of Gridley Trail; follows Gridley Creek
1	Holiday Group Campground	CC	group site	USFS (via concessionaire)	Next to Cannon Creek
4	Lake Casitas Recreation Area	CC	400+	Casitas Municipal Water District	Access to Lake Casitas (though no body contact)
–	Maple Camp	BC	group camp	USFS	Off of North Fork Matilija Trail; next to Upper North Fork Matilija Creek
–	Matilija Camp	BC	several	USFS	Off of North Fork Matilija Trail; next to Upper North Fork Matilija Creek
–	Middle Matilija Camp	BC	several	USFS	Off of North Fork Matilija Trail; next to Upper North Fork Matilija Creek
–	Murietta Camp	BC	several	USFS	Off of Murietta Trail; next to Murietta Creek
–	Ortega Camp	BC	several	USFS	Off of Ortega Motorcycle Trail
–	The Pines Camp	BC	several	USFS	Off of Horn Canyon Trail; crosses Thacher Creek
–	Valley View Camp	BC	several	USFS	Off of Pratt Trail; next to Stewart Canyon Creek
1	Wheeler Gorge Campground	CC	72	USFS (via concessionaire)	North Fork Matilija Creek and Bear Creek pass through campground.

1: Backcountry campgrounds are not included on the maps. The USFS has information on these campgrounds.

2: BC – Backcountry Campground, CC – Car-Accessible Campground

3: USFS – United States Forest Service

Sources: Ojai Trails (LPFA 2014); Hiking & Backpacking Santa Barbara & Ventura (Carey 2014);

Parks and Recreation Areas

Table 3.6.4.1.3 lists the nine nature-based parks and recreation areas in the watershed.

Table 3.6.4.1.3 Parks and Recreation Areas

Detail Map #	Facility	Managed By	Aquatic/Watershed Amenities
4	Camp Comfort[1]	County of Ventura	Next to San Antonio Creek
4	Dennison Park[1]	County of Ventura	
5	Emma Wood State Beach Group Campground[1]	State of California	Access to coast and Ventura River estuary
4	Foster Park	County of Ventura	Next to Ventura River
5	Grant Park	City of Ventura	Views of the watershed
4	Lake Casitas Recreation Area[1]	Casitas Municipal Water District	Access to Lake Casitas
5	Seaside Wilderness Park	State of California (west of river) City of Ventura (east of river)	Access to the Ventura River cobble delta and sand dunes
4	Soule Park	County of Ventura	Next to Thacher Creek
5	Surfers' Point	City of Ventura and Ventura County Fairgrounds/31st District	Ocean and estuary access

1. Also a campground

Trails

The watershed is home to over 40 trails that are maintained for public access. In addition to pedestrian access for walking, hiking, and backpacking, many of these trails provide access to bicyclists and equestrians. These trails are summarized in Table 3.6.4.1.4.

Table 3.6.4.1.4 Trails in the Watershed

Detail Map #	Trail Name	Trail Uses[1]	Miles[2]	Difficulty	Trailhead, Route & Notes
			Casitas Municipal Water District		
4	Lake Shore Trail	F, B	2.1	Easy	Unpaved trail begins at the eastern end of the paved road in the Lake Casitas Recreation Area (LCRA). Beginning from the free parking area outside of the LCRA entrance adds 1.4 miles to the walk/ride.
			City of Ventura Trails		
5	Omer Rains Trail	F, B, P	2[3]	Easy	Runs from San Buenaventura State Beach to Emma Wood State Beach
5	Ventura River Trail	F, B, P	6.3	Easy	Main St., Ventura to Foster Park
			County of Ventura Trails		
4	Ojai Valley Trail	A, F, B, P	9.5	Easy	Foster Park to Fox St., Ojai
2	Shelf Road	F, B, H	1.75	Easy	N. Signal St. (trailhead) to Gridley Rd. (trailhead)
4	Sulphur Mountain Road	F, B, H	10.5	Mod	From trailhead to trailhead (Sulphur Mountain Rd. at Casitas Springs to Sulphur Mountain Rd. at Upper Ojai)

Table 3.6.4.1.4 Trails in the Watershed *(continued)*

Detail Map #	Trail Name	Trail Uses[1]	Miles[2]	Difficulty	Trailhead, Route & Notes
					Ojai Valley Land Conservancy Trails
	Ilvento Preserve				
2	Huntington Trail	F, B, H	1	Easy-Mod	Thacher School (trailhead) to Forest N. Cook Trail
2	Forest N. Cook Trail	F, B, H	1	Easy-Mod	Connects lower to upper Huntington Trail
	Ojai Meadow Preserve				
3	Interpretative Loop Trail	F, B	1	Easy	Various trail segments in Ojai Meadow Preserve
	Valley View Preserve				
2	Foothill Trail	F, B	1.1	Easy-Mod	OVLC maintains sections of Foothill Trail on their preserve
2	Fox Canyon Trail	F, B	1.03	Mod-Diff	Shelf Road (trailhead) to Foothill Trail
2	Luci's Trail	F, B	0.75	Mod-Diff	Shelf Road (trailhead) to Foothill Trail
	Ventura River Preserve[4]				
3	Chaparral Crest Trail	F, B, H	2.9	Mod	West side of river; see map
3	Fern Grotto Trail	F, B, H	0.3	Mod	West side of river; see map
3	Kennedy Ridge Trail	F, B, H	1.0	Mod	West side of river; see map. (Trail distance is to the edge of the preserve, not the end of the trail.)
3	Rice Canyon Trail	F, B, H	1.5	Mod	West side of river; see map
3	Oso Ridge Trail	F, B, H	1.5	Mod-Diff	West side of river; see map
3	Wills Canyon Trail	F, B, H	2.2	Easy-Mod	West side of river; see map
	Other				
2	Fuelbreak Road Easement	F, B	1.0	Easy-Mod	OVLC maintains an easement over private property at the far east end of Fuelbreak Road
					State of California Trails
5	Emma Wood River Trail	F	0.7	Easy	Loop from Emma Wood Group Campground to estuary and back. Connects to Ocean's Edge Trail. Note: often occupied by transient campers.
5	Ocean's Edge Trail	F, B	0.6	Easy	Trailhead in Emma Wood State Beach Group Campground. Travels next to coast through Seaside Wilderness Park to Ventura River estuary. Connects with Emma Wood River Trail.
					US Forest Service Trails
1	Cozy Dell Trail	F, B, H	2.1	Mod	Hwy 33 (trailhead) to Foothill Trail
1	Dry Lakes Ridge	F, B, H	2.3	Diff	Hwy 33 (access) to the basins; another 2.9 to Ortega Motorcycle Trail. Accessed by an old, unmaintained bulldozer line.
2	Foothill Trail	F, B, H	1.3	Mod	From Cozy Dell Trail to dead-end just past Luci's Trail
2	Fuelbreak Road	F, B, H	2.3	Mod	Connects Gridley Trail to Pratt Trail (and trails in between)
2	Gridley Trail	F, B, H	7.1	Mod-Diff	North end of Gridley Rd. (trailhead) to Nordhoff Ridge Road
2	Horn Canyon Trail	F, B, H	4.9	Mod-Diff	Thacher School (trailhead) to Nordhoff Ridge Road
1	Murietta Divide Road	F, B, H	4.2	Diff	Main trailhead to Murietta Divide Road at T-intersection, then up to the divide

FINAL DRAFT

Table 3.6.4.1.4 Trails in the Watershed *(continued)*

Detail Map #	Trail Name	Trail Uses[1]	Miles[2]	Difficulty	Trailhead, Route & Notes
1	Murietta Trail	F, B, H	2.4	Easy-Mod	Main trailhead to Murietta Trailhead - 0.7 miles, then 1.7 miles to junction with Murietta Divide Road
2	Nordhoff Ridge Road	F, B, H	12.7[3]	Easy	The ridge runs from above Wheeler Gorge to the top of Horn Canyon, then continues into the Santa Clara River watershed
1	North Fork Matilija Trail	F	8.5	Easy-Diff	Main trailhead to North Fork Matilija Trailhead - 0.6 miles, then 7.9 miles to Cherry Creek Road trailhead
2	Ortega Motorcycle Trail	F, B, M	8.9	Mod	Hwy. 33 (trailhead) to Cherry Creek Road trailhead. Rough conditions. Seasonal closures.
2	Pratt Trail	F, B, H	4.8	Diff	N. Signal St. (trailhead) to Nordhoff Ridge Road
2	Wheeler Gorge Nature Trail	F	0.7	Easy	Loop from Hwy. 33 (trailhead)

1: ADA Accessible, B-Bike, F-Foot, H-Horse, HC-High-Clearance Vehicles, M-Motorcycle, P-Paved,

2: One-way unless otherwise indicated.

3: Mileage represents only the part of trail within the watershed.

4: Not all of the Ventura River Preserve Trails are included here or labeled on the map.

Sources: Carey 2014; Ventura County Trails 2014; LPNF 2014; Walter 2014

Ojai Valley Trail. The Ojai Valley Trail (known as the Ventura River Trail below Foster Park), runs 15.8 miles from the City of Ojai down to the coast, following an old railway route for most of the way. The trail is very popular with bicyclists, as well as walkers and horseback riders (on the Ojai Valley Trail segment). At the coast, the trail connects to the Omer Rains Trail, which runs along the coast to the San Buenaventura State Beach.

Photo courtesy of Michael McFadden

San Antonio Creek Bridge, Ojai Valley Trail

Ventura River Parkway

The "Ventura River Parkway" is a vision actively pursued by a coalition of stakeholders. The river parkway would create a continuous network of publicly accessible trails, vista points, and natural areas along the river, from the coast to Matilija Canyon. Existing trails form the beginnings of the parkway. By working with willing landowners on a voluntary basis over time, supporters hope that a parkway will take shape that will yield the many health, quality of life, and economic benefits seen in other communities that have established river parkways.

California River Parkways Act

In 2004, the state Legislature passed the California River Parkways Act, which outlined the following values of river parkways:

(a) River parkways directly improve the quality of life in California by providing important recreational, open space, wildlife, flood management, water quality, and urban waterfront revitalization benefits to communities in the state.

(b) River parkways provide communities with safe places for recreation including family picnics; bicycling and hiking; areas for river access for swimming, canoeing, and fishing; and many other activities.

(c) River parkways help revitalize deteriorated urban neighborhoods and provide an anchor for economic development by providing important recreational and scenic amenities.

(d) River parkways provide accessible open space that helps remedy the severe shortage of park and open-space areas that plague many urban and suburban communities, small towns, and rural areas.

(e) River parkways provide flood protection benefits for communities by providing wider corridors along our waterways that help store, and provide safe corridors for the passage of, storm waters.

(f) River parkways protect and restore riparian and riverine habitat.

(g) River parkways improve or protect the water quality in our rivers and streams.

(h) River parkways provide the recreational and ecosystem components of integrated regional water management and watershed plans.

(i) California can improve the quality of life in this state by assisting public agencies and nonprofit organizations in establishing, developing, and restoring river parkways.

—*California River Parkways Act of 2004: California Public Resources Code 5751(b)*

In 2010 (with funding from the California Coastal Conservancy, and sponsorship by The Trust for Public Land and VHC), California Polytechnic University Pomona (CalPoly) created a conceptual document, *Vision Plan for the Lower Ventura River Parkway* (vision plan) for the lower parkway (from the coast to Foster Park) (CalPoly 2008/2010). The vision plan, developed by CalPoly's Department of Landscape Architecture, presents a vision for the lower parkway based on local research and stakeholder input. The 317-page vision plan includes a detailed characterization of the lower watershed, complete with maps, photos, and data graphs. Sketches of potential future parkway features help bring the community vision to life.

The vision plan was intended to educate and engage the community and prospective funders about the potential for a river parkway that is compatible with recreational use, stewardship, river function, and regional ecosystems. Because it was intended to be a visioning document, the project team did not overly constrain themselves with the pragmatic hurdles that would be involved in implementing some of the design features. The plan outlines big ideas to stimulate possibilities.

Vision Plan Sketch

Source: Vision Plan for the Lower Ventura River Parkway (CalPoly 2008/2010)

National Recreation Trail Designation

Two existing trails form part of the Ventura River Parkway Trail: the Ojai Valley Trail and the Ventura River Trail. These interconnected multi-use trails connect the coast to the City of Ojai. In June 2014, this part of the Ventura River Parkway Trail was designated a National Recreation Trail (NRT). The NRT designation recognizes existing trails and trail systems that link communities to recreation opportunities on public lands and in local parks across the nation. Each designated trail is identified with a set of trail markers.

National Recreation Trail Sign, Ventura River Parkway

Viewpoints

Views of the river and other natural landscapes offer another important way that residents and visitors have access to nature. Viewpoints that are easily accessible by car or an easy walk allow less mobile individuals to see and enjoy these resources. Some of the watershed's key, readily accessible viewpoints—many of them at bridges—are summarized in this section.

Main Street Bridge

Photo Courtesy of Santa Barbara Channelkeeper

Table 3.6.4.1.5 Viewpoints

Viewpoint	View and Conditions[1]
Main Street Bridge	Views of lower Ventura River, just above the estuary. Typically has perennial flow.
Casitas Vista Bridge	Views of lower-middle Ventura River at Foster Park. Typically has perennial flow.
San Antonio Creek Bridge (on Ojai Valley Trail)	Views of the convergence of San Antonio Creek with Ventura River and the "confluence pool." Typically has perennial flow.
Santa Ana Bridge	Views of upper-middle Ventura River in the river's dry reach. Typically dry.
Santa Ana Road	Expansive views of the upper-middle Ventura River along the road. Typically dry.
Highway 150 Bridge	Views of the upper-middle Ventura River in the river's dry reach. Typically dry.
Highway 150 above Lake Casitas	Views of Lake Casitas.
Surfers' Point	Ocean views.
Grant Park	Views of the entire lower watershed, estuary, and coast.
Highway 33 - State Scenic Highway	Views of the steep, chaparral-covered mountains of the Los Padres National Forest and the Transverse Ranges.
Dennison Park	Views of the Ojai Valley's East End.

1. Conditions in the Ventura River are quite variable from year to year. "Typical" here indicates conditions in most years except during extended, multi-year droughts.

FINAL DRAFT

No Fishing Sign, Ventura River Estuary

Fishing

Lake Casitas is a popular fishing destination known for its "world class" bass fishing. In addition to largemouth bass, the lake is filled with rainbow trout, crappie, red-ear sunfish, bluegill and channel catfish.

Stream fishing in the watershed is permitted (for any species of fish) only above "anadromous waters," which are inland waters that are accessible to fish migrating from the ocean. This limits stream fishing to Matilija Creek above Matilija Dam, and North Fork Matilija Creek above Wheeler Gorge Campground.

Aquatic Recreation

Swimming, wading, surfing, boogie boarding and other body contact sports are very popular year-round activities in the watershed's coastal ocean waters. Swimming in the estuary is uncommon, though children can sometimes be seen wading around its edges.

Swimming and other body contact sports are not allowed in Lake Casitas or Matilija Reservoir.

Small, unmarked swimming holes can be found along the Ventura River, Matilija Creek, and North Fork Matilija Creek. Water levels in these swimming holes depend upon local groundwater and surface water levels.

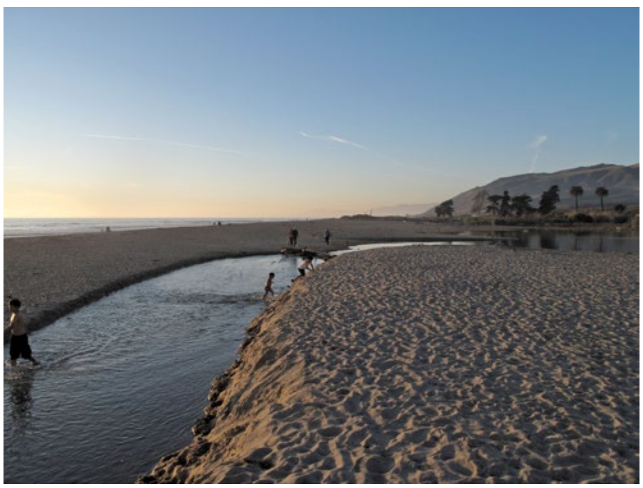
Swimming Hole, Ventura River Preserve

Photo courtesy of Ojai Valley Land Conservancy

Boys Relocating Crayfish, Lower Ventura River

Kiteboarders, Surfers' Point

Photo courtesy of Santa Barbara Channelkeeper



Kids Playing in Ventura River Estuary

Kayaking on Lake Casitas near Dam

On the rare occasions when the Ventura River water levels are high enough to be navigable by boat, the strong flows and rocky conditions are generally unsafe for boating.

> … during each summer in the early years of the 20th century, the county forester built a rock dam across the river at Foster Park to form a free swimming hole for visitors, as instructed by E. P. Foster (Percy 1976).
>
> —*Vision Plan for the Lower Ventura River Parkway – Reconnecting People with the Ventura River* (CalPoly 2008/2010)

Environmental Information and Interpretation

More insight into the watershed's natural habitats can greatly enhance visitor's appreciation of and connection to a natural site, greatly enriching their experience there. By providing environmental information and interpreting that information, resource managers aim to cultivate educated and appreciative visitors, and to encourage respect for and stewardship of those resources.

Environmental information is typically communicated through signs, printed materials, and websites.

Interpretive Sign, Ventura River Estuary

This section summarizes the watershed's key onsite environmental information and interpretation programs provided by public agencies and nonprofits. Private businesses also offer nature-based interpretive opportunities in the watershed.

Interpreting environmental information is a way of translating factual information into stories, firsthand experiences, or graphic images. Interpretive workshops, field trips, displays, tours, and presentations are all offered in the watershed to help people develop a meaningful connection with environmental resources, relationships, or processes.

Onsite static information in the form of signs or displays is under-developed. Vandalism of such resources has been a significant problem. Online information is well developed, especially with the completion of this watershed management plan. Part 3 of this plan, "Watershed Characterization," includes a comprehensive overview of the watershed's geology, hydrology, ecosystems, and water quality—illustrated with a comprehensive atlas of maps that are now available for use in interpretive materials (www.venturawatershed.org/map-atlas).

Information about the watershed's nature-based access opportunities needs to be better communicated to the public through a variety of different media in English and Spanish.

Wheeler Gorge Visitor Center

The Wheeler Gorge Visitor Center offers educational information and programs about the flora, fauna, geography, geology, natural history, trails, and camps of the LPNF. The center is located at 17017 Maricopa Highway about eight miles north of the City of Ojai, and across Highway 33 from Wheeler Gorge Campground. It is open weekends year round. Picnic sites are provided at the center. The Los Padres Forest Association manages the facility under an agreement with the USFS.

Wheeler Gorge Visitor Center

Ojai Valley Land Conservancy

Ojai Valley Land Conservancy Interpretative Plant Hike

Photo courtesy of Ojai Valley Land Conservancy

The OVLC offers many ongoing environmental interpretation programs. OVLC's monthly "Wild About Ojai" lecture series offers programs on different topics such as geology, fire ecology, watershed health, Chumash history, and native plants. Guided hikes on OVLC's preserves are offered periodically—some are general interpretive hikes and some focus on specific topics such as birds. Preserve tours are offered on request for groups of six or more; tours cover the preserve's history, ecology, trail system, and more. OVLC also partners with the nonprofit Once Upon a Watershed to host school field trips on their preserves. Kiosks at several OVLC trailheads—Old Baldwin Road, Riverview, Valley View, and Ojai Meadow Preserve (next to Nordhoff High School)—provide trail information and some information on plants and animals found on the preserves.

Ventura Hillsides Conservancy

The VHC offers many educational and outreach programs each year. Partnering with Santa Barbara Channelkeeper (as well as Surfrider Foundation and Audubon Society when possible), VHC coordinates field trips for local schools, introducing children to the issues and environment of the Ventura River watershed. VHC conducts outreach activities at local events, educating the public about the value of the watershed and recruiting volunteers to help clean trash and restore habitat in the lower river. During the wet season, they organize tree planting events on their preserves, removing non-native weeds and replacing them with native trees. VHC hosts guided preserve tours by appointment year-round.

Ventura Hillsides Conservancy Tour of Willoughby Preserve

Once Upon a Watershed

Once Upon a Watershed is a nonprofit program that provides hands-on watershed education, restoration, and stewardship experience to 4th, 5th, and 6th grade students in the Ventura River watershed. This nonprofit partners with OVLC to provide to provide school field trips on their preserves.

California State Parks

The Channel Coast District of California State Parks offers summer campfire interpretive programs at Emma Wood State Beach Campground; their staff also provides guided tours, kayak instruction, and ancient native technology classes as time permits. The district offers one of the largest junior lifeguard programs in the state with nearly 1,000 participants a year, ranging from 9 to 17 years old. In addition to water safety and awareness, the lifeguard program incorporates an introduction to the surrounding flora and fauna. The junior lifeguard program is held at San Buenaventura State Beach, just south of the watershed.

City of Ojai/Ventura Wild

The City of Ojai's Recreation Department partners with the Ventura Wild organization to provide wilderness discovery programs, including seasonal camps, for youth in the Ojai Valley.

City of Ventura's Interpretive Outreach Program

For over 30 years the City of Ventura has been providing an Interpretive Outreach Program to students (preschool to 6th grade), providing them with interactive education programs both in the classroom and at local parks, beaches, and historic sites. These programs correspond with the California Science and History-Social Science curriculum framework

City of Ventura's Interpretive Outreach Program. The City of Ventura's Interpretive Outreach Program serves more than 16,000 participants annually.

Photo courtesy of City of Ventura

and content standards. During a nature study field trip, classroom presentation, or living history field trip, students are actively engaged as they learn through direct hands-on experience. The City of Ventura's Interpretive Outreach Program serves more than 16,000 participants annually, including those from schools outside of the City of Ventura.

Santa Barbara Channelkeeper

Santa Barbara Channelkeeper (SBCK) provides watershed education for a variety of students including college, high school, and elementary school students. SBCK meets with classes at sites throughout watershed for field trips. Topics covered include the history of the watershed, current issues, and the importance of water quality monitoring. SBCK also works with teachers individually, and collaborates with community organizations including VHC and Once Upon a Watershed.

Santa Barbara Channelkeeper Water Quality Educational Field Trip

Photo courtesy of Santa Barbara Channelkeeper

3.6.4.2 Nature Access by Area

This section provides descriptions of nature access opportunities in the following five geographic areas:

Up Highway 33 (Detail Map 1)

Ojai Front Country (Detail Map 2)

Ventura River Preserve (Detail Map 3)

Ojai Valley & Upper Ojai (Detail Map 4)

Coastal Area (Detail Map 5)

Trailheads are numbered in this section to reflect the number used to identify them on the Detail Maps.

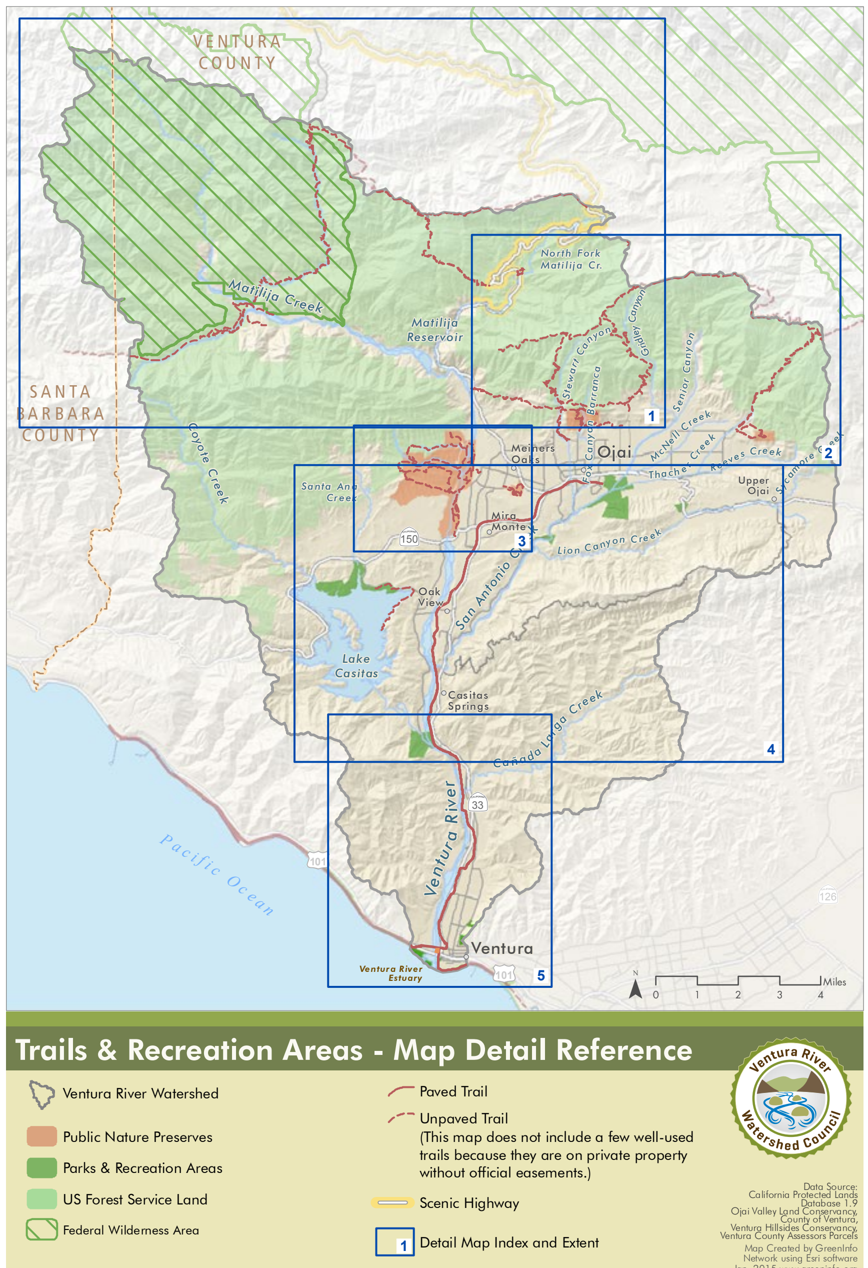


Figure 3.6.4.2.1 Trails & Recreation Areas – Map Detail Reference

Up Highway 33 (Detail Map 1)

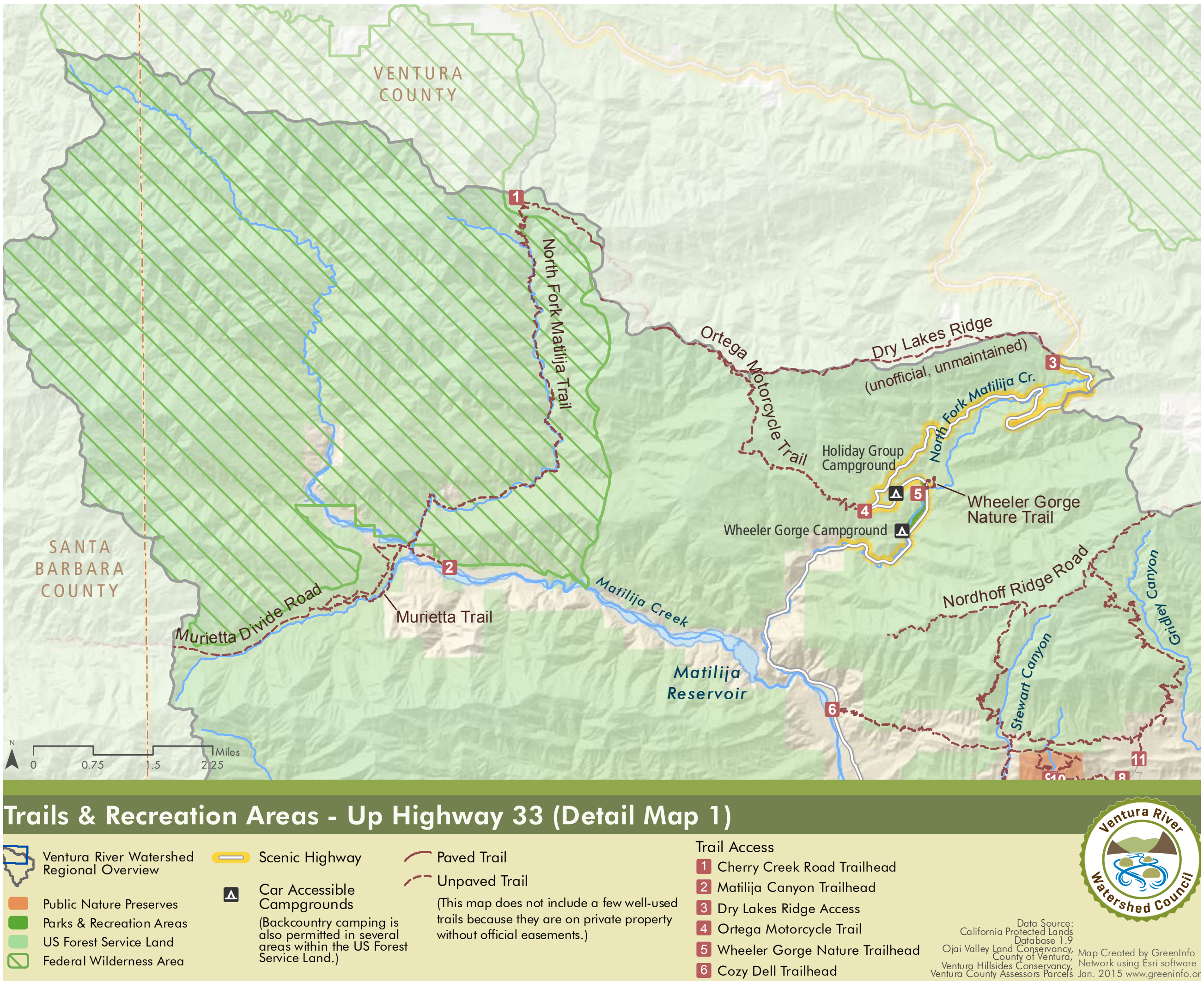


Figure 3.6.4.2.2 Trails & Recreation Areas – Up Highway 33 (Detail Map 1)

Habitat and Terrain in Los Padres National Forest

The habitat in the LPNF is largely pristine chaparral. Alluvial, mulefat, and riparian scrub habitats, as well as alder and other riparian forests, are found along streams. Patches of coast scrub and oak woodland are also found here, and there are montane/conifer forests at higher elevations. The terrain is steep.

1. Cherry Creek Road Trailhead

Located three miles off of Highway 33 on a rough dirt road. Cherry Creek Road is approximately 27 miles past Ojai. The trailhead provides access to both North Fork Matilija Trail and Ortega Motorcycle Trail. Trailhead has a dirt parking area. The road is only open from August 1 to December 15.

2. Matilija Canyon Trailhead

Located at the end of Matilija Road, 4.9 miles past the junction with Highway 33. The Matilija Canyon trailhead, provides access to a vast expanse of wilderness. Much of this area lies within the Matilija Wilderness, a federally designated wilderness area. Trailhead has a dirt parking

Matilija Creek Crossing

area. The trails that lead from the Matilija Canyon trailhead follow drainages that commonly flow year-round: Upper North Fork Matilija Creek, Murietta Creek, and Matilija Creek. These creeks are the primary headwaters of the Ventura River watershed. Swimming holes exist depending on the current water conditions. Fishing is allowed in these drainages since the endangered steelhead cannot get past Matilija Dam.

Car Break-Ins at Trailheads

Car break-ins at trailheads do occasionally happen at some of the watershed's trailheads. Do not leave valuables in the car or the trunk, especially where they would be visible from the outside.

North Fork Matilija Trail Sign

North Fork Matilija Trail

Hiking, horseback riding, swimming/wading, backcountry camping

First trail off the main road, on the right, just past the second creek crossing. Follows Upper North Fork Matilija Creek. The trail goes through wilderness so travel is restricted to foot or horseback (no bikes in wilderness). Ends at Cherry Creek Road trailhead.

Murietta Trail

Hiking, biking, horseback riding, backcountry camping (Murietta Camp)

Second trail off the main road, on the left, shortly after the North Fork Matilija Trail. Offers backcountry camping, swimming and fishing. Meets up with and follows Murietta Creek, then merges with Murietta Divide Road.

Two North Fork Matilija Creeks?

The watershed has two North Fork Matilija Creeks. The one that follows Highway 33 down from the top of the watershed is called "North Fork Matilija Creek;" the one that travels through the Matilija Wilderness in the western corner of the watershed and is an early tributary of Matilija Creek is called "Upper North Fork Matilija Creek." However, the trail that follows this creek is called the "North Fork Matilija Trail."

Murietta Creek Trail

FINAL DRAFT

Murietta Divide Road

Hiking, biking, horseback riding

Begins at the T-intersection at the end of the main road. Turn left. Goes to Murietta Divide and beyond into Santa Barbara County.

Scenic Highway

Scenic driving, biking

As Highway 33 climbs out of the Ojai Valley heading north, the landscape quickly turns to the rugged mountains of the Transverse Ranges. The highway follows the Ventura River, and then North Fork Matilija Creek—one of the two tributaries that feed into and form the Ventura River. Nine miles of Highway 33 within the watershed are designated as a National Forest Scenic Byway and a State Scenic Highway. The State Scenic Highway begins where Highway 33 crosses into USFS land 6.4 miles north of Highway 150, and extends to the top of the watershed and beyond to the Santa Barbara County line (CDOT 2014). Considered to be one of the most "picturesque national forest locations" (USFS 2005), the scenic highway features panoramic vistas of steep, chaparral-covered mountains and relatively undisturbed habitats. This scenic drive is itself a recreational destination for many people.

Highway 33 Scenic Highway

3. Dry Lakes Ridge

Hiking

Access to this area starts at an unmarked dirt turnout with parking, located 25 miles past the Wheeler Gorge Campground on the south side of Highway 33. An old, unmaintained bulldozer line leads up to Dry Lakes Ridge and the USFS's Dry Lakes Ridge Botanical Area, an area protected for its special botanical resources. The first segment is an exceedingly steep firebreak. This route is not well used, so some bushwhacking through sharp chaparral along the ridge can be expected.

Dry Lakes Ridge

4. Ortega Motorcycle Trailhead

Hiking, biking, motorcycle riding (some parts are inaccessible to motorcycles), backcountry camping (Ortega Camp)

Located on the west side of Highway 33 1.6 miles above the Wheeler Gorge Campground entrance. The trailhead is a dirt turnout with limited parking and only marked by a small trail sign. The trail is very rough and steep in places and subject to closures. It ends at the Cherry Creek Canyon Road trailhead at the top of the watershed.

Holiday Group Camp

Camping

Located on the west side of Highway 33 about one mile north of the Wheeler Gorge Campground entrance. The campsite is partially shaded with oaks and scrub oaks. This USFS campground has seven campsites.

Wheeler Gorge Nature Trail Sign

5. Wheeler Gorge Nature Trailhead

Hiking

Located on the west side of Highway 33, one half mile above the Wheeler Gorge Campground entrance. The trailhead has limited parking on either side of the highway. The trail is an easy, 0.7-mile loop that follows the North Fork Matilija Creek then climbs up into chaparral habitat and descends back. Fifteen trail markers identify native plants; a brochure interpreting the self-guided hike is available from the Wheeler Gorge Visitors Center.

Wheeler Gorge Campground

Car-accessible camping, hiking, swimming/wading, fishing

Located on Highway 33 about eight miles north of the City of Ojai. The campground is located in a shaded riparian corridor surrounded by high, rocky canyon walls. North Fork Matilija Creek and Bear Creek flow through the campground, the North Fork flows year round. This USFS campground has 72 campsites. Fishing is allowed in the campground on North Fork Matilija Creek upstream of a road crossing that acts as a fish passage barrier. Across the highway is the Wheeler Gorge Visitor Center (described earlier in this section).

6. Cozy Dell Trailhead

Hiking, biking, horseback riding

Located near Friends Packing House on the east side of Highway 33, 3.3 miles north of the City of Ojai. There is ample parking on the west side of the highway. The first mile of the trail is fairly steep and often shaded, and at the top offers exceptional views of the watershed. The trail connects to Cozy Dell Road and the Foothill Trail.

Wheeler Gorge Campground

Ojai Front Country (Detail Map 2)

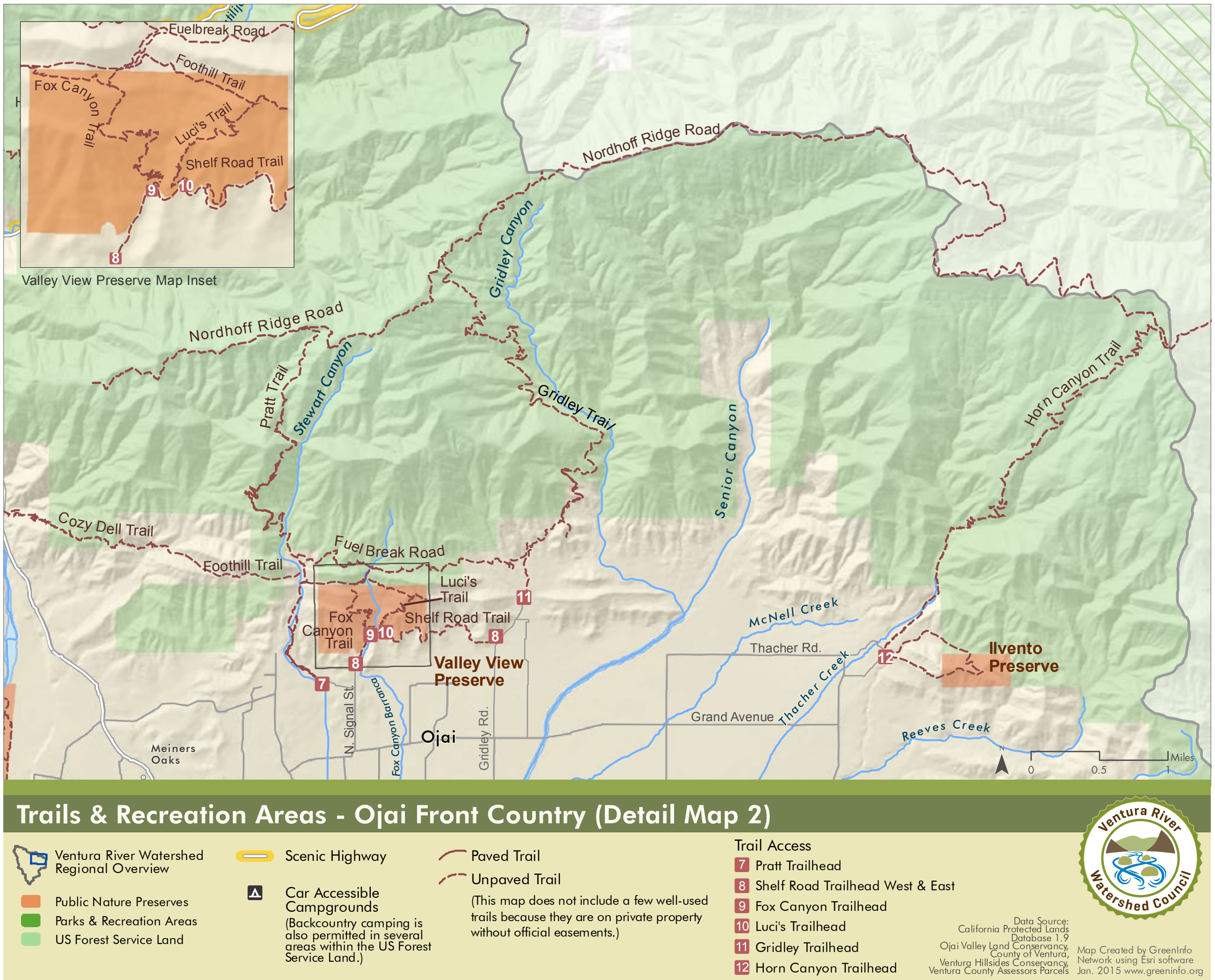


Figure 3.6.4.2.3 Trails & Recreation Areas – Ojai Front Country (Detail Map 2)

A network of publicly accessible trails crisscrosses the foothills and steep mountains that rise up from the Ojai Valley floor to Nordhoff Ridge. Many of these trails lead into the LPNF. The system of trails here provides different opportunities for day hiking, mountain biking, horseback riding, and backcountry access. Many of these trails follow drainages, and all of them provide spectacular views. Some trails are quite steep in places.

Nordhoff Ridge Road

Hiking, biking, horseback riding, driving (4-wheel-drive vehicles only), paragliding, hang-gliding, backcountry camping

Nordhoff Ridge Road travels along Nordhoff Ridge at the top of the watershed, providing commanding views all around. Several trails lead up from the watershed and end at this road. A permit from the USFS is required to drive on the road, which is accessed by vehicle from the Rose Valley Campground (located outside the watershed).

Fuelbreak Road

Hiking, biking, horseback riding

Runs more-or-less horizontally across the mountainside and connects Gridley Trail with Pratt Trail. The east end of the trail near Gridley Trail is a public easement over private property.

Foothill Trail

Hiking, biking, horseback riding (no horses on OLVC's portion of Foothill Trail)

Runs horizontally across the mountainside and connects Cozy Dell Trail, Pratt Trail, Fox Canyon Trail, and Luci's Trail.

Biking on Foothill Trail
Photo courtesy of Chad Ress

7. Pratt Trailhead

Hiking, biking, horseback riding, backcountry camping (Valley View Camp)

Located above the Stewart Canyon debris basin, up N. Signal Street. The trailhead has a dirt parking area. The lower end of Pratt trail follows Stewart Canyon Creek; the trail then heads up the steep slope of Nordhoff Ridge, ending at Nordhoff Ridge Road and Nordhoff Peak (4,485 ft). The trail's lower section ties into the Cozy Dell Trail, Foothill Trail, and Fuelbreak Road.

8. Shelf Road Trailheads West and East

Hiking, biking, horseback riding

A trailhead is located at each end of Shelf Road. The western trailhead is at the top of N. Signal Street and the eastern trailhead is on Gridley Road. Parking is on-street on N. Signal Street (or at the Pratt trailhead), and there is a small dirt parking area on Gridley Road. Shelf Road is a relatively flat trail.

Valley View Preserve Trailhead Kiosk

Photo courtesy of Ojai Valley Land Conservancy

Valley View Preserve

Hiking, biking

Located adjacent to and above Shelf Road. This 195-acre Ojai Valley Land Conservancy preserve includes the mountainside behind the City of Ojai and two short, steep trails that connect to Foothill Trail and Shelf Road. The preserve is accessed from Shelf Road.

9. Fox Canyon Trailhead
10. Luci's Trailhead

Hiking, biking

Both trailheads are accessed by foot off of Shelf Road—Luci's is bit farther east than Fox Canyon. Both trails are quite steep and connect to Foothill Trail.

11. Gridley Trailhead

Hiking, biking, horseback riding, backcountry camping (Gridley Springs Camp)

Located in the East End of the Ojai Valley at the north end of Gridley Road. The trailhead is off of a cul-de-sac and parking is on-street. The trail ends at Nordhoff Ridge Road. A horse trough is located about a third of the way to the top. Question: Is there usually water in this trough? May want to clarify.

Gridley Trailhead Sign

FINAL DRAFT

Ilvento Preserve

Located in the East End of the Ojai Valley on the private Thacher School campus near the Gymkhana Field. The 80-acre preserve offers great views. Park at the Horn Canyon trailhead parking area and follow the road to the right a short distance to the Ilvento Preserve trailhead (Huntington Trail).

Ojai Valley Land Conservancy Hike, Ilvento Preserve
Photo courtesy of Ojai Valley Land Conservancy

Huntington and Forest N. Cook Trails

Hiking, biking, horseback riding

Accessed from the Ilvento Preserve trailhead. These short trails form a loop.

12. Horn Canyon Trailhead

Hiking, biking, horseback riding, backcountry camping (The Pines)

Located in the East End of the Ojai Valley on the private Thacher School campus. Turn right after you enter the campus and continue east through the parking lot; keep right to dirt road, stream crossing, and avocado orchard. The trailhead has a dirt parking area. Horn Canyon trail crosses Thacher Creek several times before climbing up the mountain. Near the top of the watershed the trail crosses Sisar Canyon Road and then intersects with Nordhoff Ridge Road.

Ventura River and Ojai Meadow Preserves (Detail Map 3)

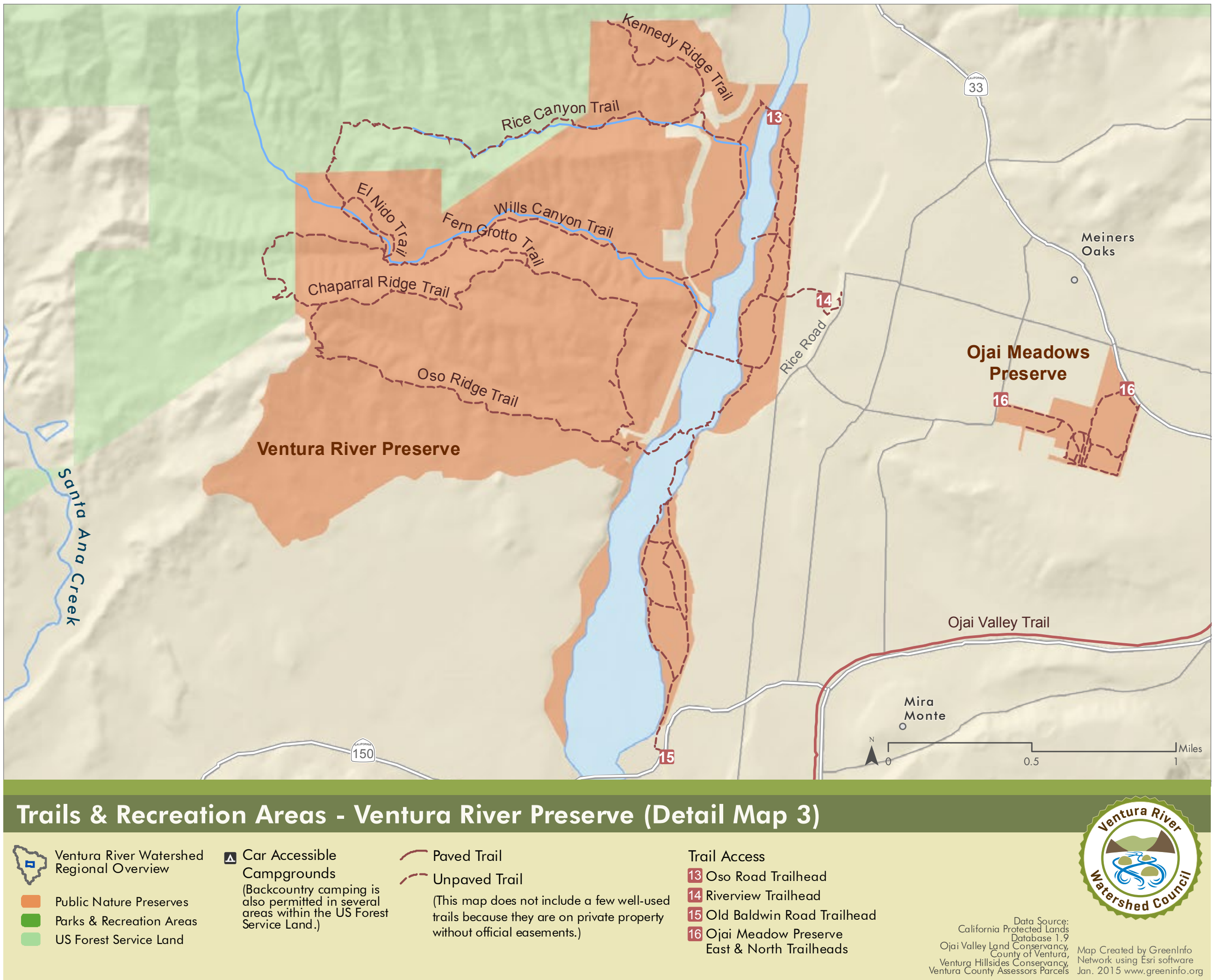


Figure 3.6.4.2.4 Trails & Recreation Areas – Ventura River and Ojai Meadow Preserves (Detail Map 3)

Ventura River Preserve

Hiking, biking, horseback riding (allowed on many but not all trails), swimming/wading, wildlife viewing

Located in and west of the Ventura River, next to the communities of Meiners Oaks and Mira Monte on one side and the LPNF on the other. The Ventura River Preserve (VRP) is the watershed's largest preserve, covering 1,583 acres, including 655 acres of floodplain, 2.6 miles of the Ventura River, and adjacent canyons to west of the river.

The VRP has three trailheads with parking adjacent to the Ventura River. A network of over 12 trails, totaling 20 miles, traverse the wide river bottom and connect to trails leading through canyons or along ridges on the west side of the river. The Rice Canyon/Wills Canyon loop is a very popular hike; the lush oak woodlands of Wills Canyon are noteworthy for their "enchanted forest" feel. Swimming holes in the river are sometimes available depending on the season and amount of rainfall that year. Provides excellent opportunities for wildlife viewing.

The habitat on the VRP is largely pristine, except for trails and historic orchards that are being restored. The river bottom includes primarily alluvial scrub and mulefat scrub habitats. The river-adjacent terraces comprise mainly grasslands and oak woodlands. Chaparral and oak woodlands dominate the canyons to the west of the river. The terrain is varied. The river bottom is flat with many boulders in some areas; canyons are moderately-steep to steep.

Ventura River Preserve Hike

Photo courtesy of Ojai Valley Land Conservancy

13. Oso Trailhead

Located at the end of Meyers Road, off of N. Rice Road in the river bottom. The trailhead has a large gravel parking area that accommodates horse trailers. The trailhead gate opens at 8:00 am and closes at 5:00 pm in the winter (Nov 1 - Mar 31) and 7:30 pm in the summer (Apr 1 – Oct 31).

Oso trailhead connects to a network of trails on the preserve. Two popular destinations are Kennedy Ridge Trail and the Wills-Rice Canyon Loop, described below. See Table 3.6.4.1.4 for more information on the various small connector trails on the preserve.

Kennedy Ridge Trail

Hiking, biking

Accessed off of Rice Canyon Trail, across the river bottom and up some gentle slopes. The trail is moderately steep and offers great views.

Wills-Rice Canyon Loop

Hiking, biking, horseback riding

Travels through two adjacent canyons. Wills Canyon is a deeply shaded oak woodland with a special "enchanted forest" feel to it; the terrain is relatively flat/gently sloping. Rice Canyon is more exposed with more varied terrain. Both trails begin on the west side of the Ventura River. The loop trail is easily accessed by either the Oso trailhead or the River-view trailhead.

14. Riverview Trailhead

Located on Rice Road just south of W. El Roblar Drive. The trailhead has a dirt parking area. Riverview trailhead offers connection to a network of trails on the preserve. The Wills-Rice Canyon Loop, described above, is a popular destination, as are the River Trails, Oso Ridge Trail, and Chaparral Crest Trail, described below. See Table 3.6.4.1.4 for more information on the various small connector trails on the preserve.

Ventura River Preserve, Riverview Trailhead

River Trails

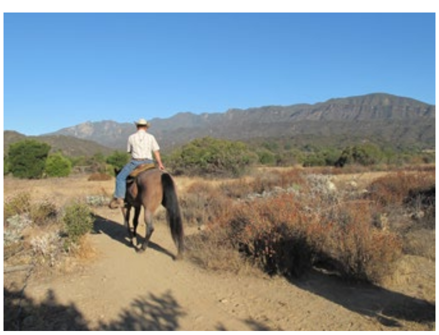
Hiking, biking, horseback riding

A network of trail segments run along the east side of the Ventura River along its 2.6-mile extent. These flat trails run through diverse alluvial scrub and grassland habitats studded with oaks and sycamores. Various options are available to cross the river bottom and connect to loop or ridge trails on the other side.

Oso Ridge Trail

Hiking, biking, horseback riding

Begins on the west side of the Ventura River; accessed from either Riverview or Oso trailhead. The trail is moderately steep, ascending and dipping as it climbs, and travels through tall stands of dense chaparral. Offers great panoramic views. Connects with Chaparral Crest Trail.



Ventura River Preserve, South Riverview Trail

Chaparral Crest Trail

Hiking, biking, horseback riding

Begins on the west side of the Ventura River; accessed from either River-view or Oso trailhead. The trail is accessed off of Oso Ridge Trail, Upper Wills Canyon Trail, or Fern Grotto Trail. The trail travels through a variety of habitats, and the terrain is quite varied, with some steep ascents and descents. Offers spectacular views.

15. Old Baldwin Road Trailhead

Located at the end of Old Baldwin Road, just off of Highway 150. The trailhead has plenty of parking and accommodates horse trailers. The first quarter mile of the trail is ADA-accessible. River bottom trails are accessible from this trailhead, as are the Oso Ridge Trail and the Chaparral Crest Trail, described above. The trailhead gate opens at 7:30 am and closes at 5:00 p.m. in the winter (Nov 1–Mar 31) and 7:30 pm in the summer (Apr 1–Oct 31).

Nature Preserves

The watershed is home to seven nature preserves that are accessible to the general public. These preserves are managed by local land conservancies.

Ojai Meadow Preserve

Hiking/walking, biking, birding

Located in an urban setting at the northwest edge of the City of Ojai, just west of Nordhoff High School off Highway 33. The 57-acre preserve is the site of a site of a restored freshwater marsh wetland that provides flood management services for the surrounding properties. As a wetland site, the preserve is particularly popular for bird watching. Habitats include oak woodland, grassland, freshwater marsh, eucalyptus forest, and southern willow riparian scrub. The terrain is open and flat.

The preserve has two trailheads and a number of winding trails and several scenic resting spots.

Birders at Ojai Meadow Preserve
Photo courtesy of Ojai Valley Land Conservancy

16. Ojai Meadow Preserve, East and West Trailheads

The eastern entrance is located on Lomita Avenue in Meiners Oaks, to the right of Meiners Oaks Elementary School. Parking is on-street. The western entrance is located on Highway 33, just north of Nordhoff High School. Parking is on-street.

Ojai Valley & Upper Ojai (Detail Map 4)

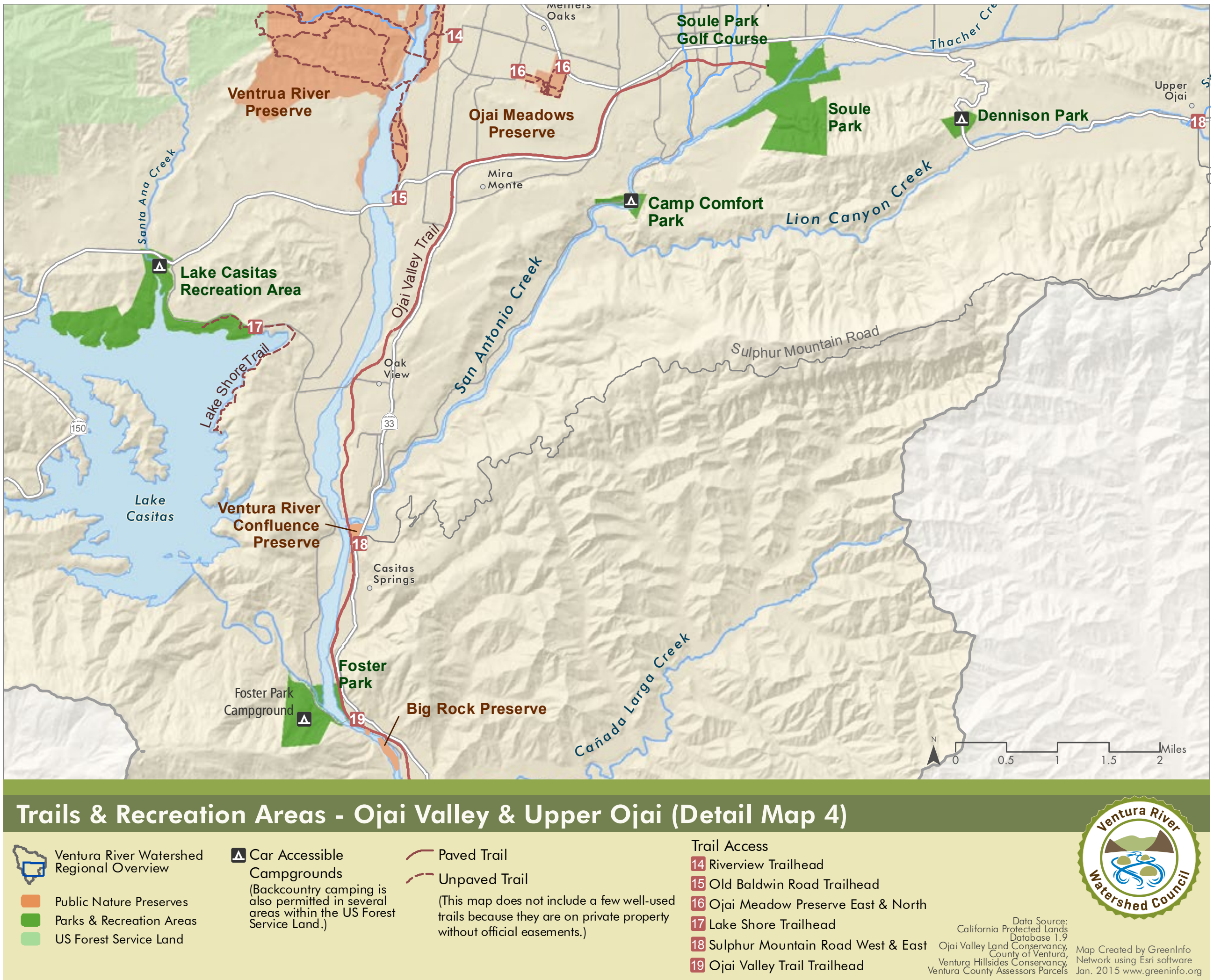


Figure 3.6.4.2.5 Trails & Recreation Areas – Ojai Valley & Upper Ojai (Detail Map 4)

Lake Casitas Recreation Area

Boating, rowing, fishing, camping, picnicking, biking, hiking, water park activities, other sports, birding, wildlife viewing

Located west of Oak View off of Highway 150 at Santa Ana Road. The expansive LCRA provides a wide variety of recreation opportunities. See the Lake Casitas Recreation Area description above in "Parks and Recreation Areas."

Habitats include open water lake, marsh, oak woodlands, grasslands, chaparral, and coastal scrub. The accessible terrain is mostly flat or rolling.

Kayaking on Lake Casitas
Photo courtesy of Michael McFadden

Bench on Lake Shore Trail, Lake Casitas

17. Lake Shore Trailhead

Hiking, biking

Located at the eastern end of the paved road in the LCRA. The trail is a well-maintained dirt road that follows the lakes eastern edge. The habitat is California walnut and oak woodlands, grassland, and riparian scrub. The terrain is mostly flat.

Soule Park

Picnicking, park-related sports, horseback riding

Located in the Ojai Valley's East End. Soule Park consists of a golf course and a large public park that has extensive grassed areas, playgrounds, two equestrian arenas, and other sports facilities. Thacher Creek runs through Soule Park, and the confluence of San Antonio and Thacher Creeks occurs within Soule Park golf course.

Soule Park Entrance Sign
Photo courtesy of Tracey Joyce

Camp Comfort Campground and Park

Camping, picnicking, wading

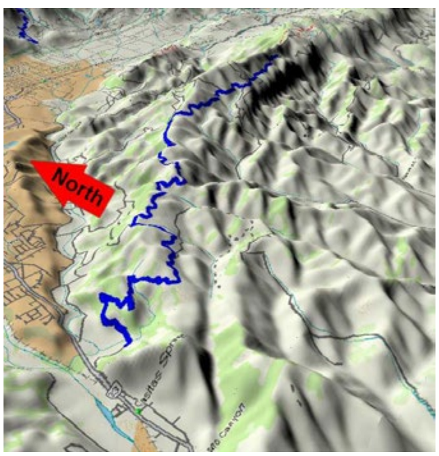
Located adjacent to San Antonio Creek about one mile south of the City of Ojai. Camp Comfort is a both a small campground and a large day use park. Large oaks and riparian trees shade most of the campground and park.

Dennison Park Sign

Dennison Park

Camping, picnicking

Located on the Santa Paula-Ojai Road (Highway 150) at the top of the Dennison Grade, which connects the Ojai Valley with Upper Ojai. Dennison Park is both a campground and a day use park, with expansive views of the Ojai Valley. Mature oaks shade much of the facility.



Sulphur Mountain Road 3D Map

Image courtesy of VenturaCountyTrails.org

18. Sulphur Mountain Road East and West Trailheads

Hiking, biking, horseback riding

The eastern trailhead is located 4.6 miles up the upper end of Sulphur Mountain Road, which is off of Highway 150. Trailhead parking is on-street. The trail is a well-maintained fire road that climbs gradually from Casitas Springs to Upper Ojai. The trail is 10.5 miles one way. The lower end travels through oak woodland. Most of the trail travels through grazed grasslands. The terrain consists of rolling hills. The trail offers views of much of the watershed and beyond, including the Channel Islands.

The western trailhead is located 0.3 miles up the lower end of Sulphur Mountain Road, off of Highway 33 just north of Casitas Springs. Trailhead parking is on-street. Sulphur Mountain Road is a well-maintained fire road that climbs from Casitas Springs to Upper Ojai. The trail is 10.5 miles one way.

Sulphur Mountain Road

Confluence Preserve

Birding

Located along the Ventura River above and below its confluence with San Antonio Creek. This 13-acre preserve is only accessible along the Ojai Valley Trail, which marks the western edge of the preserve. The habitat is dense riparian forest with willows, tall sycamores, and cottonwoods.

Foster Park

Picnicking, biking, wading, birding, wildlife viewing

Located on the east bank of the Ventura River just south of Casitas Springs. A large historical park first developed in 1906. Large sycamores and cottonwoods shade the park. Offers easy access to the Ventura River and the Ventura River/Ojai Valley Trail.

Foster Park Campground
Photo courtesy of Tracey Joyce

Foster Park Campground

Camping, wading, birding, wildlife viewing

Located on the west bank of the Ventura River across from the Foster Park day use park. The campground is set among mature oaks.

19. Ojai Valley Trail Trailhead

Biking, walking (paved), horseback riding

Follows an old railroad right-of-way along the Ventura River from Foster Park to Oak View, continuing through urban and open space areas to the City of Ojai. Traveling north along the Ventura River, the Ojai Valley Trail winds through riparian forest habitat, crosses San Antonio Creek, and then offers overlooks of the lower end of the river's dry reach. A fence separates the paved path from an adjacent dirt bridle path for horseback riders. The south end of the trail connects seamlessly to the Ventura River Trail. The area under the freeway overpass at Casitas Vista Road is used informally for parking.

Sign at Big Rock Preserve
Photo courtesy of Ventura Hillsides Conservancy

Big Rock Preserve

Wading, birding, wildlife viewing

Located in the Ventura River bottom just south of Foster Park. Ventura Hillside Conservancy's 17.5-acre Big Rock Preserve is accessible from the Ventura River Trail near the watershed mural. The habitat is riparian willow forest.

Coastal Area (Detail Map 5)

Figure 3.6.4.2.6 Trails & Recreation Areas – Coastal Area (Detail Map 5)

Seaside Wilderness Park

Hiking, biking, swimming, surfing, ocean fishing

Located south of Emma Wood State Beach Group Campground and extending to the east bank of the Ventura River at the estuary. The park is located on the Ventura River delta and covers a long stretch of coast, from the estuary at one end to Emma Wood State Beach North Beach Campground at the other. The park land to the west of the river is state-owned, and a smaller piece of land to the east of the river is owned by the City of Ventura. Open, windswept cobble fields cover much of the area, along with dunes and rare dune swale and rocky intertidal wetlands. The Ocean's Edge Trail travels through the park.

20. Ocean's Edge Trailhead

Located in the Emma Wood State Beach Group Campground. The trail begins by going under the railroad tracks, continues into the open cobble field habitat of Seaside Wilderness Park, and follows the coast southeast to the estuary.

Ocean's Edge Trail, Seaside Wilderness Park

Emma Wood State Beach Group Campground

Camping, picnicking, biking, hiking, swimming, surfing, ocean fishing

Emma Wood State Beach Group Campground

Photo courtesy of Tracey Joyce

Located on the coast west of the Ventura River estuary, south of Highway 101. The Emma Wood State Beach Group Campground is at the west end of Main Street. Camping is restricted to groups or bicyclists/hikers without vehicles (one night limit). Two miles west (outside of the Ventura River watershed) is the Emma Wood State Beach North Beach Campground, which has paved campsites located immediately adjacent to the beach for self-contained vehicles.

The group campground is an open, grassed area with capacity for four groups of 30 people. On the river side, the campground is adjacent to riparian scrub and forest along the Ventura River estuary. On the ocean side, the campground is adjacent to Seaside Wilderness Park (described below). The campground marks the western edge of the Ventura River delta.

Those not using the campground's facilities can still access the trails and wilderness park by parking outside the campground on Main Street.

21. Emma Wood River Trailhead

Located at the eastern edge of Emma Wood State Beach Group Campground. The trail makes a short loop to the Ventura River estuary and back through its adjacent riparian habitats. This area has historically been used by homeless individuals for camping.

22. Omer Rains Coastal Trail and Ventura River Trail Access

Biking, walking (paved)

Omer Rains Coastal Trail travels along the coast between Emma Wood State Beach North Beach Campground and San Buenaventura State Beach. Passes over the Ventura River at Main Street Bridge then along the river and estuary. The trail is popular for walking and biking, with connections up and down the coast and to the Ventura River Trail.

Omer Rains Coastal Trail

Ventura River Trail follows an old railroad right-of-way along the Ventura River from the Main Street Bridge to Foster Park. The Ventura River Trail connects to both the Ojai Valley Trail and the Omer Rains CoastalTrail. Much of the trail travels through urban and industrial areas. Paved parking is available east of the Main Street Bridge. At the Foster Park end, the dirt area under the freeway at the Casitas Springs exit is used for trailhead parking. The north end of the trail connects seamlessly with the Ojai Valley Trail.

Ventura River Trail Sign

A Continuous Trail from the Coast to Ojai

Together the Ventura River Trail, the Ojai Valley Trail, and the Omer Rains Coastal Trail provide a continuous multi-use paved path along the Ventura River corridor from the beach all the way to the City of Ojai. This trail network facilitates bicycle commuting in the Ojai and Ventura areas. The trail follows the route of the old Southern Pacific Railroad that once transported Ojai Valley produce to Ventura. The 1969 floods washed out much of the tracks.

FINAL DRAFT

Willoughby Preserve

Hiking, wading, birding, wildlife viewing

Located in the Ventura River bottom in Ventura, between the Main Street Bridge and the 101 Freeway, adjacent to the RV park. Paved parking is available east of the Main Street Bridge. A small network of trails on the Ventura Hillsides Conservancy's 9-acre preserve provide a unique look at the lower river where it enters the estuary. The habitat is riparian scrub and forest. Provides excellent opportunities for wildlife viewing.

Surfers' Point/Seaside Park

Located at the coast at the end of Figueroa Street, adjacent to the Ventura County Fairgrounds. Surfers' Point/Seaside Park is a popular location for surfing and kite surfing as well as picnicking and enjoying the beach. The park has parking, outdoor showers, and other amenities (City of Ventura 2007). The Omer Rains Coastal Trail travels through the park.

Surfers' Point
Photo courtesy of Paul Jenkin

23. Promenade and Omer Rains Trail Access

Biking, walking (paved)

Travels along the beachfront, from the estuary to the Ventura Pier.

Promenade, Ventura Beach

Grant Park Overlook

Picnicking, watershed viewing

Located on a low ridge overlooking downtown Ventura and the lower Ventura River. The overlook at Grant Park lies on the edge of the Ventura River watershed. The park is accessible from Ferro Drive or Brakey Road or by foot via the Ventura Botanical Gardens Demonstration Trail behind Ventura City Hall. The overlook provides expansive views of the coastline, Channel Islands, and the Ventura River watershed.

3.6.4.3 Key Data and Information Sources/ Further Reading

Below is a summary of some of key documents that address access to nature in the watershed. See "4.3 References" for complete reference citations.

City of San Buenaventura, 2005 Ventura General Plan (City of San Buenaventura 2005)

Draft Environmental Impact Statement/Environmental Impact Report for the Matilija Dam Ecosystem Restoration Project (USACE 2004)

History of the Ventura County Parks (VCGSA 2013)

Lake Casitas Final Resource Management Plan Environmental Impact Statement, & Appendices (URS 2010)

Land Management Plan: Part 2 Los Padres National Forest Strategy (USFS 2005a)

Recreational Impacts on Coastal Habitats: Ventura County Fairgrounds, California (Capelli 1991)

Ojai General Plan – Circulation Element (City of Ojai 1997)

Ojai General Plan – Conservation Element (City of Ojai 1987)

Ventura County General Plan: Ojai Valley Area Plan (VCPD 2008)

Vision Plan for the Lower Ventura River Parkway (CalPoly 2008/2010)

Acronyms

ADA—Americans with Disability Act

LCRA—Lake Casitas Recreation Area

LPNF—Los Padres National Forest

NRT—National Recreation Trail

OMP—Ojai Meadow Preserve

OVLC—Ojai Valley Land Conservancy

SBCK—Santa Barbara Channelkeeper

USFS—United States Forest Service

VHC—Ventura Hillsides Conservancy

VRP—Ventura River Preserve