The Nature Conservancy

Protecting nature. Preserving life.™



Conservation Plan for the Lower Santa Clara River Watershed and Surrounding Areas

2008

Table of Contents

EXECUTIVE SUMMARY **4**

INTRODUCTION **6**

PROJECT HISTORY 6
STAKEHOLDERS AND PARTNERS 7

BIOGEOGRAPHIC SETTING **8**

THE SOUTH COAST ECOREGION 8
THE SANTA CLARA RIVER 8

PROJECT AREA **10**

COASTAL AREAS 12
UPLAND WILDLIFE LINKAGES 14

SITUATIONAL ANALYSIS **16**

INFRASTRUCTURE 16
LAND OWNERSHIP AND USE 18
Lower Watershed *18*
Coastal Areas *18*
Upland Wildlife Linkages *18*
URBANIZATION 19
WATER SUPPLY AND QUALITY 19
Lower Watershed *19*
Coastal Areas *20*

CONSERVATION FRAMEWORK **24**

PLANNING APPROACH 24
CONSERVATION TARGETS 24
TARGET VIABILITY 27

CONSERVATION FOCUS AREAS **35**

CONSERVATION CHALLENGES **61**

THREATS 61
Incompatible Urban Development — Very High *61*
Altered Fire Regime — High *62*
Bank Stabilization and Channelization — High *62*
Invasive Plants — High *63*
Aquatic Barriers — High *64*
Climate Change — High *64*

CONSERVATION VISION **71**

CONSERVATION STRATEGIES **72**

LAND ACQUISITION 72
LAND-USE PLANNING 72
PUBLIC PLANNING 72
LAND-USE POLICY 72
PUBLIC ADVOCACY AND EDUCATION 73
SCIENTIFIC INVESTIGATION 73
LAND MANAGEMENT 73

MEASURES OF CONSERVATION SUCCESS **75**
SHORT-TERM SUCCESS 75
Land Acquisition *75*
Land-Use Planning *75*
Land-Use Policy *75*
Public Advocacy and Education *76*
Scientific Investigation *76*
Land Management *76*
LONG-TERM SUCCESS 77
Land Acquisition *77*
Land-Use Planning *77*
Land-Use Policy *78*
Public Advocacy and Education *78*
Scientific Investigation *78*
Land Management *78*

REFERENCES AND SUGGESTED READINGS **79**

APPENDIX A: ENDANGERED, THREATENED AND RARE SPECIES OF THE LOWER SANTA CLARA WATERSHED 84

APPENDIX B: ENDANGERED, THREATENED AND RARE SPECIES OF MCGRATH, ORMOND, AND MUGU 90

APPENDIX C: CLEAN WATER ACT SECTION 303(D) LIST OF IMPAIRED WATERBODIES ON THE SANTA CLARA RIVER 94

APPENDIX D: INVASIVE ANIMALS THREATENING NATIVE SANTA CLARA RIVER RIPARIAN SPECIES 95

Executive Summary

Introduction

The lower watershed of the Santa Clara River, located entirely within Ventura County, California, encompasses an area of great biological richness. This river system has historically provided habitat for a wide array of native plants and animals and has also supplied humans with water, fish, and fertile farmland. These resources and habitat are increasingly threatened by invasive non-native species and other problems associated with increasing urbanization. The intent of this conservation plan is to focus collaborative, strategic conservation action to abate the main threats to — and enhance the viability of — the watershed's unique natural heritage.

> Using The Nature Conservancy's "Conservation by Design" planning process, the planning team identified conservation targets and assessed threats to their viability to characterize the state of the watershed. The team then proposed priority conservation strategies and actions for the short and long terms. The resulting conservation plan, along with the conservation plan for the river's upper watershed, is intended to guide conservation action by The Nature Conservancy and its partners. This plan is an example of how the mission of The Nature Conservancy can be carried out in a specific place. Paraphrasing The Nature Conservancy's mission statement, we can say that this plan will help us "*preserve the plants, animals, and natural communities that represent the diversity of life in the lower Santa Clara River watershed by protecting the land and waters they need to survive.*"

The following paragraphs provide a brief outline of the conservation plan's key components.

The Santa Clara River

The Santa Clara River, which lies within California's South Coast ecoregion, provides important habitat for many native plant and animal species. It is a "flashy" river system, prone to swiftly rising and dropping flows that are highly dependent on weather patterns and local water management.

The Project Area

The project area includes the main stem of the river, tributary watersheds, and the estuary of the Santa Clara River. It also encompasses adjacent landscapes that provide important wildlife linkages. Ormond and Mugu Beaches are included because they serve as important habitat for many threatened and endangered species. The project area is divided into eleven focus areas. This division allows us to bring our conservation analysis to a finer resolution and to compare geographic areas.

Situational Analysis

A little less than half of the lands within our lower watershed project area are publicly owned or privately conserved. Most of the urban and agricultural development in this project area follows the coast and the main stem of the Santa Clara River, as does the road network. These areas consist of residential, agricultural, and industrial properties and are primarily in private ownership,.

Conservation

Our planning team identified priority "conservation targets" in order to have a framework on which to characterize threats, viability, and conservation strategies of the overall system. The targets in this plan included coastal communities, riparian forest and scrub communities, grasslands, coastal sage scrub communities, oak woodlands, chaparral communities, aquatic vertebrates, and wide-ranging terrestrial vertebrates. Nested targets are embedded within each of these conservation targets. These "nested targets" serve as important indicators of the health of conservation targets.

Target Viability
The team assessed the viability of each conservation target by using its ecological attributes: landscape context, condition, and size. Individual conservation targets ranged from "good" to "poor," while the overall current condition of the watershed was ranked "fair." Thus, the overall condition of the lower Santa Clara River watershed project area is currently a functional ecosystem, but if left unprotected, it will be vulnerable to serious degradation.

Focus Areas
The project area is divided into finer-scale "focus areas" for the purposes of this conservation plan: Ormond-Mugu; Santa Clara Estuary –McGrath; Santa Clara River Main Stem; Ventura Hillsides; Santa Paula Creek; Foothills; Sespe Creek; Pole Creek; Hopper Creek; Santa Susana Mountains; and South Mountain. These focus areas were delineated with the help of GIS software and were based on natural features.

Conservation Challenges
The plan identifies threats and sources of threats for each conservation target in the lower Santa Clara River project area. The planning team singled out six critical threats: incompatible urban development; altered fire regime; bank stabilization and channelization; invasive plants; aquatic barriers; and climate change.

Conservation Vision
Our conservation vision for the lower Santa Clara watershed requires that we

- Protect and enhance quality representations of each natural community conservation target and the characteristic variation within those communities.
- Protect and enhance populations of aquatic vertebrate and wide-ranging terrestrial vertebrate conservation targets, as well as the sensitive plant and animal species that rely on the Santa Clara River and coastal areas for all or a portion of their life cycles.
- Connect protected natural communities and populations, in large part through the conservation of the wildlife linkages that connect the Santa Monica Mountains to Los Padres National Forest.
- Abate threats to the viability of conservation targets.

Conservation Strategies
Conservation strategies are tools used to abate threats to conservation goals and targets and/or to enhance target viability. The most effective strategies tend to be those that are highly leveraged and accomplish multiple goals. The strategies for this conservation plan are land acquisition, land use planning, land use policy, public advocacy and education, scientific investigation, and land management.

Conservation Success Measures
Each conservation target was assigned measures of short- and long-term success that serve as guidelines or goals to be achieved within the next five or ten years. These measures of success include percentages or acres of habitat or linkages to be conserved, the collaboration and involvement of regional policy and planning efforts, data acquisition, restoration, and site security.

Introduction

The Nature Conservancy's L.A.–Ventura Project Area includes three major features: (1) the Santa Clara River watershed; (2) the coastal areas of McGrath State Beach and Ormond Beach; and (3) several wildlife linkages connecting the Los Padres National Forest, Angeles National Forest, and the Santa Monica Mountains.

The Santa Clara River flows roughly 86 miles from its headwaters near the town of Acton to the Pacific Ocean. It is one of the last rivers in southern California with primarily natural flows (as opposed to dam-controlled flows). Historically, the river meandered over the Oxnard Plain, creating a wide delta and a series of lagoons from McGrath State Beach to Ormond Beach and Point Mugu. Despite the close proximity of a rapidly expanding urban landscape, the project area is home to native ecosystems that are rich in biodiversity and largely intact and functional. However, urban expansion presents a pressing threat that, left unchecked, could destroy what are some of the last remaining natural areas in southern California. To protect the integrity of the L.A.–Ventura Project Area, immediate conservation action is required.

The goal of this conservation plan is to provide specific prescriptions for protecting and improving the integrity of the lower Santa Clara River watershed, nearby coastal ecosystems, and associated wildlife corridors. This *Conservation Plan for the Lower Santa Clara River Watershed and Surrounding Areas* is intended to guide that conservation work by identifying "conservation targets" or elements of biodiversity that serve as the focus of planning efforts, pinpointing activities that threaten the conservation targets, and developing strategies to combat those threats and enhance target viability. To make the planning process more manageable, we have divided the watershed and coastal areas into 11 smaller sections that we call "focus areas."

Project History

The Nature Conservancy launched the L.A.–Ventura Project in 1999 with a primary focus of safeguarding and enhancing the native biodiversity of the lower Santa Clara River watershed, which was defined roughly at that time as the portion of the river in Ventura County. The importance of the work has been described and the work itself has been guided by a number of TNC's analyses including:

- *California Southwest Bioregional Conservation Analysis* (1993)
- *L.A.–Ventura Project Initial Assessment* (1999)
- *Lower Santa Clara River Focus Plan* (2001)
- *California South Coast Ecoregional Assessment* (draft 2004)
- *California 2010 Goal* (2004) prioritization analysis

Beginning in 2005, The Nature Conservancy embarked on a collaborative planning process to expand the scope of the L.A.–Ventura Project to include the upper portion of the watershed that lies in Los Angeles County. With the help of dozens of partner agencies, organizations, and consultants, The Nature Conservancy developed the *Santa Clara River Upper Watershed Conservation Plan* (Matsumoto et al., 2006).

Upon completion of the upper watershed plan, it became apparent that an updated conservation plan for the lower watershed and nearby coastal areas was also necessary for three main reasons. First, The Nature Conservancy's focus in the lower watershed necessarily evolved from protecting the riverbed to protecting the surrounding floodplains as a means of safeguarding the river's natural processes. Second, The Nature Conservancy was invited to participate in a massive coastal wetland restoration at Ormond

Beach, as well as an inholding protection effort at McGrath State Beach. Although Ormond Beach is both a priority terrestrial and marine[1] portfolio conservation site for The Nature Conservancy, planning for engagement in this coastal area had not been addressed until this plan was undertaken. Lastly, The Nature Conservancy and its partners are actively engaged in the protection of wildlife linkages between the Los Padres National Forest and the Santa Monica Mountains. This conservation plan integrates all of these efforts by updating the lower watershed plan and incorporating the coastal areas of McGrath State Beach and Ormond Beach, as well as the upland wildlife linkages. The Nature Conservancy anticipates that this plan will be used in combination with the plan for the upper watershed to implement L.A.–Ventura Project-wide conservation strategies.

As of summer 2007, with the support of its partners, The Nature Conservancy had acquired considerable landholdings within the L.A.–Ventura Project Area. Within the Santa Clara River watershed, The Nature Conservancy had acquired 18 properties along the main stem of the river. These properties span 11 river miles and total roughly 2,500 acres. At Ormond Beach The Nature Conservancy currently owns two properties totaling 277 acres. Through an assist with partner agencies, The Nature Conservancy also helped protect a 1,700-acre upland ranch within the Santa Monica–Sierra Madre wildlife linkage. In addition, the nonprofit organization Friends of the Santa Clara River has acquired and is restoring the 230-acre Hedrick Ranch Nature Area located on the Santa Clara River terrace.

Stakeholders and Partners

Accomplishing the ambitious conservation goals of the L.A.–Ventura project in the face of immediate and pervasive threats requires the cooperation and commitment of many stakeholders and partners. The following list highlights organizations and agencies whose support has been important in furthering our conservation goals.

Stakeholders and Partners	
♦ California Department of Fish and Game	♦ Resource Conservation District – Ventura County
♦ California Department of Parks and Recreation	♦ Santa Clara River Trustee Council
♦ City Corps	♦ Santa Monica Mountains Conservancy
♦ City of Oxnard	♦ South Coast Wildlands
♦ County of Ventura	♦ State Coastal Conservancy
♦ Department of Defense	♦ United Water Conservation District
♦ Environmental Protection Agency	♦ University of California, Los Angeles
♦ Friends of the Santa Clara River	♦ University of California, Santa Barbara
♦ McGrath Lake Trustee Council	♦ U.S. Army Corps of Engineers
♦ National Oceanic and Atmospheric Administration	♦ U.S. Fish and Wildlife Service
♦ National Park Service	♦ U.S. Forest Service
♦ Natural Resource Conservation Service	♦ Ventura County Watershed Protection District
♦ Ormond Beach Task Force	♦ Wetlands Recovery Project
♦ Reliant Energy	♦ Wildlife Conservation Board

[1] In its *Southern California Marine Ecoregional Assessment* (2004), The Nature Conservancy designated the Ventura Coast as one of seven priority conservation areas based on its biodiversity patterns, threats, and opportunities for conservation. Key biodiversity targets found within the Ventura Coast include coastal salt marsh, steelhead stream, sand and gravel beaches, tidal flats, wave-cut rocky platform, offshore rocks, seabird colonies (California least tern), kelp, inner-shelf mixed slopes, flats, canyons, and mid-shelf flats. Threats consist of coastal development (increasing urbanization, in-water structures, and oil and gas development), over-fishing, pollution (oil spills), and altered freshwater flow (reduced freshwater input). Opportunities for conservation include The Nature Conservancy's L.A.-Ventura Project, steelhead habitat links from the Sespe wilderness to the Santa Clara River to near-shore sites, and establishment of a Long Term Ecological Research (LTER) site to study land-based impacts in the Santa Barbara Channel.

Biogeographic Setting

The South Coast Ecoregion

The L.A.–Ventura Project lies within the California South Coast ecoregion (South Coast), which stretches from the coastal areas of Santa Barbara County to El Rosario in Baja California.[2] The South Coast is part of a broader area in California that is 1 of only 5 areas in the world that features Mediterranean-type ecosystems. Despite the fact that they occupy only 2 percent of the world's land area, Mediterranean habitats harbor 16 percent of the Earth's plant species.[3] As a result, it is one of the most biologically diverse ecoregions in North America. Just the northern half of the South Coast contains at least 138 endemic plant and animal species and more imperiled species than any other ecoregion in the continental United States (CBI, 2005).

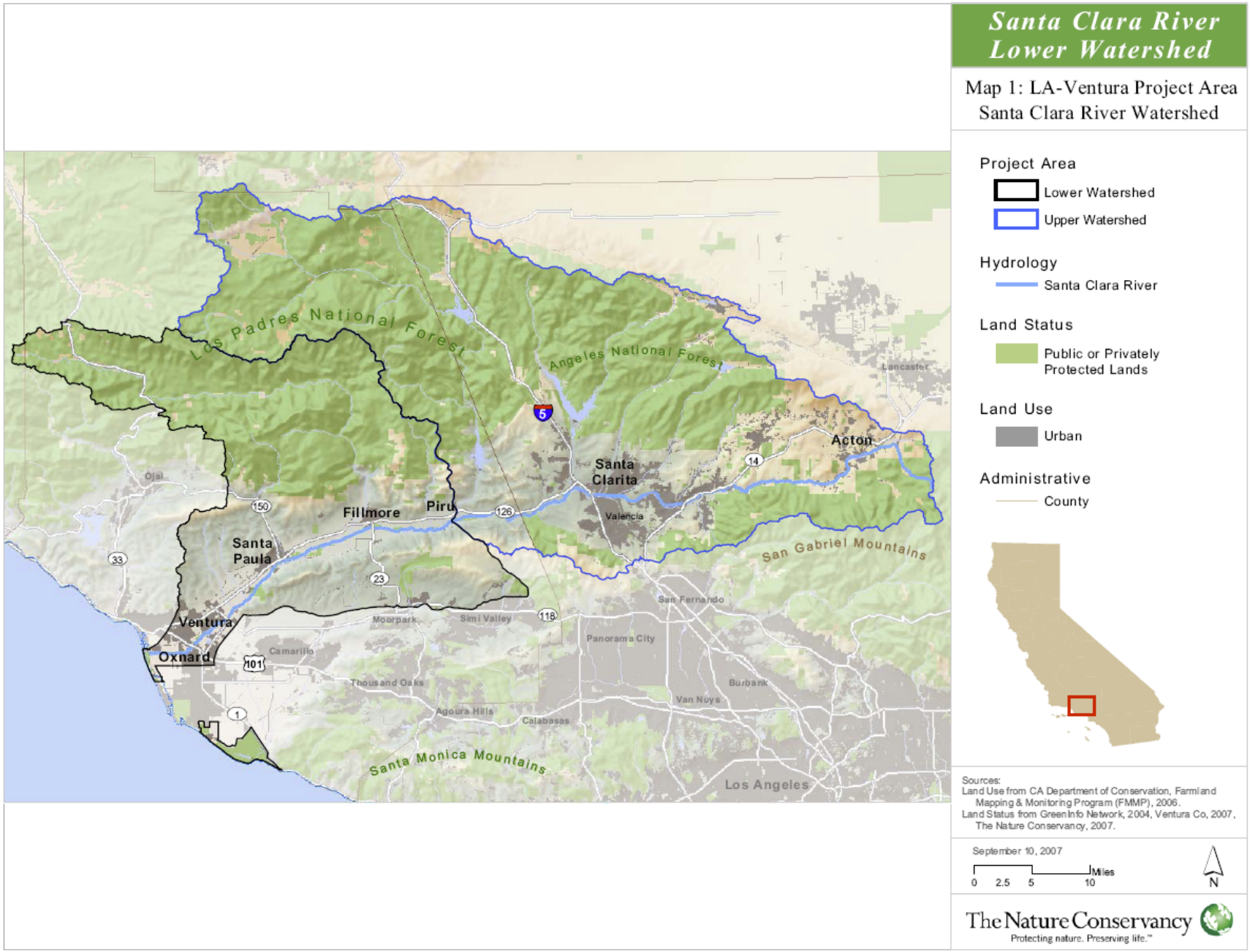
Its pleasant climate also makes the South Coast one of the most coveted places to live in the world, and because of this, the ecoregion has a large and growing population. Between 2005 and 2006, southern California's population increased by 1.2 percent to over 18.2 million people. When compared among the 50 states, the region's population ranks as the fourth largest after California, Texas, and New York (SCAG, 2006). As a result, human land uses, most notably urbanization, have altered or destroyed up to 90 percent of the wetlands that historically existed in southern California (SCWRP, 2001). With few places left to reproduce and forage, many wetland-dependent species are now threatened or endangered. The Santa Clara River watershed and Ventura County's coastal areas provide a refuge to many of those species.

The Santa Clara River

The Santa Clara River flows roughly 86 miles from the San Gabriel Mountains to the Pacific Ocean. With a 1,600 square mile watershed the system is the second largest in the South Coast and one of the last to remain in a relatively natural state. (See Map 1, L.A.–Ventura Project Area.) Natural flows continue to exist primarily because there are no dams and only 1 major water diversion on the mainstem of the river. In addition, the river's banks have, thus far, largely escaped levee construction and channelization. This is in stark contrast to other southern California rivers, such as the Los Angeles, San Gabriel and Santa Ana Rivers, which are lined by concrete channels.

Characteristic of South Coast rivers, the Santa Clara River is an extremely dynamic and flashy system, prone to drought and flood events, as well as fire, landslides and seismic activity. During periods of drought, much of the riverbed can be dry and dusty. Wildfires can sweep entire mountain ranges and river segments, leaving denuded lands vulnerable to mudslides and erosion and altering vegetation communities. The 2003 Piru (>63,000 acres) and Simi (>108,000 acres) fires burned into the channel of the Santa Clara River. The fire killed mature willows, cottonwoods and other native riparian vegetation opening the door for invasion of the riparian corridor by the aggressive non-native bamboo-like, giant reed (*Arundo donax*). Seismic events, including the 1994 Northridge earthquake, have caused oil or wastewater pipelines to rupture, sending contaminants into the river. Heavy rains, such as those in the winter of 2004-2005, can cause massive flooding, which can damage or destroy personal property and infrastructure along the river's banks and transport debris downstream and disperse invasive weeds.

[2] An ecoregion is a large area of land and water that contains a geographically distinct assemblage of natural communities. Ecoregions are defined primarily by similar landforms, climate, ecological processes, and vegetation.
[3] See: *http://conserveonline.org/workspaces/global.med.assessment*


Santa Clara River
Lower Watershed
Map 1: LA-Ventura Project Area
Santa Clara River Watershed
Project Area
Lower Watershed
Upper Watershed
Hydrology
Santa Clara River
Land Status
Public or Privately Protected Lands
Land Use
Urban
Administrative
County
Los Padres National Forest
Angeles National Forest
San Gabriel Mountains
Santa Monica Mountains
Ventura
Oxnard
Santa Paula
Fillmore
Piru
Santa Clarita
Acton
Lancaster
Ojai
Valencia
Moorpark
Simi Valley
Camarillo
Thousand Oaks
Agoura Hills
Calabasas
San Fernando
Panorama City
Van Nuys
Burbank
Los Angeles
Sources:
Land Use from CA Department of Conservation, Farmland Mapping & Monitoring Program (FMMP), 2006.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007, The Nature Conservancy, 2007.
September 10, 2007
Miles
0 2.5 5 10
N
The Nature Conservancy
Protecting nature. Preserving life.™

Project Area

We defined the project area of the *Conservation Plan for the Lower Santa Clara River Watershed and Surrounding Areas* to include three main components: the main stem and estuary of the Santa Clara River; the sub-watersheds formed by tributaries that join the main stem west of Piru Creek; and Ormond and Mugu Beaches. (See Map 2, Project Area.) The Upper Santa Clara River project area encompasses the remaining watershed, which includes the Piru Creek sub-watershed and lies mostly within Los Angeles County. For a more detailed description of this portion of the watershed see The Nature Conservancy's *Santa Clara River Upper Watershed Conservation Plan* (2006).

The project area features roughly 30 miles of river along the main stem and four major tributaries, all lying to the north — Santa Paula Creek, Sespe Creek, Pole Creek, and Hopper Creek — as well as several smaller creeks that flow through barrancas located within the Ventura Hillsides and foothills.

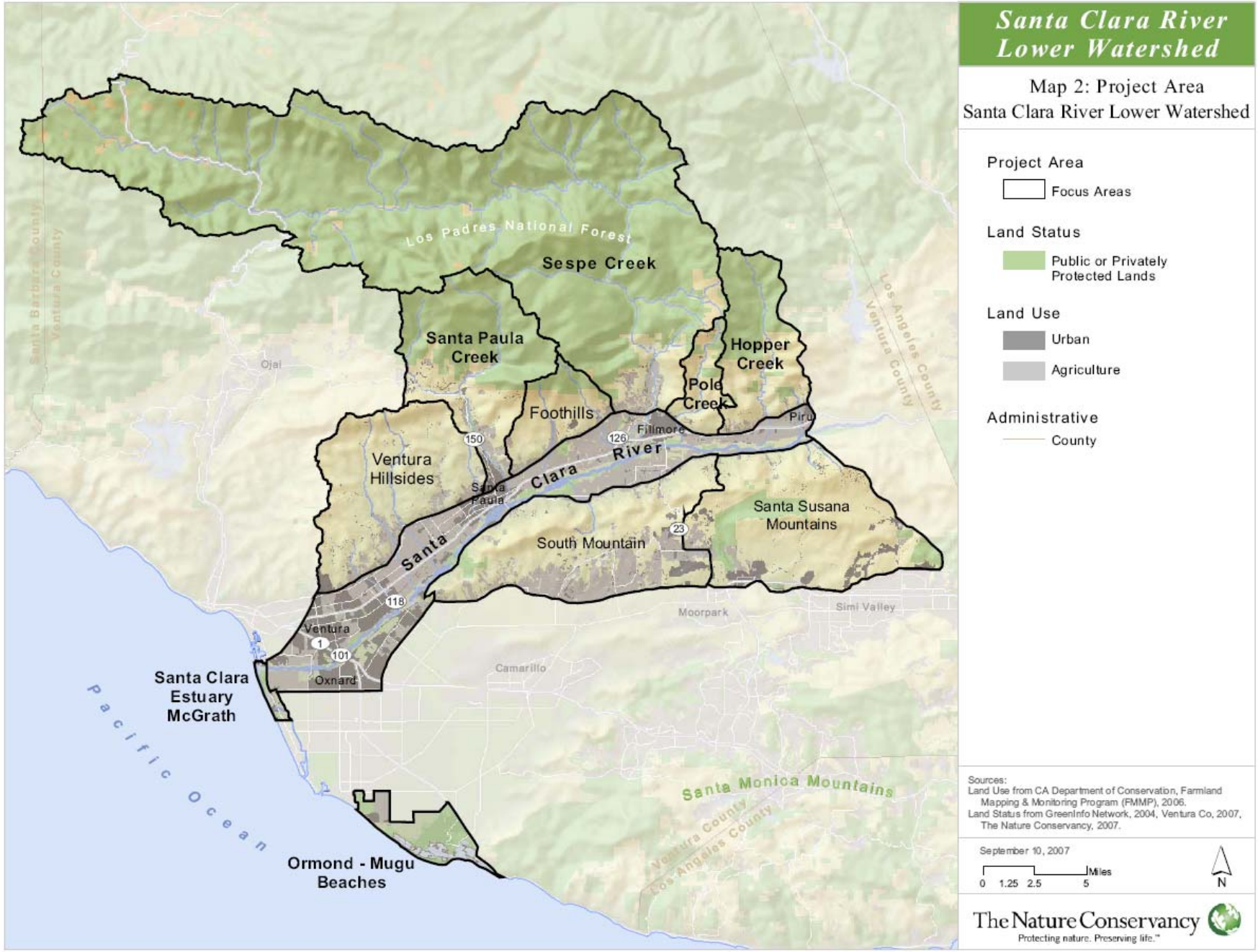
Only a few miles from the estuary is the Vern Freeman diversion, the only flow-regulating facility along the river's main stem. Operated by United Water Conservation District, the diversion helps to combat seawater intrusion in the Oxnard Plain by diverting surface water for groundwater recharge. Because of the presence of several fish species, most notably the endangered southern steelhead trout, the diversion features a fish ladder.

Two additional fish ladders are located on Santa Paula Creek. The first, owned by the U.S. Army Corps of Engineers, was constructed to provide passage through a grade-controlled portion of the creek just above the channelized section leading through the city of Santa Paula and into the confluence with the main stem. The second was intended to aid fish passage at the Harvey Diversion Dam, which is operated by Farmers Irrigation District for agricultural irrigation. Both fish ladders were severely damaged during the 2005 floods.

In recognition of Sespe Creek's outstanding scenic diversity and recreational potential, as well as its provision of habitat for several endangered species, approximately 31.5 miles of Sespe Creek was designated as a National Wild and Scenic River[4] in 1991. It is the only such designation in southern California. Rivers designated as Wild and Scenic are offered protection from federal support of actions, such as the construction of dams, that could diminish their free-flowing qualities or outstanding resource values. A portion of Sespe Creek was also designated a Wild Trout[5] stream in 2001 by the California Department of Fish and Game in recognition of its aesthetic appeal and excellent trout habitat, which includes spawning habitat for the endangered southern steelhead.

[4] The Wild and Scenic Rivers Act was designed to prohibit dams and other federally assisted water resources projects that would adversely affect designated river values; protect outstanding natural, cultural, and/or recreational values; ensure that water quality is maintained in designated rivers; and require the creation of a river management plan. For more information, see *www.rivers.gov* .

[5] The California Wild Trout Program was established to provide for the designation of "aesthetically pleasing and environmentally productive streams and lakes to be managed exclusively for wild trout. For more information, see *www.dfg.ca.gov/fishing/html/WildAndHeritageTrout/WHTrout_o.htm* . CDFG (California Department of Fish and Game). 2001. Sespe Creek. Wild Trout Program. See also: http://www.wrpinfo.scc.ca.gov/watersheds/sc/sc_subprofiles.html and *http://www.dfg.ca.gov/fishing/wtp/waters/sespe.htm*.


Santa Clara River
Lower Watershed
Map 2: Project Area
Santa Clara River Lower Watershed
Project Area
Focus Areas
Land Status
Public or Privately Protected Lands
Land Use
Urban
Agriculture
Administrative
County
Los Padres National Forest
Sespe Creek
Santa Paula Creek
Hopper Creek
Pole Creek
Foothills
Ventura Hillsides
Santa Clara River
South Mountain
Santa Susana Mountains
Santa Clara Estuary McGrath
Ormond - Mugu Beaches
Pacific Ocean
Santa Monica Mountains
Ojai
Fillmore
Piru
Santa Paula
Moorpark
Simi Valley
Camarillo
Ventura
Oxnard
Santa Barbara County
Ventura County
Los Angeles County
150
126
23
118
1
101
Sources:
Land Use from CA Department of Conservation, Farmland Mapping & Monitoring Program (FMMP), 2006.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007, The Nature Conservancy, 2007.
September 10, 2007
0 1.25 2.5 5 Miles
N
The Nature Conservancy
Protecting nature. Preserving life.™

Research indicates that 18 state and/or federally listed threatened or endangered species have been identified in the lower Santa Clara River watershed. For a detailed list of these species, see Appendix A, *Endangered, Threatened, and Rare Species of the Lower Santa Clara Watershed*. Of these species, six have U.S. Fish and Wildlife Service-designated critical habitat[6] within the lower watershed: Ventura marsh milk-vetch, southern steelhead, tidewater goby, arroyo toad, California condor, and California gnatcatcher. (See Map 3, Critical Habitat.) Furthermore, the Santa Clara River is considered a major steelhead watershed because the Santa Clara, along with the Santa Maria, Santa Ynez, and Ventura Rivers, historically contained the largest runs of southern steelhead. These four rivers still contain the largest remaining (although dramatically reduced from historical levels) core populations within the species' range and are identified as high priorities for immediate protection (NOAA, 2007). This plan considers all species with critical habitat located within the project area, as well as several other rare, threatened, or endangered species.

Coastal Areas

The project area includes two important coastal areas at McGrath State Beach and Ormond Beach. The coastal areas include rare sand-dune systems and coastal wetlands that provide an important stopover along the Pacific Flyway. Eleven state and/or federally listed threatened or endangered plant and animal species have been located within the coastal areas. For a detailed list of these species, see Appendix B, *Endangered, Threatened, and Rare Species of McGrath, Ormond, and Mugu*. Two of these, the California brown pelican and the light-footed clapper rail, are not found elsewhere in the project area. In addition, many other sensitive species, including California Department of Fish and Game Species of Special Concern[7] and nearly 200 species of birds, can be found throughout the coastal areas.

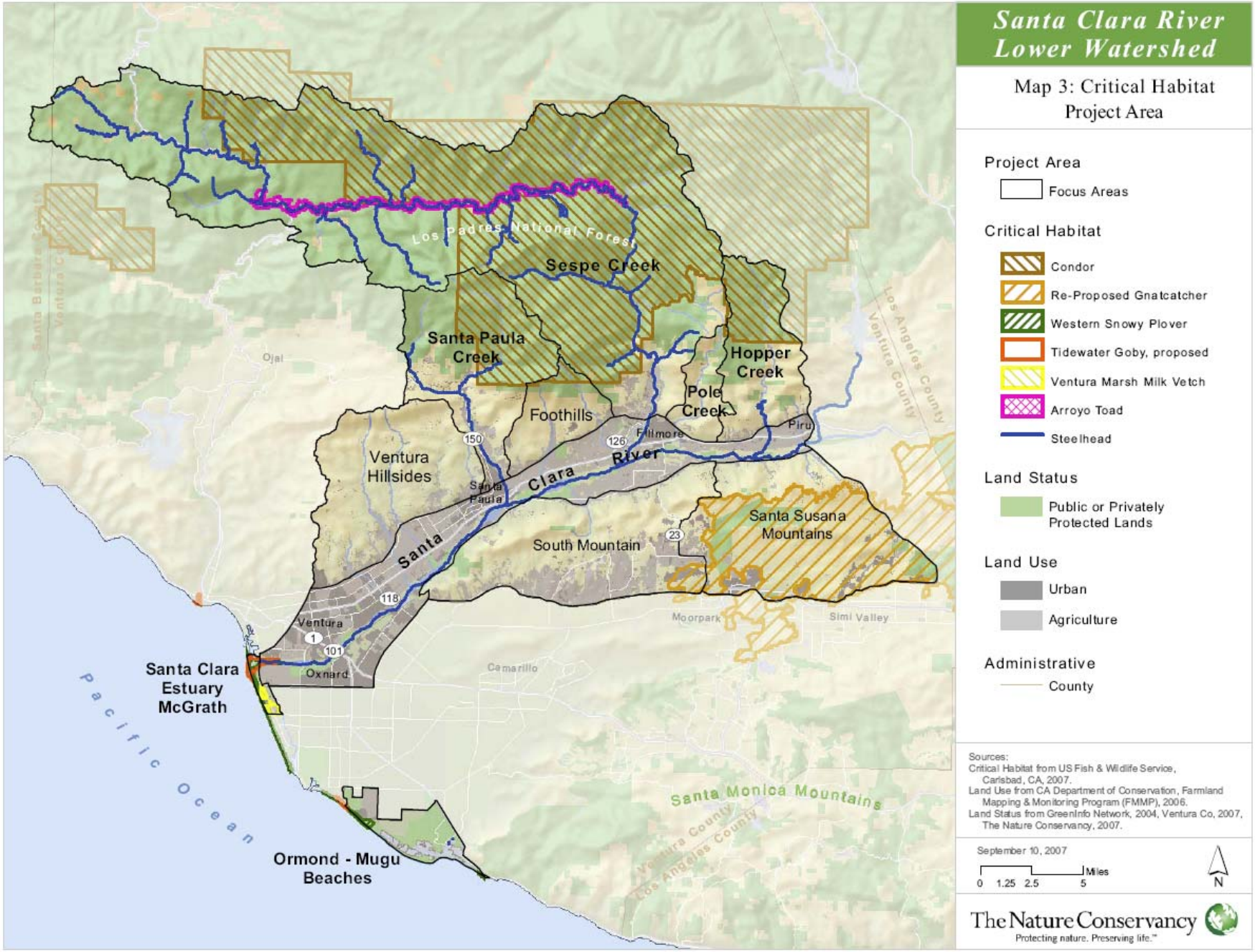
Since 1961, McGrath State Beach and the Santa Clara Estuary Natural Preserve have provided visitors with access to one of the state's best bird-viewing areas. McGrath State Beach includes a campground, hiking trails, beach access along a two-mile stretch of Pacific coast, picnic grounds, and interpretive signage. The less-visited southern portion of McGrath State Beach includes a rare coastal freshwater lake known as McGrath Lake. Nine (9) important habitats converge in and around McGrath State Beach, making the area high in biological diversity. These habitats include the Pacific Ocean, sandy beach, coastal dunes, the Santa Clara River and estuary, freshwater marsh, brackish marsh, riparian woodlands, and McGrath Lake. Critical habitat has been designated by the U.S. Fish and Wildlife Service for the endangered Ventura marsh milk-vetch at McGrath State Beach and the adjacent Mandalay Beach.

The wetlands within Ormond Beach once totaled 1,000 acres; however, as a result of development, only some 250 acres currently remain. Five sensitive habitat types have been identified at Ormond Beach including open waters/ocean (essential fish habitat), southern coastal salt marsh, coastal freshwater/brackish marsh, willow scrub, and southern foredune (includes marine intertidal unconsolidated-sand wetland) (Josselyn et al., 2007). While the wetlands and other habitats found in the coastal area have undergone substantial alteration as a result of industrial, agricultural, and urban development, the existing natural communities are a significant resource for several plant and animal species. For example, critical habitat has been proposed for the Western snowy plover at Ormond Beach and Mandalay Beach. (See Map 3, Critical Habitat.)

---

[6] The Endangered Species Act (ESA) requires the federal government to designate critical habitat for any species it lists under the ESA. Critical habitat consists of specific areas that are essential for an endangered species' conservation. For more information, see *http://www.fws.gov/endangered/listing/index.html#CH* .

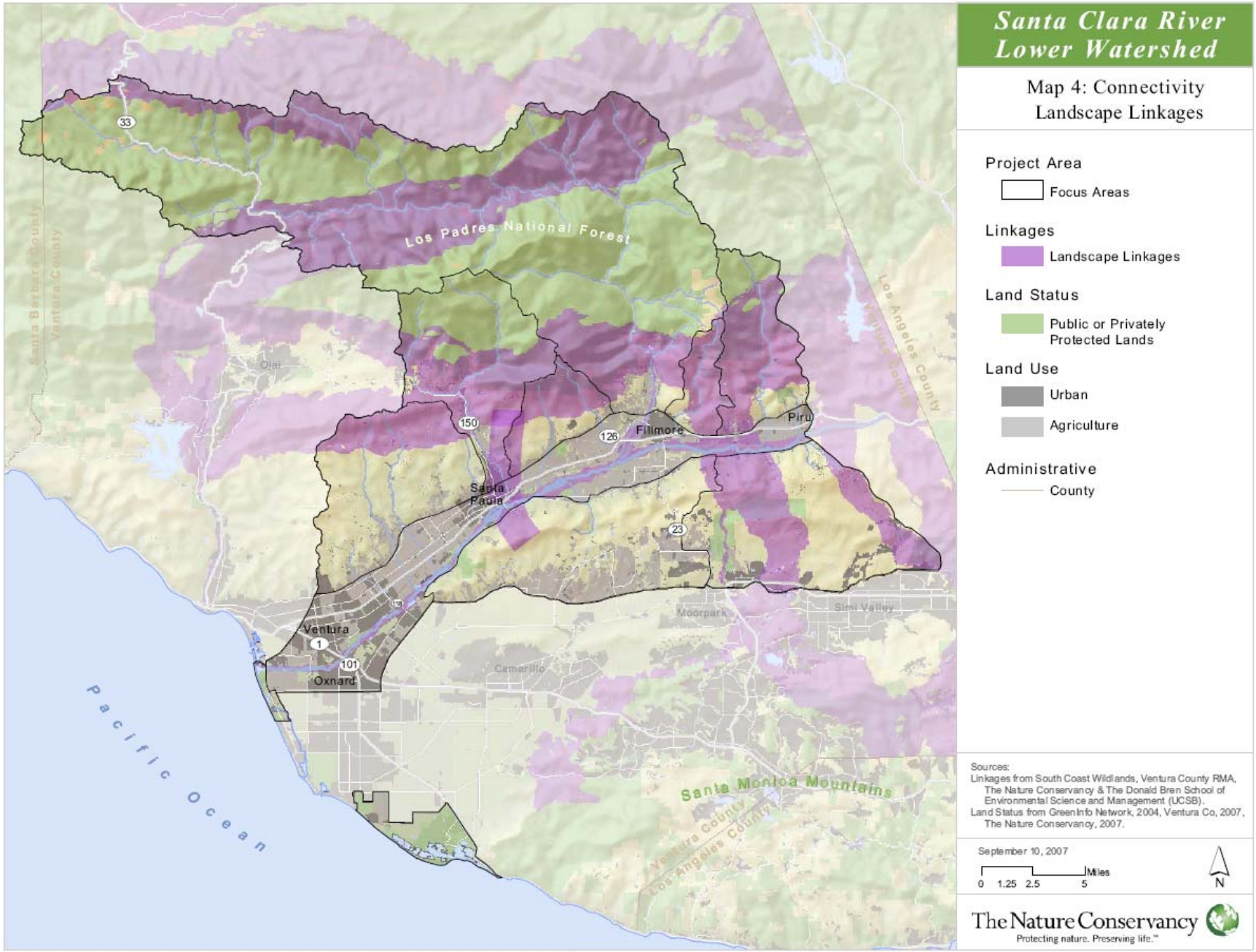
[7] "Species of Special Concern" (SSC) status applies to animals not listed under the federal Endangered Species Act or the California Endangered Species Act, but which nonetheless (1) are declining at a rate that could result in listing, or (2) historically occurred in low numbers and known threats to their persistence currently exist. For more information, see *www.dfg.ca.gov/hcpb/species/ssc/ssc.shtml* .


Santa Clara River
Lower Watershed
Map 3: Critical Habitat
Project Area
Project Area
Focus Areas
Critical Habitat
Condor
Re-Proposed Gnatcatcher
Western Snowy Plover
Tidewater Goby, proposed
Ventura Marsh Milk Vetch
Arroyo Toad
Steelhead
Land Status
Public or Privately
Protected Lands
Land Use
Urban
Agriculture
Administrative
County
Los Padres National Forest
Sespe Creek
Santa Paula
Creek
Hopper
Creek
Pole
Creek
Foothills
Ventura
Hillsides
Santa Clara River
South Mountain
Santa Susana
Mountains
Santa
Ventura
Oxnard
Santa Clara
Estuary
McGrath
Pacific Ocean
Ormond - Mugu
Beaches
Santa Monica Mountains
Moorpark
Simi Valley
Camarillo
Ojai
Fillmore
Piru
Sources:
Critical Habitat from US Fish & Wildlife Service,
Carlsbad, CA, 2007.
Land Use from CA Department of Conservation, Farmland
Mapping & Monitoring Program (FMMP), 2006.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007,
The Nature Conservancy, 2007.
September 10, 2007
Miles
0 1.25 2.5 5
N
The Nature Conservancy
Protecting nature. Preserving life.™

Upland Wildlife Linkages

The Santa Clara River watershed and nearby coastal areas are intricately connected to other nearby terrestrial, coastal, and marine ecosystems. Movement is essential to the survival of both the wildlife and native plants that inhabit the South Coast. Habitat loss and fragmentation are the leading threats to biodiversity, both in southern California and globally. Patterns of habitat conversion to urban and agricultural uses are disrupting movement patterns and can alter essential ecosystem functions, including predator-prey relationships, gene flow, pollination and seed dispersal, competitive or mutualistic relationships among species, resistance to invasion by alien species, energy flow, and nutrient cycling. As a result, the South Coast has become a "hot spot" for species at risk of extinction.

The Santa Monica-Sierra Madre Wildlife Linkage is one of the few coastal-to-inland linkages remaining in the South Coast. This potential path for wildlife movement begins roughly between Pole Creek and Hopper Creek, crosses the Santa Clara River to the Santa Susana Mountains, proceeds through Tierra Rejada and then heads south in two forks — the west fork through Conejo Mountain, and the east through Simi Hills (Penrod et al., 2006). (See Map 4, Landscape Linkages.)


Santa Clara River
Lower Watershed
Map 4: Connectivity
Landscape Linkages
Project Area
Focus Areas
Linkages
Landscape Linkages
Land Status
Public or Privately
Protected Lands
Land Use
Urban
Agriculture
Administrative
County
Los Padres National Forest
Santa Barbara County
Ventura County
Los Angeles County
Ojai
Fillmore
Piru
Santa
Paula
Ventura
Oxnard
Moorpark
Simi Valley
Camarillo
Pacific Ocean
Santa Monica Mountains
Sources:
Linkages from South Coast Wildlands, Ventura County RMA,
The Nature Conservancy & The Donald Bren School of
Environmental Science and Management (UCSB).
Land Status from GreenInfo Network, 2004, Ventura Co, 2007,
The Nature Conservancy, 2007.
September 10, 2007
Miles
0 1.25 2.5 5
N
The Nature Conservancy
Protecting nature. Preserving life.™

Situational Analysis

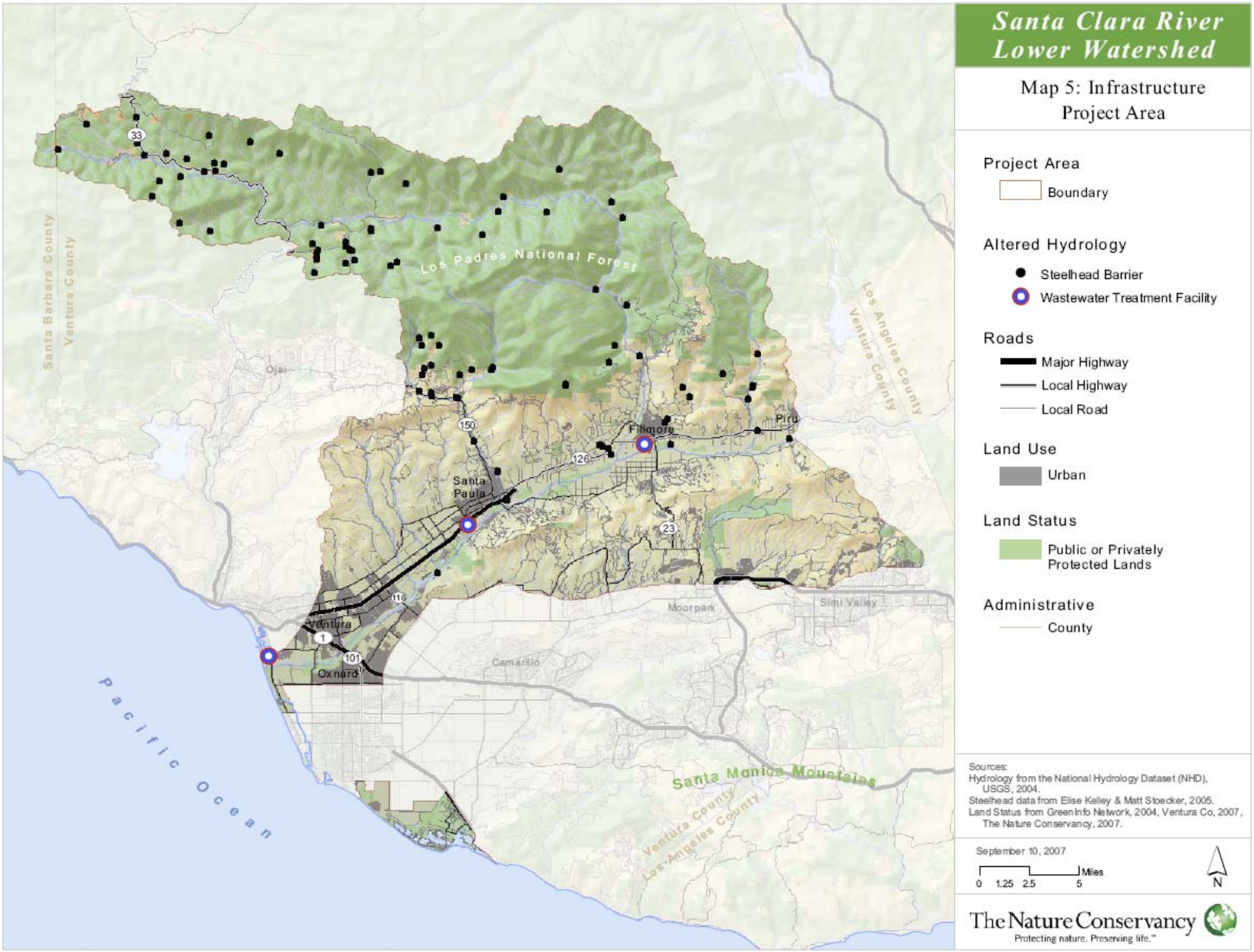
In order to understand the context within which our conservation targets lie, we examined four elements of the anthropogenic landscape. Roads and cities define the current infrastructure. Land ownership and use describe how the land is used and by whom. Urbanization discusses the pressures to expand the human footprint within Ventura County and the current laws governing development. The source, quality, distribution, and use of water are also considered.

Infrastructure

Major infrastructure and associated development throughout the Santa Clara River watershed follow both the river channel and several major regional transportation corridors. The lower watershed is traversed by U.S. 101, running north-south through coastal Ventura County and Highway 126, running east-west and connecting Interstate 5 in Los Angeles County to U.S. 101. Highways threaten wildlife linkage connectivity throughout the project area. In addition to those listed above, Highway 23 between Thousand Oaks and Simi Valley, and Highway 118, running east-west through Simi Valley, pose challenges to wildlife movement. Incorporated cities within the lower watershed include Ventura (population 106,710),[8] Santa Paula (population 29,133), and Fillmore (population 15,180), all of which sit in the lower, flatter lands in or near the river's floodplain.

McGrath State Beach, located south of the Santa Clara River estuary, is bounded by the Pacific Ocean to the west and Harbor Boulevard to the east. The Mandalay Power Plant, operated by Reliant Energy, sits on an inholding near the center of the state beach. The city of Oxnard (population 189,990) is located on the coast and divides McGrath State Beach from the Ormond Beach-Point Mugu coastal area. The Ormond Beach restoration area surrounds another Reliant Energy power plant. Major power lines and a 100-foot Edison easement cross through the middle of Ormond Beach along Edison Drive, which leads to the power plant. (See Map 5, Infrastructure.)

[8] Population statistics are 2006 estimates from the State of California Department of Finance and the U.S. Census.


Santa Clara River
Lower Watershed
Map 5: Infrastructure
Project Area
Project Area
Boundary
Altered Hydrology
Steelhead Barrier
Wastewater Treatment Facility
Roads
Major Highway
Local Highway
Local Road
Land Use
Urban
Land Status
Public or Privately
Protected Lands
Administrative
County
Los Padres National Forest
Santa Barbara County
Ventura County
Los Angeles County
Ventura County
Ojai
Fillmore
Piru
Santa
Paula
Moorpark
Simi Valley
Ventura
Oxnard
Camarillo
Pacific Ocean
Santa Monica Mountains
Ventura County
Los Angeles County
33
150
126
23
118
1
101
Sources:
Hydrology from the National Hydrology Dataset (NHD),
USGS, 2004.
Steelhead data from Elise Kelley & Matt Stoecker, 2005.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007,
The Nature Conservancy, 2007.
September 10, 2007
Miles
0 1.25 2.5 5
N
The Nature Conservancy
Protecting nature. Preserving life.™

Land Ownership and Use

Lower Watershed

Approximately 50 percent of the lower watershed — 193,000 acres — is in public ownership or is privately conserved. Of the lands in private conservation, roughly 2,500 acres are currently owned by The Nature Conservancy. The nonprofit organization Friends of the Santa Clara River has conserved an additional 230 acres.[9] Most publicly owned lands lie within Los Padres National Forest, which consists primarily of higher-elevation lands featuring chaparral and grasslands, with some riparian and oak woodland habitats along the waterways.

Privately owned lands constitute the other half of the watershed. Most of these lands are found at lower elevations directly surrounding the Santa Clara River. Natural vegetation types include chaparral, grasslands, riparian, coastal sage scrub, and oak woodlands. Private landholdings are mostly small, ranging from city lots (3 percent of the lower watershed) to ranchettes of five to 40 acres (8 percent) to agricultural lands, which are commonly held in plots of 40 to 300 acres (37 percent). The largest private land use in the lower watershed is agriculture, which includes berry, row crop, citrus, and avocado production. Oil wells also dot the landscape. It is estimated that only about 16 percent of the Santa Clara River watershed's lower-elevation lands are in permanent conservation.[10] For a more detailed account of land ownership and use within the lower watershed, see Tables 1 and 2.

Coastal Areas

More than 5,000 acres, or 73 percent, of the coastal areas are in public ownership or privately conserved. (The coastal areas make up 1.4 percent of the project area.) While the percentage in public ownership or private conservation may seem high, it represents only a small portion of the coastal areas historically found in Ventura County. These are the last remaining patches of relatively intact coastal habitat supporting several rare, threatened, and endangered species. In addition, a vast majority of the publicly owned land, more than 4,000 acres, is found on Naval Air Station Ventura County's facilities at Point Mugu and Port Hueneme. Thirty percent of the coastal area is in urban and/or industrial use, 11 percent is used for private waterfowl hunting, and 11 percent is used for agriculture. In addition, many recreational opportunities exist within the coastal areas including bird watching, beach access, and swimming. Oil wells operate on inholdings at McGrath State Beach. For a more detailed account of landownership and use in the coastal areas, see Tables 1 and 2.

Upland Wildlife Linkages

Of the nearly 140,000 acres that comprise the wildlife linkages located in the lower watershed, roughly 79,000 acres, or 57 percent, are in public ownership or privately conserved, mostly within Los Padres National Forest and the Simi Hills. The remaining 43 percent are currently under private ownership. These privately owned portions of the linkages lie primarily to the south of Los Padres National Forest and provide the important connection between the national forest and the Santa Monica Mountains. Tracts located within the wildlife linkages are generally large. Sixty-seven percent of the tracts are greater than 300 acres, 27 percent range from 40 to 300 acres, and 5 percent range from 5 to 40 acres, while fewer than 1 percent are less than 5 acres in size. Agriculture and urban uses within the wildlife linkages are minimal, representing only 2.2 percent and 1.5 percent, respectively. However, due to the linear nature of these linkages, urban and agricultural areas can create significant breaks, and urban expansion and infrastructure development poses significant threats to the linkages.

[9] The Nature Conservancy and Friends of the Santa Clara River conservation information, accurate as of summer 2007.
[10] Personal communication with Liz Chattin, a biologist for the Ventura County Planning Division.

Urbanization

As in the upper watershed, pressures to increase urbanization and suburban sprawl are significant in the lower watershed. However, the enactment of Save Open-Space and Agricultural Resources (SOAR) initiatives in Ventura County and eight of its cities has slowed the pace of large-tract development. SOAR gives citizens the right to vote before tract development takes place on open space or agricultural lands outside of cities. SOAR also restricts urban sprawl through City Urban Restriction Boundaries (CURB), which are urban boundary lines drawn around a city. City plans to annex lands outside the CURB lines for urbanization purposes must be approved by vote of the people who live within the city's jurisdiction. County SOAR ordinances do not apply to cities, and none of the individual city SOAR ordinances apply to the county or to another city. Additionally, none of the SOAR ordinances apply to special districts.

While SOAR is a tool that can be used in an attempt to prevent tract development in certain areas, it does not protect against exurban development, including the subdivision of large parcels of agricultural and open-space land into clusters of smaller single-family ranchettes that comply with minimum lot sizes under zoning designations. This less dense form of development can be particularly threatening to the ecological integrity of the watershed, as it fragments habitat and threatens wildlife movement corridors by bringing fences, roads, people, and pets into previously intact, open lands. Thus, on a per-household basis, ranchette development can result in significantly greater habitat impacts than smaller lot developments.

The effects of development in the project area are heightened by the fact that Ventura County currently lacks an integrated central conservation plan to coordinate the land use, conservation planning, and mitigation activities being carried out throughout the county by various entities. Conservation and mitigation efforts are carried out on a case-by-case basis and are not organized to contribute to a larger conservation vision. Exacerbating this scenario is the county's ministerial permitting process. Small-scale projects, such as the construction of single family dwellings on existing lots, most agricultural activities, and the removal of up to three oaks per year (ten for agricultural purposes), can be approved under ministerial permits. Unlike activities approved under discretionary permits, those approved under ministerial permits are not subject to the California Environmental Quality Act (CEQA) process, which usually requires an evaluation of environmental impacts. While the environmental impacts of each individual project allowed under the ministerial permitting process are often minimal, the net effect, or cumulative impact, of the thousands of these projects permitted each year is significant and increasing.

Along the river, the pressure to urbanize continues and brings with it the need for increased flood control. While the Santa Clara is relatively unaltered compared to other southern California rivers, the levees, bank stabilizations, and channels constructed to protect homes and valuable agricultural lands have cut the river off from much of its historical floodplain and disrupted its hydrological cycle. Pressures to continue narrowing the main stem of the Santa Clara River and its tributaries threaten important in-channel and streamside habitat, as well as the river's almost entirely natural flow regime.

Water Supply and Quality

Lower Watershed

In addition to sustaining natural habitat, the Santa Clara River watershed provides public drinking water and irrigation water for agriculture. United Water Conservation District is the wholesale water district for the lower watershed.

Three municipal wastewater reclamation and/or treatment plants release effluent into the lower Santa Clara River. The facilities are located along the main stem of the river in Fillmore and Santa Paula and

adjacent to the estuary in Ventura. (See Map 5, Infrastructure.) Ventura's facility has a design capacity of 14 million gallons per day (MGD) and is a tertiary treatment facility. Santa Paula's facility[11] has a design capacity 2.6 MGD, a peak capacity of 5.9 MGD, and is a secondary treatment facility. Fillmore's[12] has a design capacity of 1.3 MGD, a peak capacity of 2.2 MGD, and is a secondary treatment facility (Birosik, 2006).

Although water quality in the Santa Clara River is generally regarded as good (CBI, 2005), 13 river segments in the lower watershed are on the Clean Water Act section 303(d) list for impaired waterbodies. All of the impaired segments are scheduled to be assigned Total Maximum Daily Loads[13] by the year 2019. Two additional segments have already been assigned TMDL's: river reach three[14] for chloride in 2003 and ammonia in 2004, and Wheeler Canyon-Todd Barranca for nitrate and nitrite in 2004. For a more detailed list of these segments and their impairments, see Appendix C, *Clean Water Act Section 303(d) List of Impaired Waterbodies on the Santa Clara River*.

Issues with nitrate and chloride have been noted in the lower watershed for several years. Concentrations of nitrates have been detected in reaches of the river downstream from developed areas and are thought to be derived from agricultural practices and reliance on septic waste disposal systems (Birosik, 2006). Nitrate concentrations may continue to increase as agricultural lands are converted from tree-based crops such as citrus and avocados to more lucrative and more fertilizer-intensive row crops, including berries. However, further research into this trend is necessary. Elevated chloride concentrations that have been detected coming from the Santa Paula wastewater reclamation plant are due to domestic use of water softeners (Birosik, 2006). In addition, waters with increased chloride concentrations originating in the upper watershed flow downstream and are affecting avocado farms in the lower watershed. A TMDL has been established to regulated chloride in the upper watershed, which primarily stems from the Valencia and Saugus wastewater treatment plants. Ventura County farmers were largely in support of the most stringent standards when the TMDL was being established. A recent report prepared for the Upper Santa Clara River, *Chloride Threshold Recommendations for the Protection of Aquatic Life in the Upper Santa Clara River* (Advent Group, 2004), includes information on the effects of chloride toxicity on local plants and animals, as well as recommendations for designating threshold levels of chloride for the river.

Coastal Areas

Water quality near the coastal areas is compromised by storm water run-off, agricultural run-off and other industrial uses.

McGrath Lake is on the Clean Water Act section 303(d) list of impaired water bodies for fecal coliform, chlordane, DDT, Dieldrin, and PCBs in sediment, as well as sediment toxicity. TMDLs must be developed by 2012 to address the listing, meet standards, and restore the lake. In addition, McGrath Beach is on the list for coliform bacteria. The source of the bacteria is the pumping outfall from the lake. A TMDL has been adopted to address this impairment. The TMDL is being implemented through a single Cleanup and Abatement Order issued to Coastal Berry (now SC Land Corporation) because they operate the pump that discharges the lake water to the beach.

---

[11] The Santa Paula wastewater treatment plant is scheduled to be upgraded to a design capacity of 4.2 MGD and a peak capacity of 8.0 MGD by 2010. It will also add wastewater recycling and percolation ponds by this date.

[12] The Fillmore wastewater treatment plant is scheduled to be upgraded to a design capacity of 2.4 MGD and a peak capacity of 6.0 MGD by September 2009. It will also add wastewater recycling by this date.

[13] A Total Maximum Daily Load (TMDL) is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards. A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. The calculation must include a margin of safety to ensure that the waterbody can be used for the purposes the state has designated. The Clean Water Act, section 303, establishes the water quality standards and TMDL programs. For more information see ***http://www.epa.gov/owow/tmdl/intro.html***

[14] River Reach 3 is located between the Freeman Diversion and A Street.

Ormond Beach contains a number of agricultural, industrial, and urban drainages with potential run-off contamination. Three segments of Ormond Beach have been added to the federal 303(d) list of impaired waterbodies for indicator bacteria: J Street, Oxnard drain, and Arnold Road. TMDLs are expected to be completed for these segments in 2008. Another large source of water quality degradation is the former Halaco metals recycling site, which includes roughly 710,000 cubic yards of waste, including radioactive thorium and heavy metals. Some of the site's constituents have penetrated the surrounding water table, and the Environmental Protection Agency (EPA) has proposed the site for listing under Superfund. If listed, EPA would conduct extensive water quality testing to assess the extent of groundwater contamination.

Table 1: Situational Analysis by Focus Area.

		Ormond-Mugu	Santa Clara Estuary-McGrath	Santa Clara River Mainstem	Ventura Hillsides	Santa Paula Creek	Foothills	Sespe Creek	Pole Creek	Hopper Creek	Santa Susana Mountains	South Mountain
General	Area (acres)	6,611	1,087	48,545	30,860	29,728	9,878	166,471	6,308	18,183	38,950	37,112
	Percent of Project Area	1.7%	0.3%	12.3%	7.8%	7.6%	2.5%	42.3%	1.6%	4.6%	9.9%	9.4%
Land Ownership												
Public or Privately Conserved	Area (acres)	5,296	371	2,380	10	18,991	1,983	154,505	1,204	9,442	4,262	670
	Percent of Focus Area	80.0%	34.1%	4.9%	0.0%	63.9%	20.1%	92.8%	19.1%	51.9%	10.9%	1.8%
Private	Area (acres)	1,316	716	46,165	30,849	10,737	7,895	11,966	5,104	8,741	34,687	37,112
	Percent of Focus Area	20.0%	65.9%	95.1%	100.0%	36.1%	79.9%	7.2%	80.9%	48.1%	89.1%	98.2%
Land Use												
Agriculture	Area (acres)	782	45	22,593	2,826	1,402	1,152	1,604	66	544	1,337	9,753
	Percent of Focus Area	0.1	0.0	0.5	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.3
Urban	Area (acres)	2,134	211	15,455	1,134	1,046	130	393	138	100	3,623	1,917
	Percent of Focus Area	32.2%	19.4%	31.8%	3.7%	3.5%	1.4%	0.2%	2.2%	0.5%	9.3%	5.2%

Table 2: Situational Analysis by Conservation Target.

		Coastal Communities	Riparian Forest & Scrub Communities	Grasslands	Coastal Sage Scrub Communities	Chaparral Communities	Oak Woodlands
General	Area (acres)	2,186	9,626	43,522	80,873	150,499	28,240
	Percent of Project Area	0.6%	2.4%	11.1%	20.5%	38.2%	7.2%
Land Ownership Public or Privately Conserved							
	Area (acres)	1,807	4,575	17,933	12,977	135,383	14,425
	Percent of Project Area	0.5%	1.2%	4.6%	3.3%	34.4%	3.7%
Private	Area (acres)	379	5,051	25,589	67,896	15,117	13,815
	Percent of Project Area	0.1%	1.3%	6.5%	17.2%	3.8%	3.5%

Conservation Framework

Planning Approach

As a science-based conservation organization, The Nature Conservancy has, over the past 20 years, developed and refined a planning approach known as the *Five-S Framework for Site Conservation* (2000). This framework has been successfully used to develop hundreds of conservation plans throughout the world, including the *Lower Santa Clara River Focus Plan* (2001) and the *Santa Clara River Upper Watershed Conservation Plan* (2006). For more information on the framework, see *Conservation Action Planning: Developing Strategies, Taking Action, and Measuring Success at Any Scale* (2007).

Conservation Targets

Landscape-scale conservation begins with identifying and understanding the priority conservation targets in an area. A conservation target is an element of biodiversity that serves as the focus of planning efforts. These targets may include ecological systems, ecological communities, plant or animal species, or other important resources. Conservationists can then develop strategies to protect and enhance the viability of those targets.

The Project Area contains a wide array of natural communities and habitats, ranging from hillsides covered in oak and walnut woodlands to the creeks and streams that flow to the Santa Clara River. Adding to this diversity, prominent habitats found in the nearby coastal areas include beaches, dunes, and seasonal wetlands. We have identified the following major vegetation community types and species assemblages as conservation targets: coastal communities, riparian forest and scrub communities, grasslands, coastal sage scrub communities, oak woodlands, chaparral communities, aquatic vertebrates, and wide-ranging terrestrial vertebrates. (See Maps 6 through 11, Conservation Targets.) The community-level targets represent important constituents of the ecosystem, while the species assemblages essentially integrate across those communities.

Embedded within each conservation target are nested targets that are important indicators of the health of the conservation target. The nested targets include threatened or endangered species, special plant assemblages, and wildlife linkages that provide important connections between habitats. Generally, conservation targets and nested targets co-occur within the landscape, share ecological processes, and face similar threats.

The following table (Table 3) outlines the conservation targets and nested targets found within the lower Santa Clara River watershed.

Table 3: Conservation Targets

Conservation Target	Description	Location Within Project Area	Nested Targets
Coastal Vegetation Communities	Coastal vegetation communities and their associated animal species	Along the coast of the Pacific ocean near McGrath State Beach, Ormond Beach, and Point Mugu.	♦ Dunes ♦ Coastal-dependent focal bird species including: bank swallow (*Riparia riparia*), Belding's savannah sparrow (*Passerculus sandwhichensis beldingi*), California least tern (*Sternula antillarum* ssp. *browni*), and western snowy plover (*Charadrius alexandrinus nivosus*) ♦ Salt marsh bird's beak (*Cordylanthus maritimus* ssp *maritimus*), and Ventura marsh milk vetch (*Astragalus pychnostachyus* var. *lanosissimus*) ♦ Freshwater coastal lake ♦ Coastal marsh
Riparian Forest and Scrub Communities	Riparian vegetation and riparian-dependent animal species	Along the mainstem of the Santa Clara River, its tributaries, and the coast.	♦ Riparian-dependent focal bird species including: bank swallow (*Riparia riparia*), southwestern willow flycatcher (*Empidonax traillii extimusa*), least Bell's vireo (*Vireo bellii pusillus*), Peregrine falcon (Falco peregrinus), and yellow billed cuckoo (*Coccyzus americanus occidentalis*) ♦ Cottonwood-willow riparian forest ♦ Alluvial fan scrub ♦ Southern sycamore alder riparian woodland
Grasslands	Grassland (herbaceous) vegetation and associated animal species	Scattered throughout the lower hillsides on both the north and south sides of the Santa Clara River. There is also a large patch in the northwest portion of the Sespe Creek subbasin.	♦ Grassland-dependent focal bird species including: bank swallow (*Riparia riparia*), Belding's savannah sparrow (*Passerculus sandwhichensis beldingi*), and Peregrine falcon (*Falco peregrinus*).
Coastal Sage Scrub Communities	Coastal Sage Scrub vegetation and associated animal species	Covering the lower hillsides on both the north and south sides of the Santa Clara River. There is also a sizable patch in the northeast portion of the Sespe Creek subbasin.	♦ Coastal Sage Scrub-dependent focal bird species including: bank swallow (*Riparia riparia*), California condor (*Gymnogyps californianus*), coastal California gnatcatcher (*Polioptila californica californica*), and Peregrine falcon (*Falco peregrinus*).
Oak Woodlands	Oak dominated landscapes where oaks have at least 10% canopy cover and associated animal species	Scattered throughout the upper and lower hillsides on both the north and south sides of the Santa Clara River.	♦ Blue Oak Woodland, Coastal Oak, Montane hardwood-Conifer, Montane Hardwood, Valley Oak Woodland and associated tree species. ♦ Woodlands-dependent focal bird species including: California condor (*Gymnogyps californianus*), and Peregrine falcon (*Falco peregrinus*).
Chaparral Communities	Chaparral vegetation and associated animal species	Covering the northern portion of the lower Santa Clara River watershed, especially those portions that lie within Los Padres National Forest.	♦ California condor (*Gymnogyps californianus*) ♦ Other chaparral dependent focal bird species

Table 3: Conservation Targets (continued)

Aquatic Vertebrates	Fish, amphibians, and reptiles dependent on freshwater aquatic habitats for all parts of their lifecycle	Throughout the project area.	♦ Southern steelhead (*Oncorhynchus mykiss*) ♦ Arroyo southwestern toad (*Bufo microscaphus californicus*) ♦ California red-legged frog (*Rana aurora draytonii*) ♦ Santa Ana sucker (*Catostomus santaanae*) ♦ Tidewater goby (*Eucylcogobius Newberryi*)
Wide Ranging Terrestrial Vertebrates	Animals, primarily mammals, requiring large ranges to maintain viable population sizes and genetic diversity	Throughout the project area.	♦ Mountain lions ♦ Bobcats

Target Viability

Viability indicators provide a means of assessing the current and future health, or viability, of the conservation targets. For each target we ranked three ecological attributes that, in combination, paint a picture of the target's overall viability : (1) size — the area or abundance of the target's occurrence; (2) condition — measuring the composition, structure, and biotic interaction that characterize the occurrence; and (3) landscape context — which examines habitat fragmentation, dispersal and migration routes, and ecological processes that establish and maintain target occurrence. Each ranking was determined based on a ten-year planning horizon. The table below summarizes the viability rankings for each conservation target.

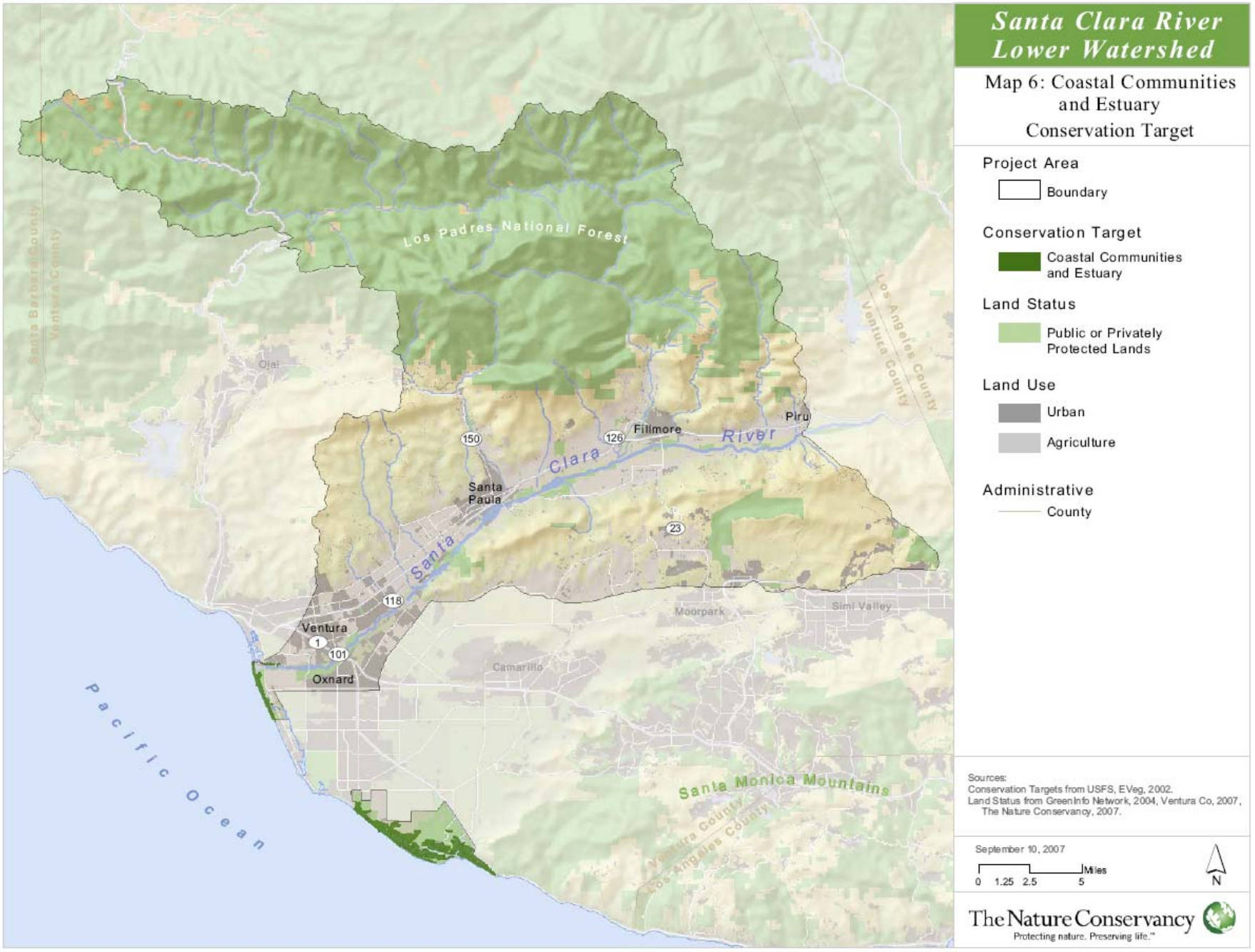
Table 4: Target Viability Summary – Viability rankings of each conservation target's key attributes.

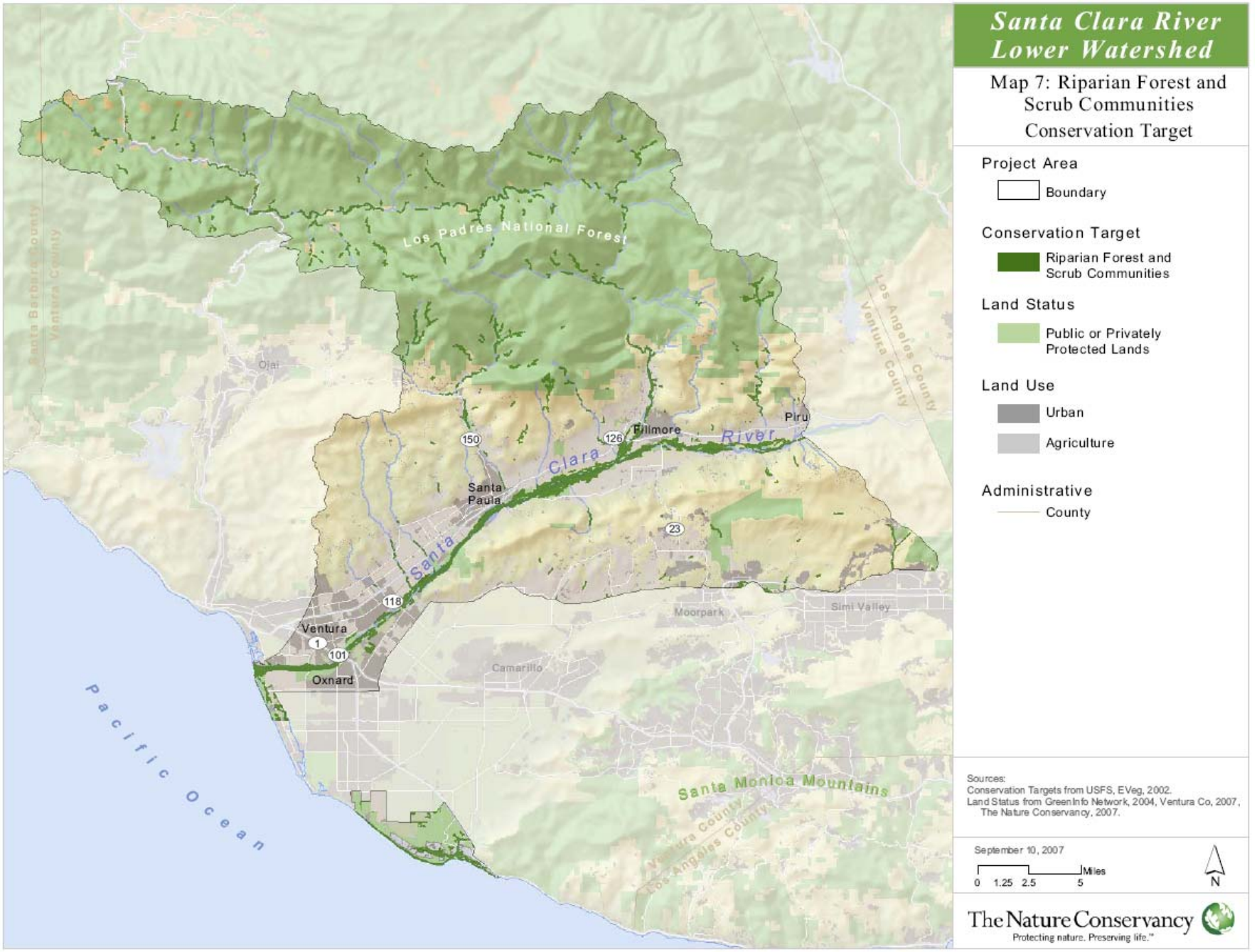
Conservation Targets		Ecological Attributes			
		Landscape Context	Condition	Size	Viability Rank
1	Coastal Communities	Fair	Good	Poor	**Fair**
2	Riparian Forest and Scrub Communities	Fair	Good	Good	**Good**
3	Grasslands	Poor	Poor	Poor	**Poor**
4	Coastal Scrub Communities	Fair	Good	Fair	**Fair**
5	Oak Woodlands	Fair	Fair	Fair	**Fair**
6	Chaparral Communities	Good	Fair	Very Good	**Good**
7	Aquatic Vertebrates	Poor	Fair	Poor	**Poor**
8	Wide Ranging Terrestrial Vertebrates	Poor	Fair	Fair	**Fair**
Site Biodiversity Health Rank					**Fair**

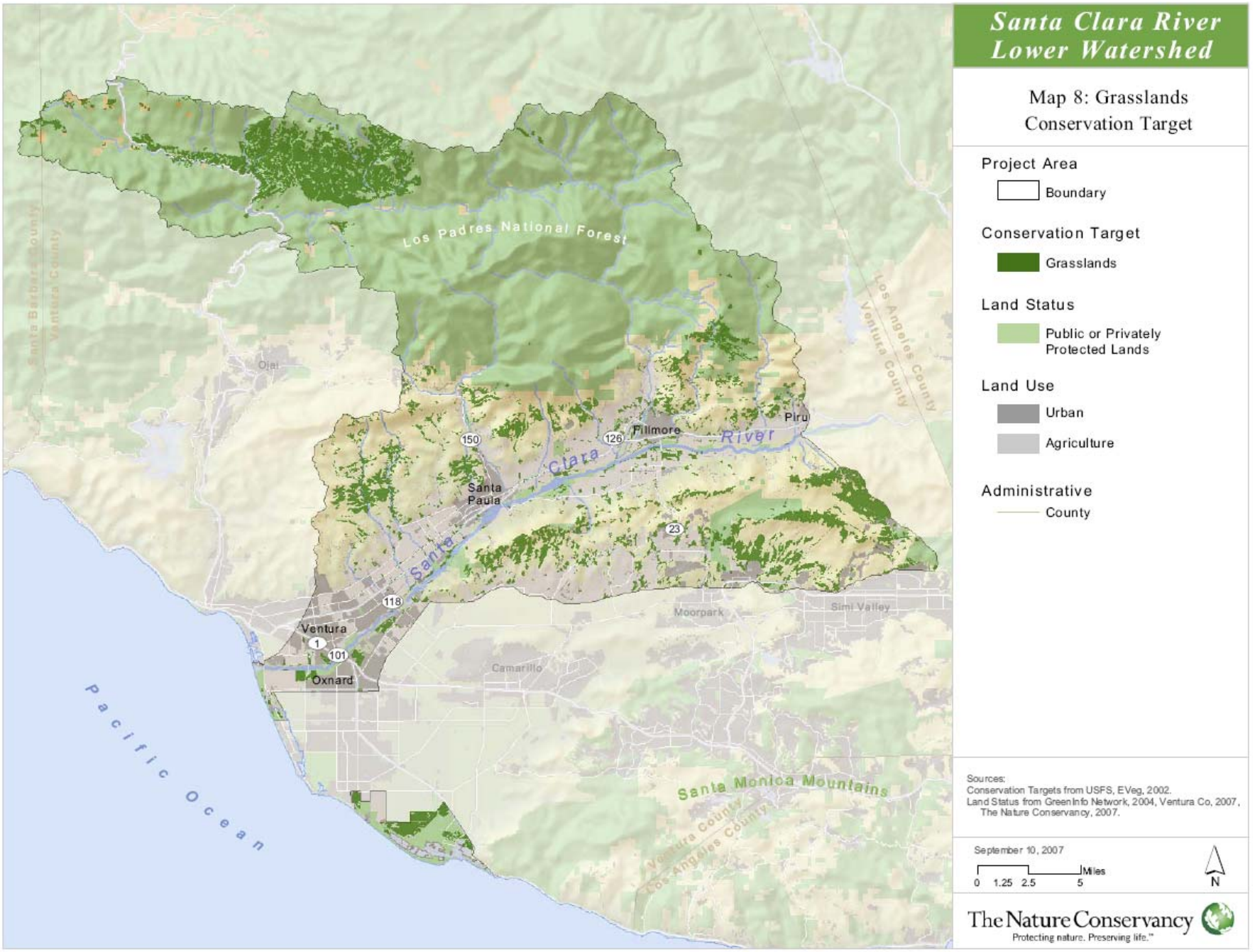
While individual conservation targets ranged in rank from "good" to "poor," the overall current condition of the watershed ranked "fair." Below are the definitions of the rankings:

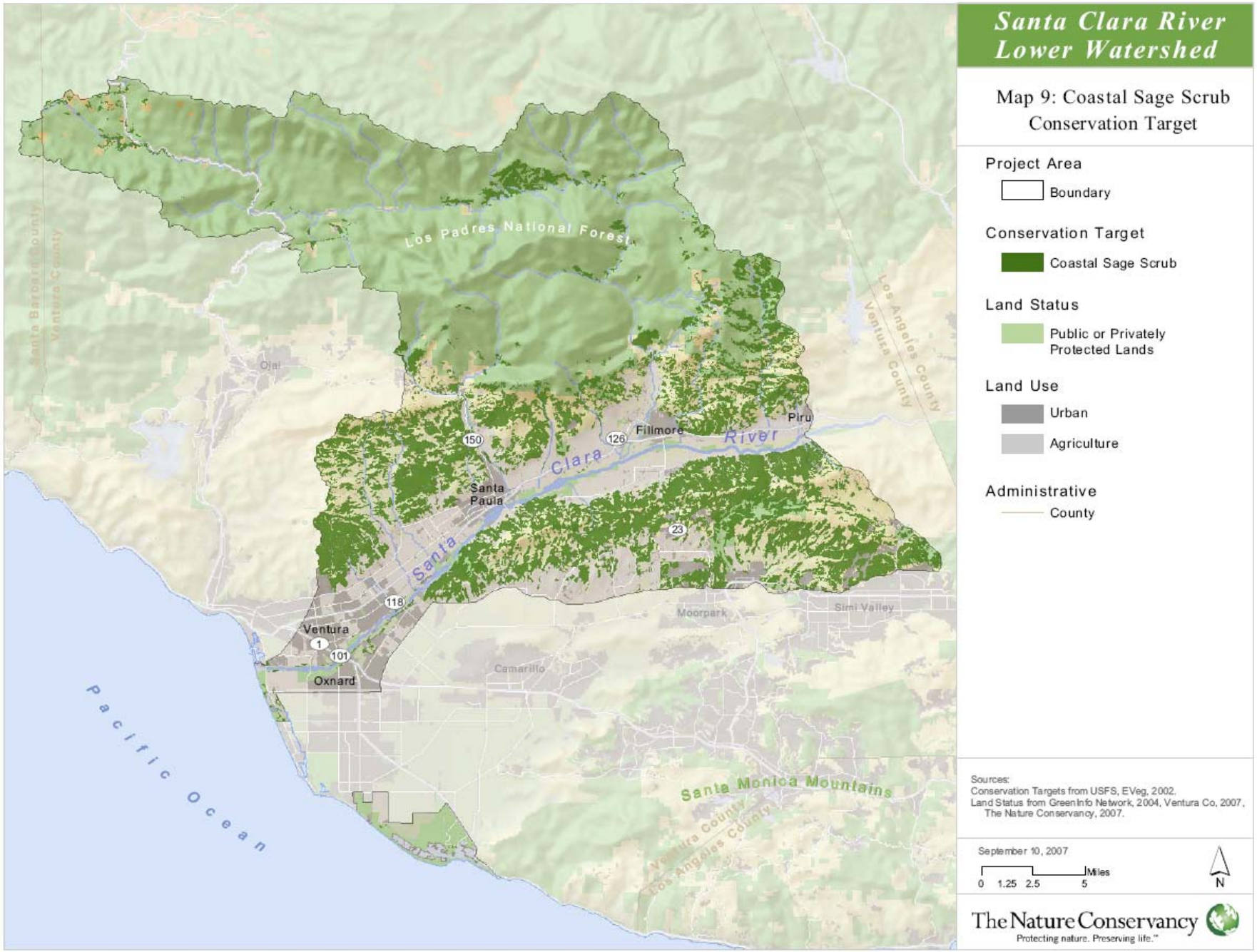
- Very Good — The factor or target is naturally functioning and requires little human intervention.
- Good — The factor or target is functioning within its range of acceptable variation; it may require some human intervention.
- Fair — The factor or target lies outside its range of acceptable variation and requires human intervention. If unchecked, the target will be vulnerable to serious degradation.
- Poor — Allowing the factor or target to remain in this condition for an extended period will make restoration or preventing extirpation practically impossible (Low, 2003).

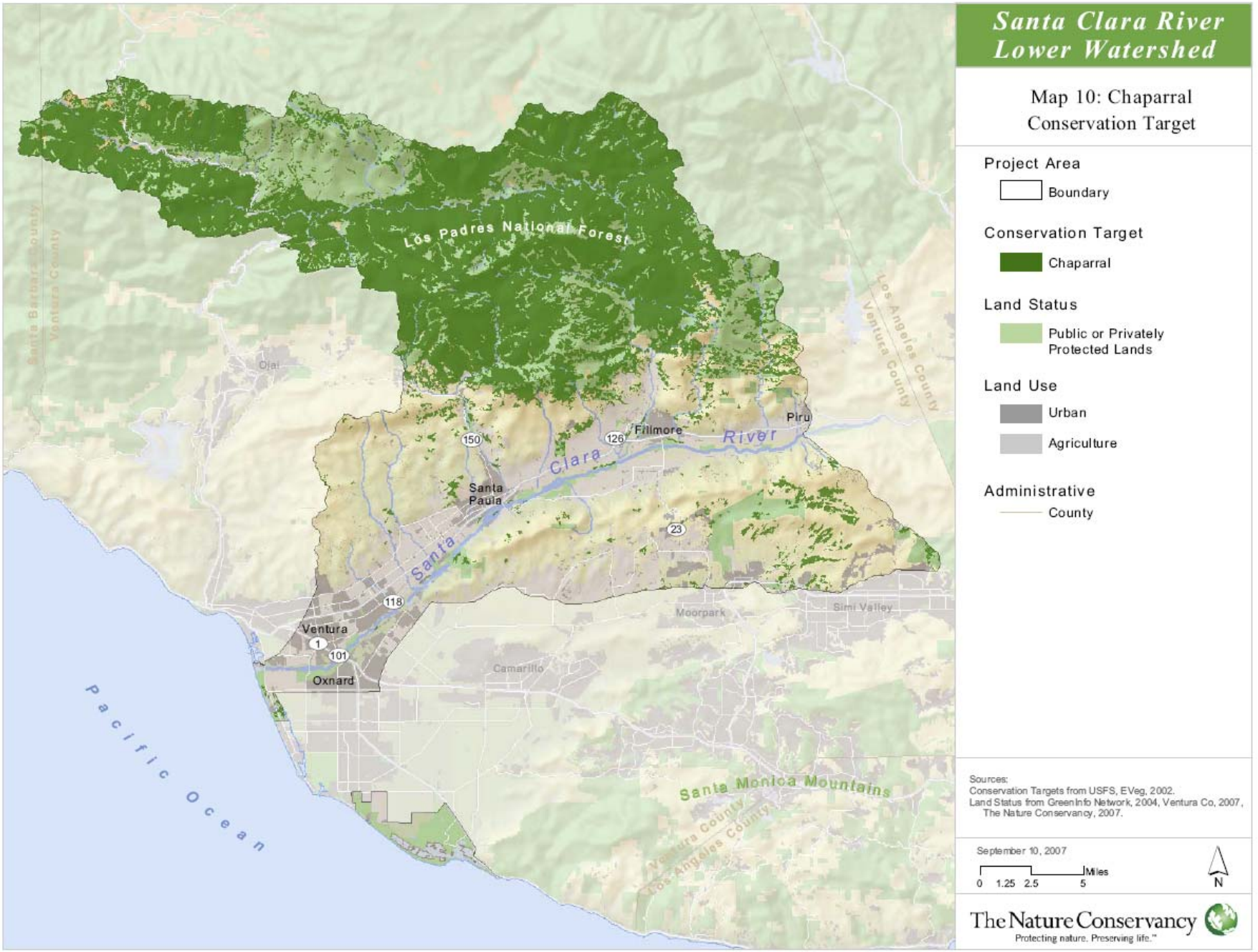
The rank of some conservation targets is often driven by the status of high-profile species, such as steelhead trout or other conservation subtargets. The ranking is thus a broad approximation of target viability and does not necessarily dictate precisely where conservation action will be directed. That decision must be made after examining additional factors such as the manageability of the target and the capacity to conduct conservation work effectively. This assessment is the first step in determining where to focus our efforts. Our viability assessment shows that overall, the lower Santa Clara River watershed is functional but requires active conservation to maintain and improve the viability of its constituent components.

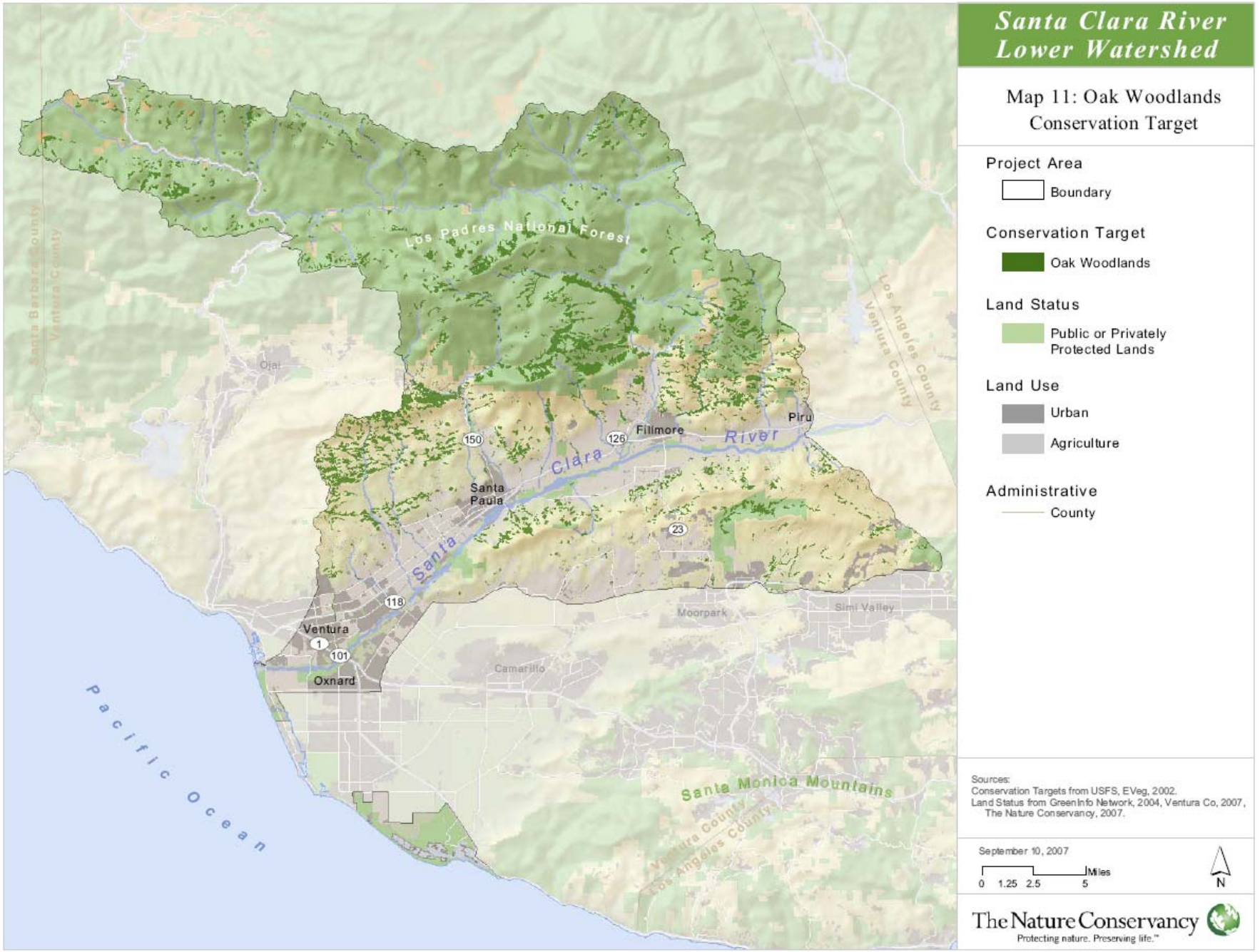

Santa Clara River
Lower Watershed
Map 6: Coastal Communities and Estuary Conservation Target
Project Area
Boundary
Conservation Target
Coastal Communities and Estuary
Land Status
Public or Privately Protected Lands
Land Use
Urban
Agriculture
Administrative
County
Los Padres National Forest
Santa Barbara County
Ventura County
Los Angeles County
Ojai
Fillmore
Piru
Santa Clara River
Santa Paula
Santa
Ventura
Oxnard
Moorpark
Simi Valley
Camarillo
Pacific Ocean
Santa Monica Mountains
150
126
23
118
1
101
Sources:
Conservation Targets from USFS, EVeg, 2002.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007, The Nature Conservancy, 2007.
September 10, 2007
0 1.25 2.5 5 Miles
N
The Nature Conservancy
Protecting nature. Preserving life.™


Santa Clara River
Lower Watershed
Map 7: Riparian Forest and Scrub Communities
Conservation Target
Project Area
Boundary
Conservation Target
Riparian Forest and Scrub Communities
Land Status
Public or Privately Protected Lands
Land Use
Urban
Agriculture
Administrative
County
Los Padres National Forest
Santa Barbara County
Ventura County
Los Angeles County
Ojai
Piru
Fillmore
Santa Clara River
Santa Paula
Ventura
Oxnard
Moorpark
Simi Valley
Camarillo
Santa Monica Mountains
Pacific Ocean
150
126
23
118
1
101
Sources:
Conservation Targets from USFS, EVeg, 2002.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007, The Nature Conservancy, 2007.
September 10, 2007
Miles
0 1.25 2.5 5
N
The Nature Conservancy
Protecting nature. Preserving life.™


Santa Clara River
Lower Watershed
Map 8: Grasslands
Conservation Target
Project Area
Boundary
Conservation Target
Grasslands
Land Status
Public or Privately
Protected Lands
Land Use
Urban
Agriculture
Administrative
County
Los Padres National Forest
Ojai
Santa Barbara County
Ventura County
Los Angeles County
Ventura County
Piru
Fillmore
150
126
Santa Clara River
Santa Paula
23
Santa
118
Moorpark
Simi Valley
Ventura
1
101
Oxnard
Camarillo
Pacific Ocean
Santa Monica Mountains
Ventura County
Los Angeles County
Sources:
Conservation Targets from USFS, EVeg, 2002.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007,
The Nature Conservancy, 2007.
September 10, 2007
Miles
0 1.25 2.5 5
N
The Nature Conservancy
Protecting nature. Preserving life.™


Santa Clara River
Lower Watershed
Map 9: Coastal Sage Scrub
Conservation Target
Project Area
Boundary
Conservation Target
Coastal Sage Scrub
Land Status
Public or Privately
Protected Lands
Land Use
Urban
Agriculture
Administrative
County
Los Padres National Forest
Santa Barbara County
Ventura County
Los Angeles County
Ojai
Fillmore
Piru
Santa Clara River
Santa Paula
Moorpark
Simi Valley
Ventura
Oxnard
Camarillo
Pacific Ocean
Santa Monica Mountains
150
126
23
118
1
101
Sources:
Conservation Targets from USFS, EVeg, 2002.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007,
The Nature Conservancy, 2007.
September 10, 2007
Miles
0 1.25 2.5 5
N
The Nature Conservancy
Protecting nature. Preserving life.™


Santa Clara River
Lower Watershed
Map 10: Chaparral
Conservation Target
Project Area
Boundary
Conservation Target
Chaparral
Land Status
Public or Privately
Protected Lands
Land Use
Urban
Agriculture
Administrative
County
Los Padres National Forest
Ojai
Santa Barbara County
Ventura County
Los Angeles County
Fillmore
Piru
Santa Clara River
Santa Paula
150
126
23
118
Ventura
1
101
Oxnard
Moorpark
Simi Valley
Camarillo
Pacific Ocean
Santa Monica Mountains
Sources:
Conservation Targets from USFS, EVeg, 2002.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007,
The Nature Conservancy, 2007.
September 10, 2007
0 1.25 2.5 5 Miles
N
The Nature Conservancy
Protecting nature. Preserving life.™


Santa Clara River
Lower Watershed
Map 11: Oak Woodlands
Conservation Target
Project Area
Boundary
Conservation Target
Oak Woodlands
Land Status
Public or Privately
Protected Lands
Land Use
Urban
Agriculture
Administrative
County
Los Padres National Forest
Santa Barbara County
Ventura County
Los Angeles County
Ojai
Fillmore
Piru
Santa Clara River
Santa Paula
Moorpark
Simi Valley
Camarillo
Ventura
Oxnard
Pacific Ocean
Santa Monica Mountains
150
126
23
118
1
101
Sources:
Conservation Targets from USFS, EVeg, 2002.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007,
The Nature Conservancy, 2007.
September 10, 2007
0 1.25 2.5 5 Miles
N
The Nature Conservancy
Protecting nature. Preserving life.™

Conservation Focus Areas

To examine issues in subregions of the project area with a finer resolution, we divided it into 11 conservation focus areas. These focus areas were delineated with the help of GIS software and based on natural features.

The conservation focus areas include Ormond and Mugu Beaches, the Santa Clara River Estuary and McGrath State Beach, the main stem of the Santa Clara River, Ventura Hillsides, Santa Paula Creek, Foothills, Sespe Creek, Pole Creek, Hopper Creek, the Santa Susana Mountains, and South Mountain. The following maps and table illustrate and summarize locations of focus areas as well as land-use patterns, percent coverage of conservation targets, nested targets, and threats to listed targets. (See Table 5, Maps 12 through 22, Conservation Targets, and Maps 23 through 33, Nested Targets.)

The pattern of land ownership throughout the lower watershed also divides the project area into general categories. Higher elevations tend to support relatively intact landscapes that fall within public ownership, primarily Los Padres National Forest. More intensive human land uses such as irrigated agriculture, urbanization, and highways concentrate along the main stem of the Santa Clara River and its broad floodplain, in Simi Valley, around Thousand Oaks, and along the coast. When looking at the threats and stressors that affect the project area, it is important to consider these various land uses in order to identify cross-watershed strategies.

Table 5: Focus Areas

Focus Area	Land Use Patterns	Percent (%) Coverage of Conservation Targets	Nested Targets*	Threats
Ormond-Mugu	▪ Almost 1/2 of this area is urbanized with a small percentage of agricultural lands. ▪ This area has the largest percentage of military lands at about seventy percent.	▪ Chaparral – 0.1% ▪ Coastal – 32.3% ▪ Grasslands – 15.5% ▪ Riparian – 11.1% ▪ Coastal Sage Scrub – 1%	▪ Dunes ▪ Coastal-dependent focal bird species ▪ Salt marsh bird's beak (*Cordylanthus maritimus* ssp *maritimus*), and Ventura marsh milk vetch (*Astragalus pychnostachyus* var. *lanosissimus*) ▪ Coastal marsh ▪ Grassland-dependent focal bird species	▪ Altered hydrological regime ▪ Altered geomorphology ▪ Incompatible urban development ▪ Climate change ▪ Incompatible recreational use ▪ Halaco Superfund site ▪ Invasive plants and animals
Santa Clara Estuary-McGrath	▪ About 1/5 of this area is urbanized, with a small percentage of agricultural lands. ▪ Mostly private lands with about one-third protected.	▪ Chaparral – 13.6% ▪ Coastal – 17.3% ▪ Grasslands – 6.8% ▪ Riparian – 29.6% ▪ Coastal Sage Scrub – 9.2% ▪ Linkage	▪ Dunes ▪ Coastal-dependent focal bird species ▪ Freshwater lake ▪ Coastal marsh ▪ Riparian-dependent focal bird species ▪ Cottonwood-willow riparian forest ▪ Southern sycamore alder riparian woodlands ▪ Wildlife linkages	▪ Altered hydrological regime ▪ Altered geomorphology ▪ Incompatible urban development ▪ Climate change ▪ Sewer treatment plant effluent ▪ Incompatible recreational use ▪ Invasive plants and animals
Santa Clara River Mainstem	▪ Because of the fertile floodplains, almost half of this area is agriculture. ▪ Another 1/3 is urbanized. These urban areas include the cities of Ventura, Santa Paula, and Fillmore. ▪ The vast majority is privately owned.	▪ Chaparral – 0.7% ▪ Grasslands – 5.6% ▪ Riparian – 9.8% ▪ Coastal Sage Scrub – 1.4% ▪ Oak Woodlands – 0.3% ▪ Linkage	▪ Riparian-dependent focal bird species ▪ Cottonwood-willow riparian forest ▪ Alluvial fan scrub ▪ Southern sycamore alder riparian woodlands ▪ Wildlife linkages	▪ Altered hydrological regime ▪ Altered fire regime ▪ Bank stabilization/ channelization ▪ Incompatible urban development ▪ Aquatic barriers ▪ Climate change ▪ Sewer treatment plant effluent ▪ Incompatible recreational use ▪ Resource extraction ▪ Invasive plants and animals
Ventura Hillsides	▪ This area is composed entirely of private lands, with small amounts of urbanization and agriculture.	▪ Chaparral – 2.8% ▪ Grasslands – 14.1% ▪ Riparian – 0.1% ▪ Coastal Sage Scrub – 53.8% ▪ Oak Woodlands – 16.3%	▪ Coastal sage scrub dependent bird species ▪ Blue Oak Woodland, Coastal Oak, Montane hardwood-Conifer, Montane Hardwood, Valley Oak Woodland and associated tree species ▪ Wildlife linkages	▪ Incompatible urban development ▪ Altered fire regime ▪ Invasive plants ▪ Climate change

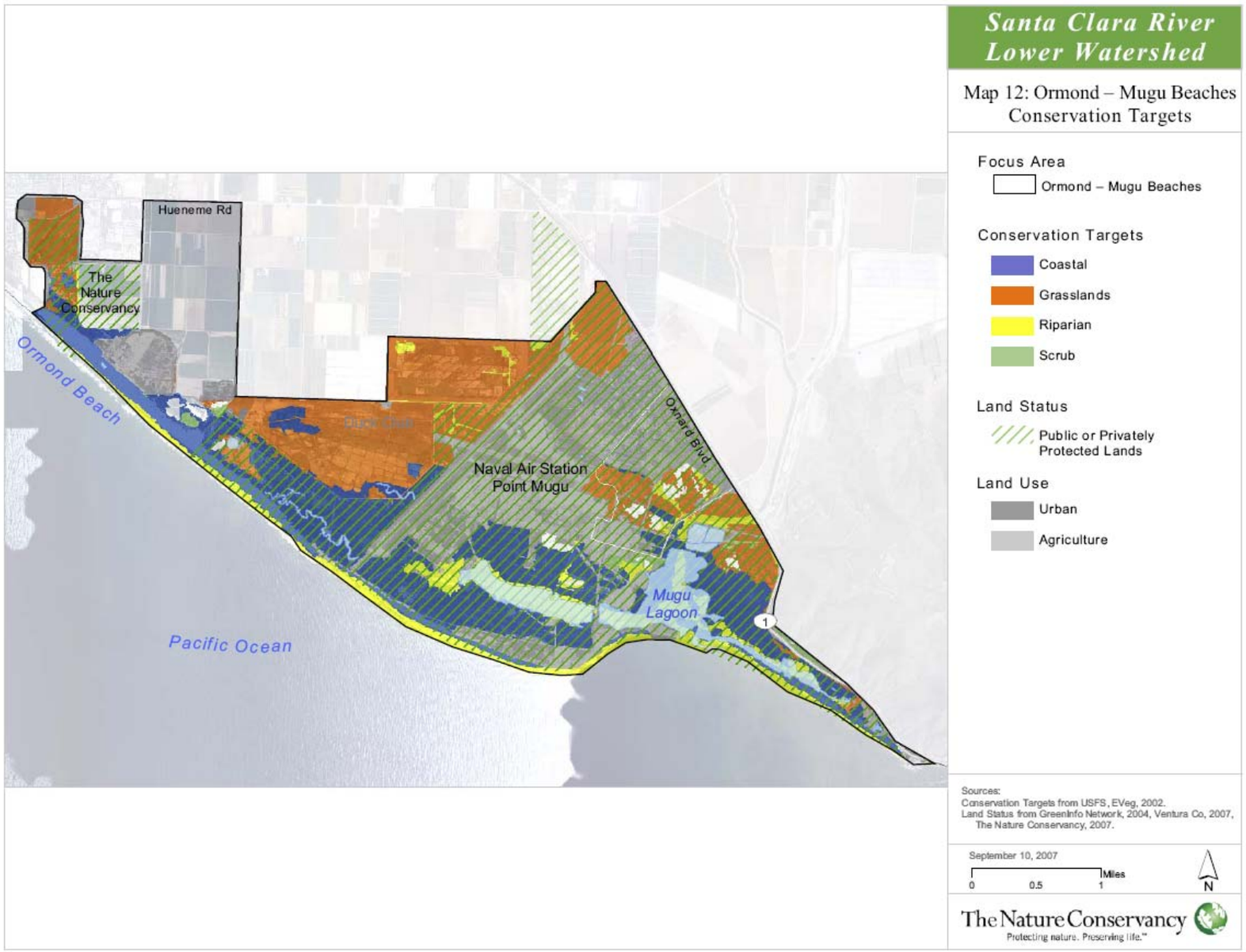
Table 5: Focus Areas (continued)

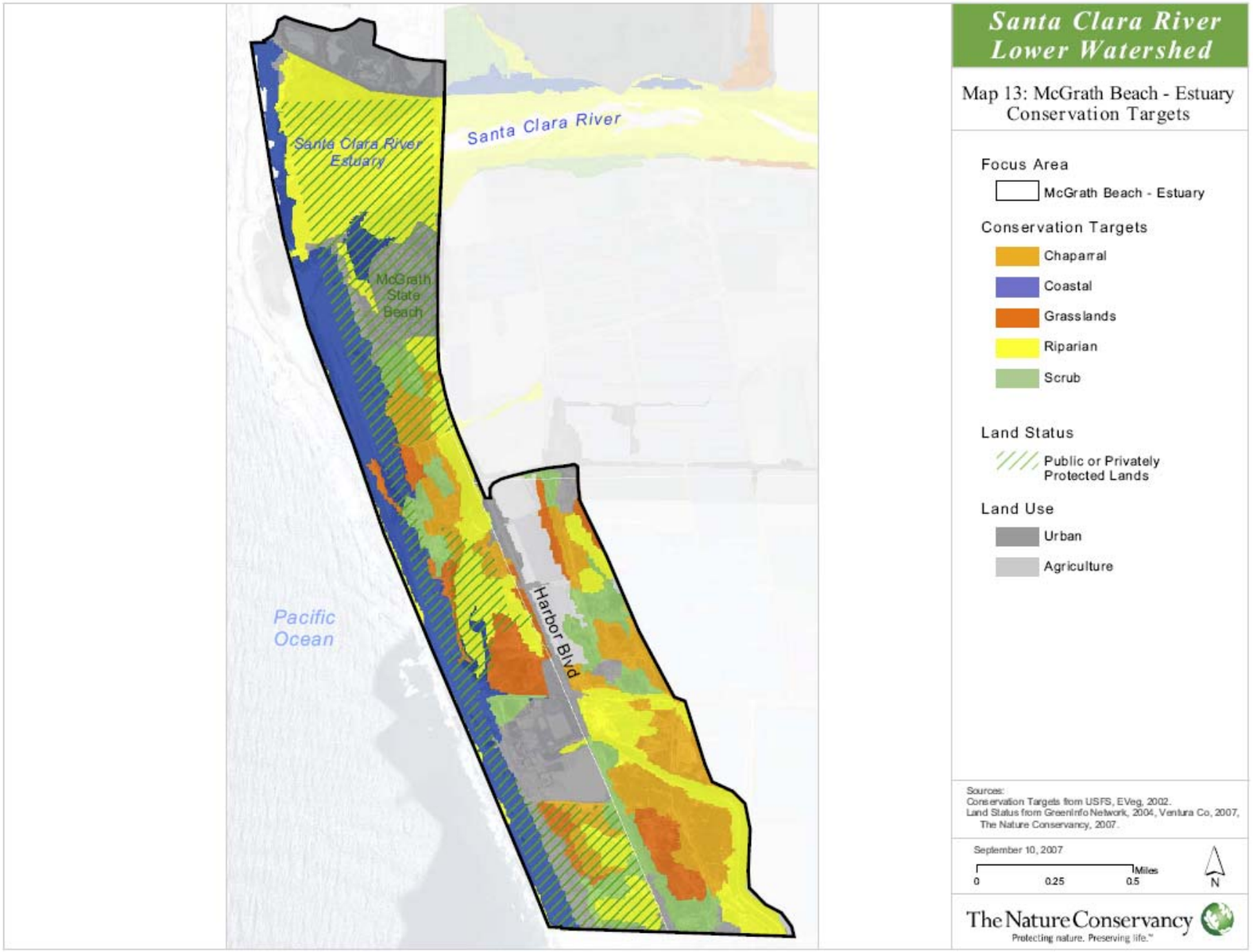
Focus Area	Land Use Patterns	Percent (%) Coverage of Conservation Targets	Nested Targets*	Threats
Santa Paula Creek	▪ Over 1/2 of this area is protected, with about ten percent in agricultural or urbanized zones.	▪ Chaparral – 62.0% ▪ Grasslands – 3.5% ▪ Coastal Sage Scrub – 13.6% ▪ Linkage	▪ California condor ▪ Chaparral and associated focal bird species	▪ Incompatible urban development ▪ Altered fire regime ▪ Invasive plants ▪ Aquatic barriers ▪ Climate change ▪ Invasive animals
Foothills	▪ This area is mostly private land, with about 1/5 protected. ▪ There is very little urbanization and some agriculture in the flatter areas.	▪ Chaparral – 24.7% ▪ Grasslands – 14.7% ▪ Riparian – 2.5% ▪ Coastal Sage Scrub – 36.6% ▪ Oak Woodlands – 8.4%	▪ Coastal sage scrub and associated focal bird species ▪ California condor ▪ Chaparral and associated focal bird species	▪ Incompatible urban development ▪ Altered fire regime ▪ Invasive plants ▪ Climate change
Sespe Creek	▪ The majority of this area lies within the Los Padres National Forest, so it is mostly protected land.	▪ Chaparral – 71.2% ▪ Grasslands – 9.7% ▪ Riparian – 1.3% ▪ Coastal Sage Scrub – 4.6% ▪ Oak Woodlands – 7.2%	▪ California condor ▪ Chaparral and associated focal bird species	▪ Altered fire regime ▪ Aquatic barriers ▪ Climate change ▪ Polluted food sources for condors ▪ Resource extraction ▪ Invasive animals
Pole Creek	▪ Pole creek almost entirely lies within a wildlife linkage. ▪ About 4/5 of this land is private, with most of the rest being protected.	▪ Chaparral – 19.1% ▪ Grasslands – 18.6% ▪ Coastal Sage Scrub – 42.8% ▪ Oak Woodlands – 16.0% ▪ Linkage	▪ California condor ▪ Chaparral and associated focal bird species ▪ Grassland dependent focal bird species and mammals ▪ Coastal sage scrub and associated focal bird species ▪ Blue Oak Woodland, Coastal Oak, Montane hardwood-Conifer, Montane Hardwood, Valley Oak Woodland and associated tree species	▪ Altered fire regime ▪ Climate change ▪ Resource extraction
Hopper Creek	▪ This area is almost equally split between private and protected lands, with a small amount of agriculture and urban lands.	▪ Chaparral – 24.9% ▪ Grasslands – 10.2% ▪ Riparian – 1.6% ▪ Coastal Sage Scrub – 42.2% ▪ Oak Woodlands – 14% ▪ Linkage	▪ California condor ▪ Chaparral and associated focal bird species ▪ Coastal sage scrub and associated focal bird species	▪ Altered fire regime ▪ Invasive plants ▪ Climate change ▪ Polluted food sources for condors ▪ Resource extraction

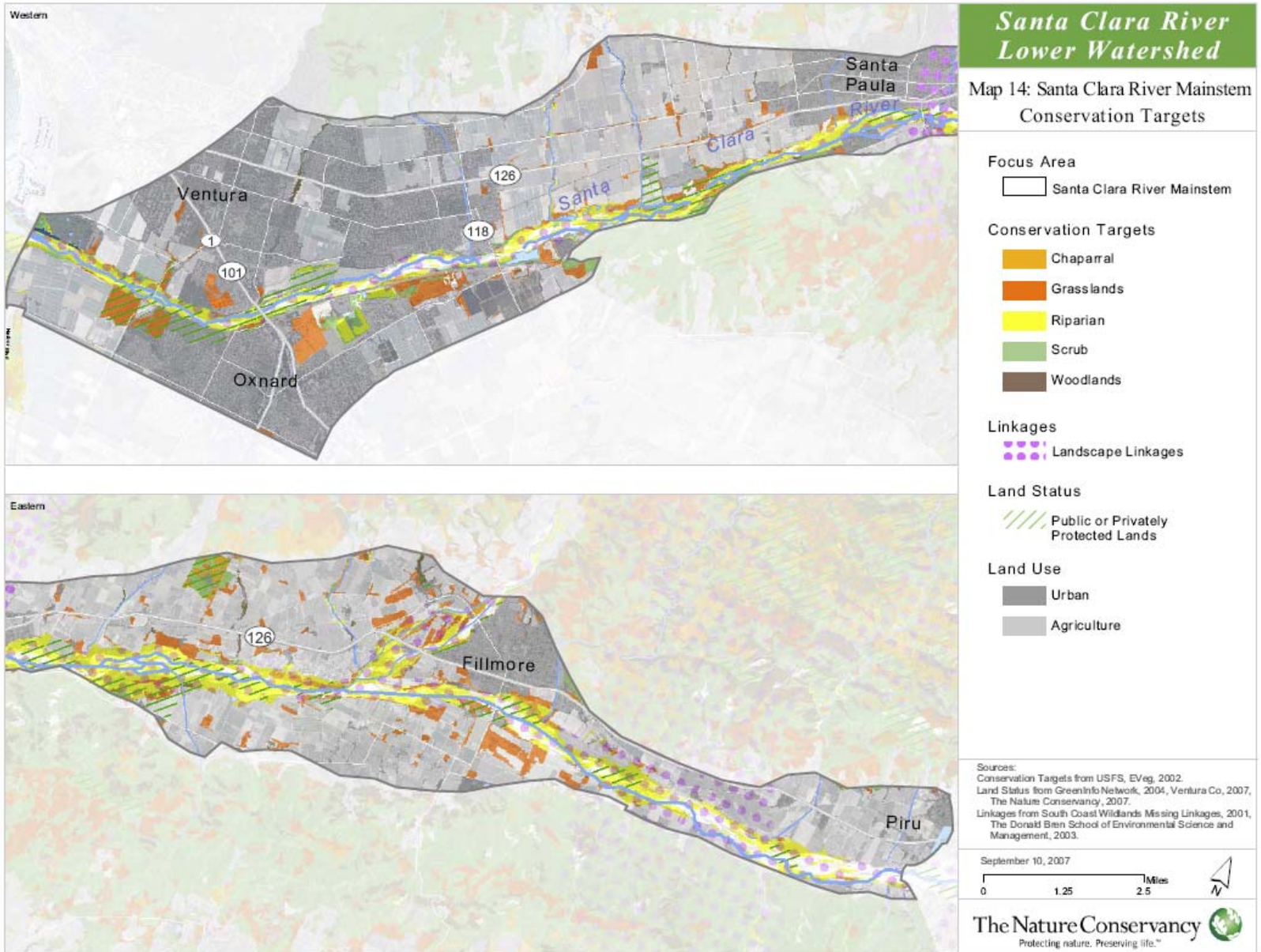
Table 5: Focus Areas (continued)

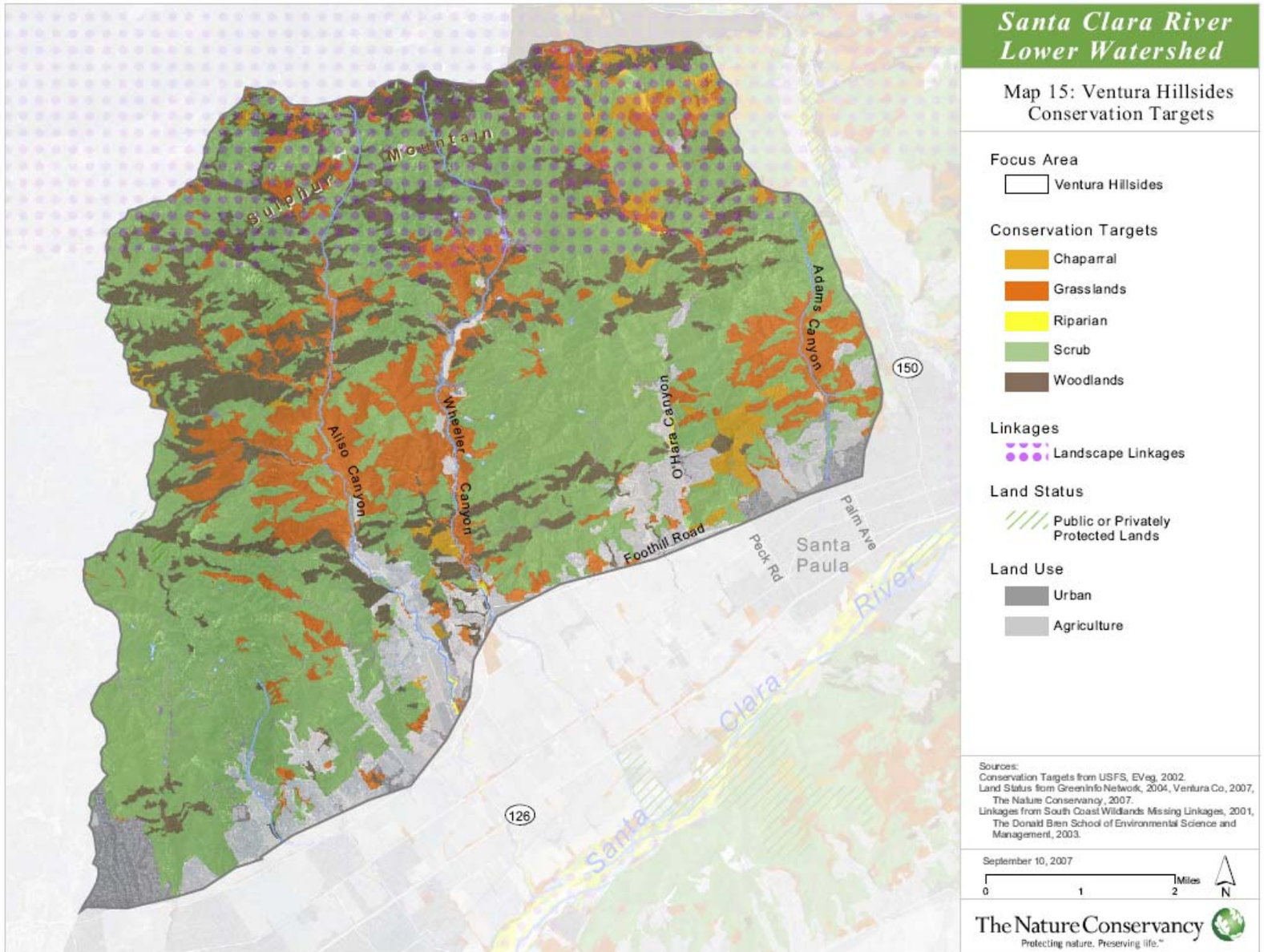
Focus Area	Land Use Patterns	Percent (%) Coverage of Conservation Targets	Nested Targets*	Threats
Santa Susana Mountains	▪ The majority of this area is private lands, with about 1/10 of it in both agriculture and urban as well as protected. ▪ A large portion of it contains two wildlife linkages.	▪ Chaparral – 9.1% ▪ Grasslands – 21.6% ▪ Riparian – 0.6% ▪ Coastal Sage Scrub – 50.5% ▪ Linkages	▪ Grassland dependent focal bird species ▪ Coastal sage scrub and associated focal bird species	▪ Incompatible urban development ▪ Altered fire regime ▪ Invasive plants ▪ Climate change ▪ Resource extraction
South Mountain	▪ The majority of this area is private lands, with a little less than 1/3 in agriculture.	▪ Chaparral – 1.4% ▪ Grasslands – 12.3% ▪ Coastal Sage Scrub – 48.7% ▪ Oak Woodlands – 5% ▪ Linkages	▪ Coastal sage scrub and associated focal bird species	▪ Incompatible urban development ▪ Altered fire regime ▪ Invasive plants ▪ Climate change ▪ Resource extraction

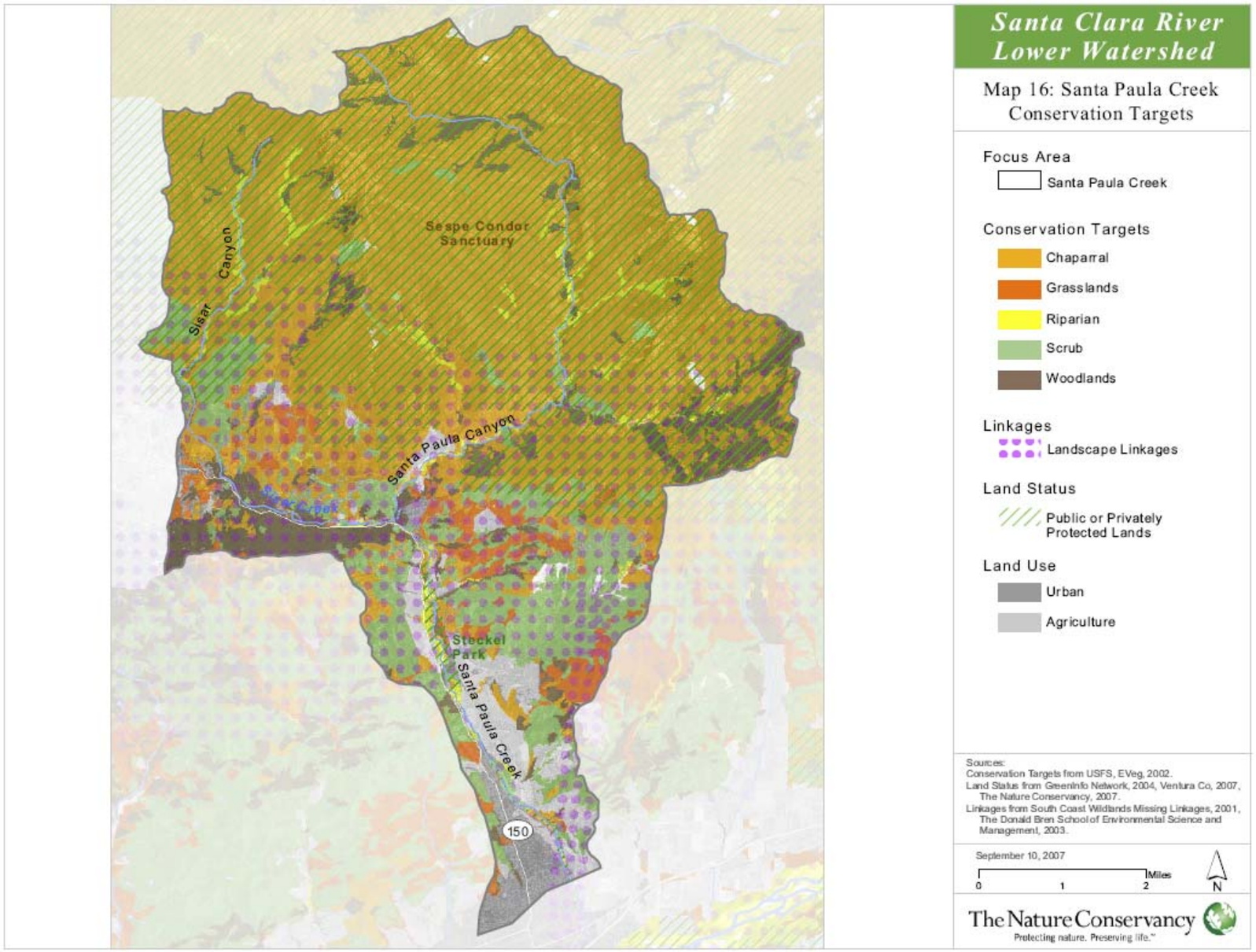
*The Nested Targets shown in this table were included when the focus area contained equal to or greater than 15% of a conservation target.

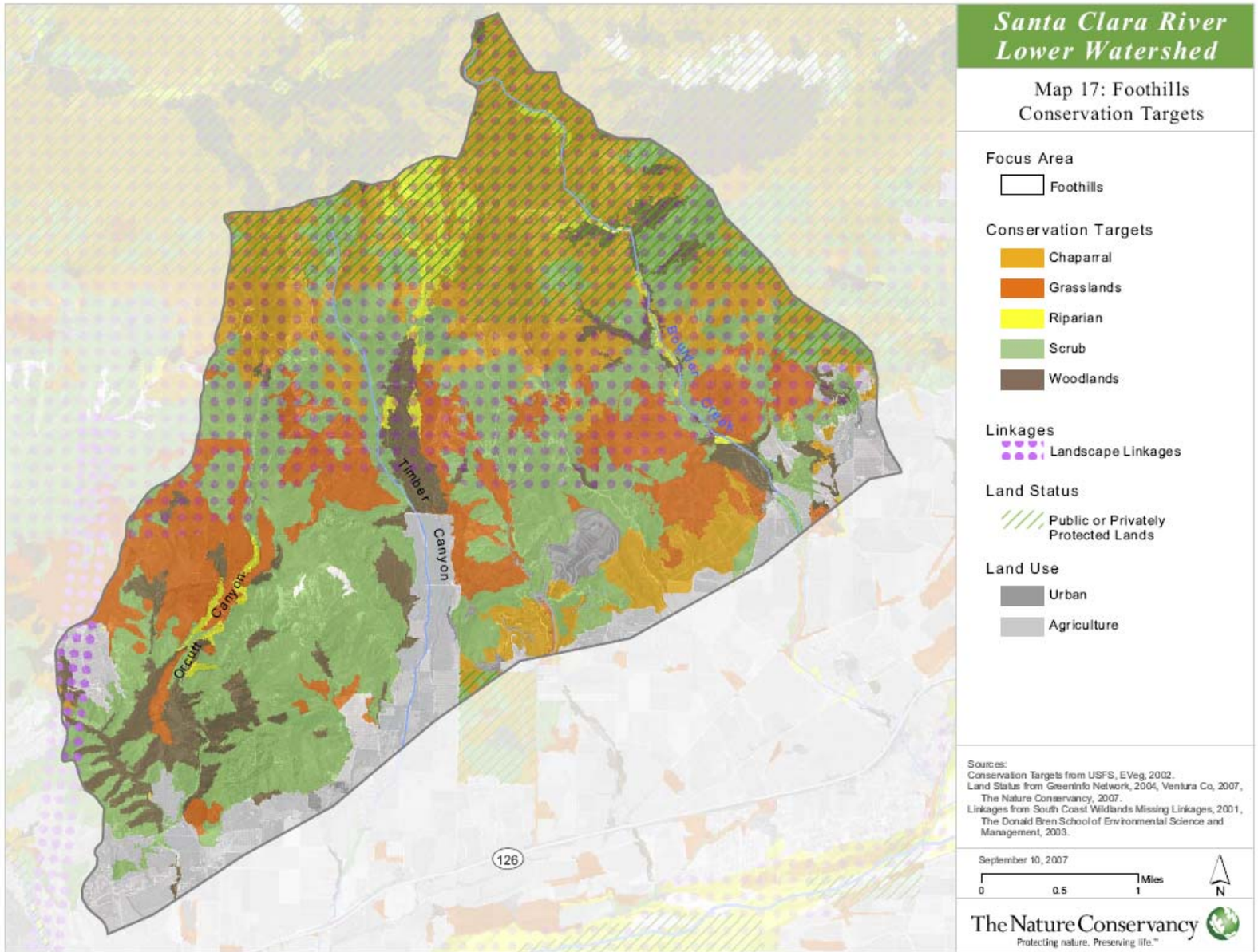

Santa Clara River
Lower Watershed
Map 12: Ormond – Mugu Beaches
Conservation Targets
Focus Area
Ormond – Mugu Beaches
Conservation Targets
Coastal
Grasslands
Riparian
Scrub
Land Status
Public or Privately
Protected Lands
Land Use
Urban
Agriculture
Hueneme Rd
The
Nature
Conservancy
Ormond Beach
Oxnard Blvd
Naval Air Station
Point Mugu
Mugu
Lagoon
Pacific Ocean
1
Sources:
Conservation Targets from USFS, EVeg, 2002.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007,
The Nature Conservancy, 2007.
September 10, 2007
Miles
0
0.5
1
N
The Nature Conservancy
Protecting nature. Preserving life.™

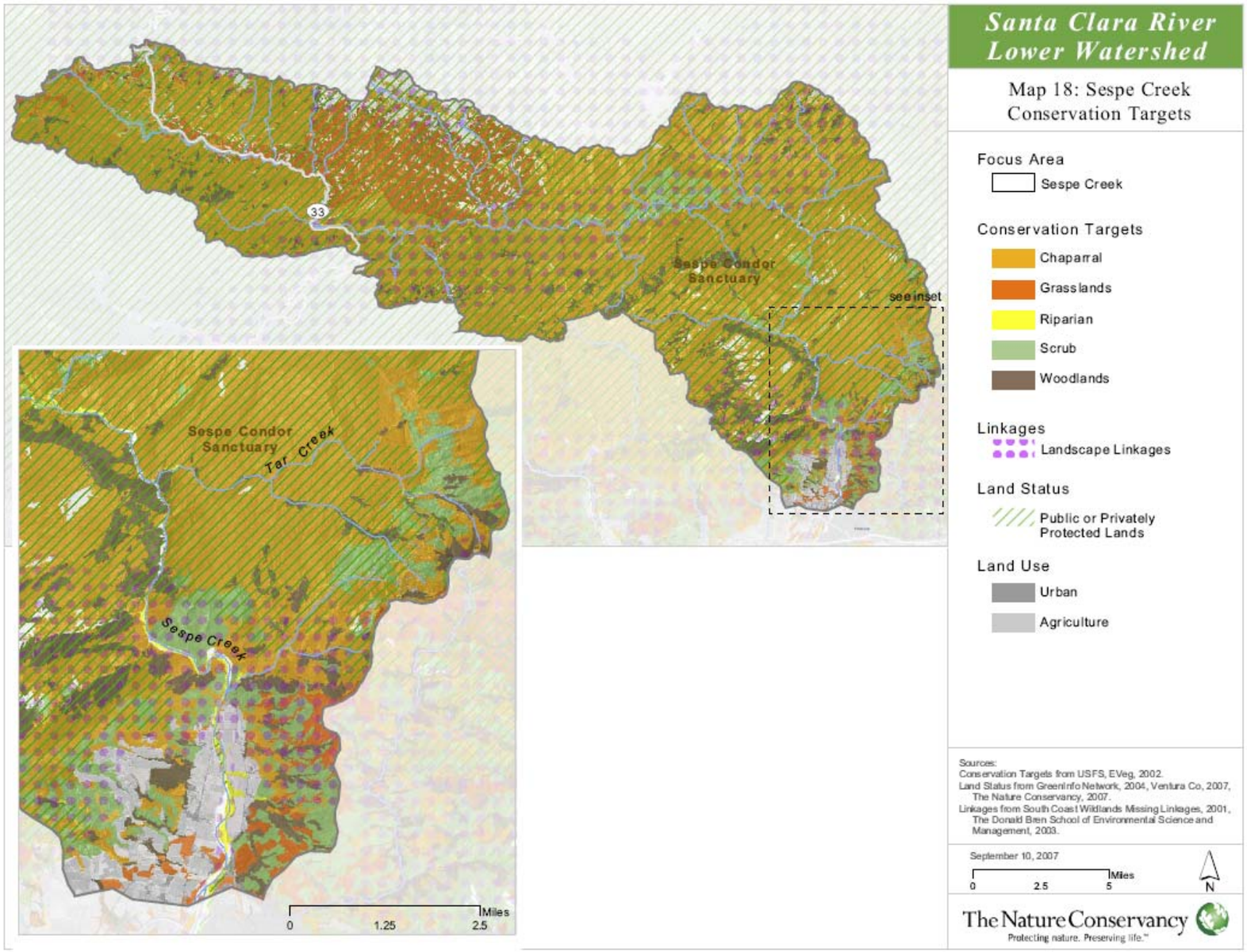

Santa Clara River Lower Watershed
Map 13: McGrath Beach - Estuary Conservation Targets
Santa Clara River
Santa Clara River Estuary
McGrath State Beach
Pacific Ocean
Harbor Blvd
Focus Area
McGrath Beach - Estuary
Conservation Targets
Chaparral
Coastal
Grasslands
Riparian
Scrub
Land Status
Public or Privately Protected Lands
Land Use
Urban
Agriculture
Sources:
Conservation Targets from USFS, EVeg, 2002.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007, The Nature Conservancy, 2007.
September 10, 2007
0
0.25
0.5
Miles
N
The Nature Conservancy
Protecting nature. Preserving life.™

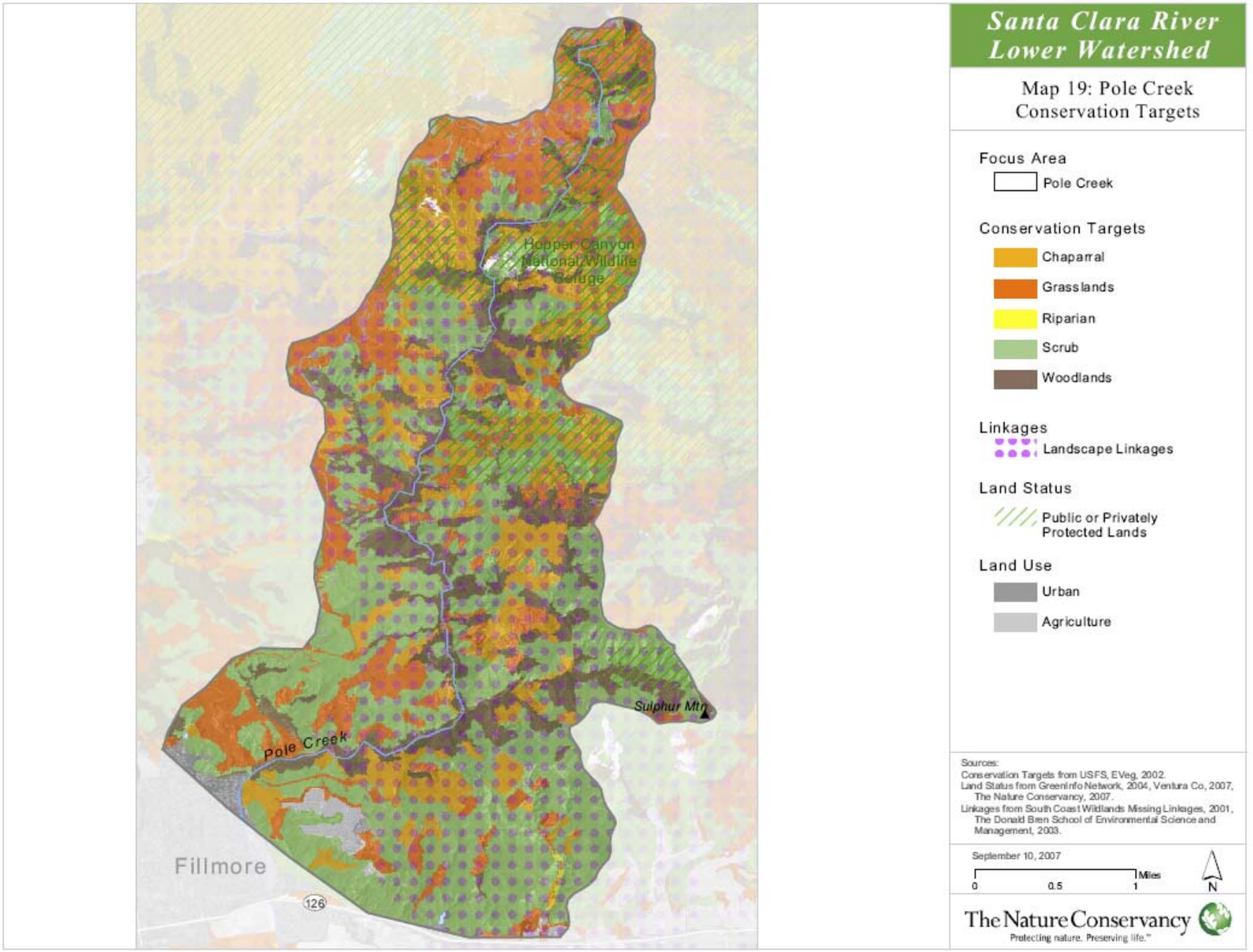

Western
Santa Paula
Santa Clara River
Ventura
126
118
1
101
Oxnard
Eastern
126
Fillmore
Piru
Santa Clara River Lower Watershed
Map 14: Santa Clara River Mainstem Conservation Targets
Focus Area
Santa Clara River Mainstem
Conservation Targets
Chaparral
Grasslands
Riparian
Scrub
Woodlands
Linkages
Landscape Linkages
Land Status
Public or Privately Protected Lands
Land Use
Urban
Agriculture
Sources:
Conservation Targets from USFS, EVeg, 2002.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007, The Nature Conservancy, 2007.
Linkages from South Coast Wildlands Missing Linkages, 2001, The Donald Bren School of Environmental Science and Management, 2003.
September 10, 2007
0
1.25
2.5
Miles
N
The Nature Conservancy
Protecting nature. Preserving life.™

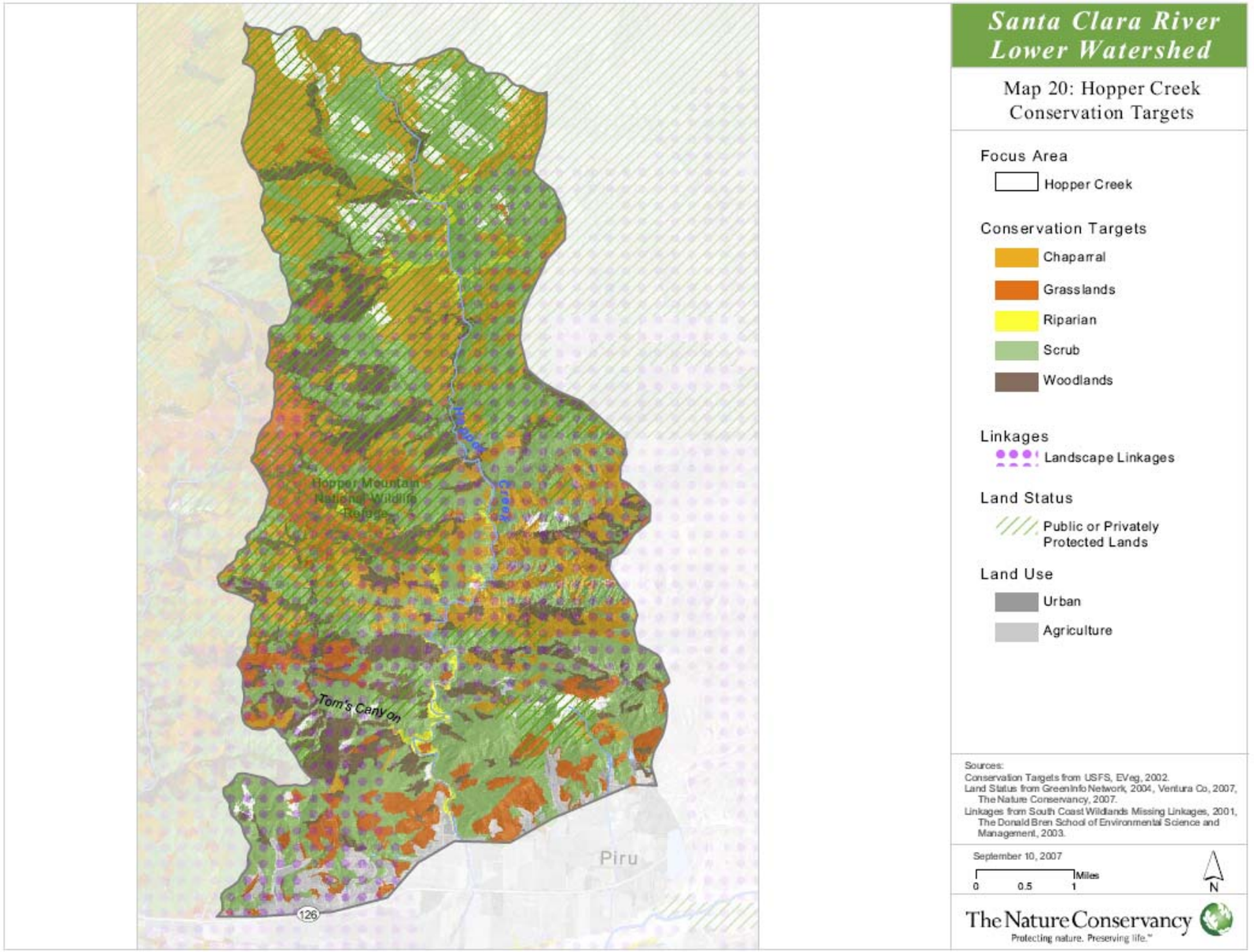

Santa Clara River
Lower Watershed
Map 15: Ventura Hillsides
Conservation Targets
Focus Area
Ventura Hillsides
Conservation Targets
Chaparral
Grasslands
Riparian
Scrub
Woodlands
Linkages
Landscape Linkages
Land Status
Public or Privately
Protected Lands
Land Use
Urban
Agriculture
Sulphur Mountain
Aliso Canyon
Wheeler Canyon
O'Hara Canyon
Adams Canyon
Foothill Road
Peck Rd
Palm Ave
Santa Paula
Santa Clara River
150
126
Sources:
Conservation Targets from USFS, EVeg, 2002.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007, The Nature Conservancy, 2007.
Linkages from South Coast Wildlands Missing Linkages, 2001, The Donald Bren School of Environmental Science and Management, 2003.
September 10, 2007
0
1
2
Miles
N
The Nature Conservancy
Protecting nature. Preserving life.™

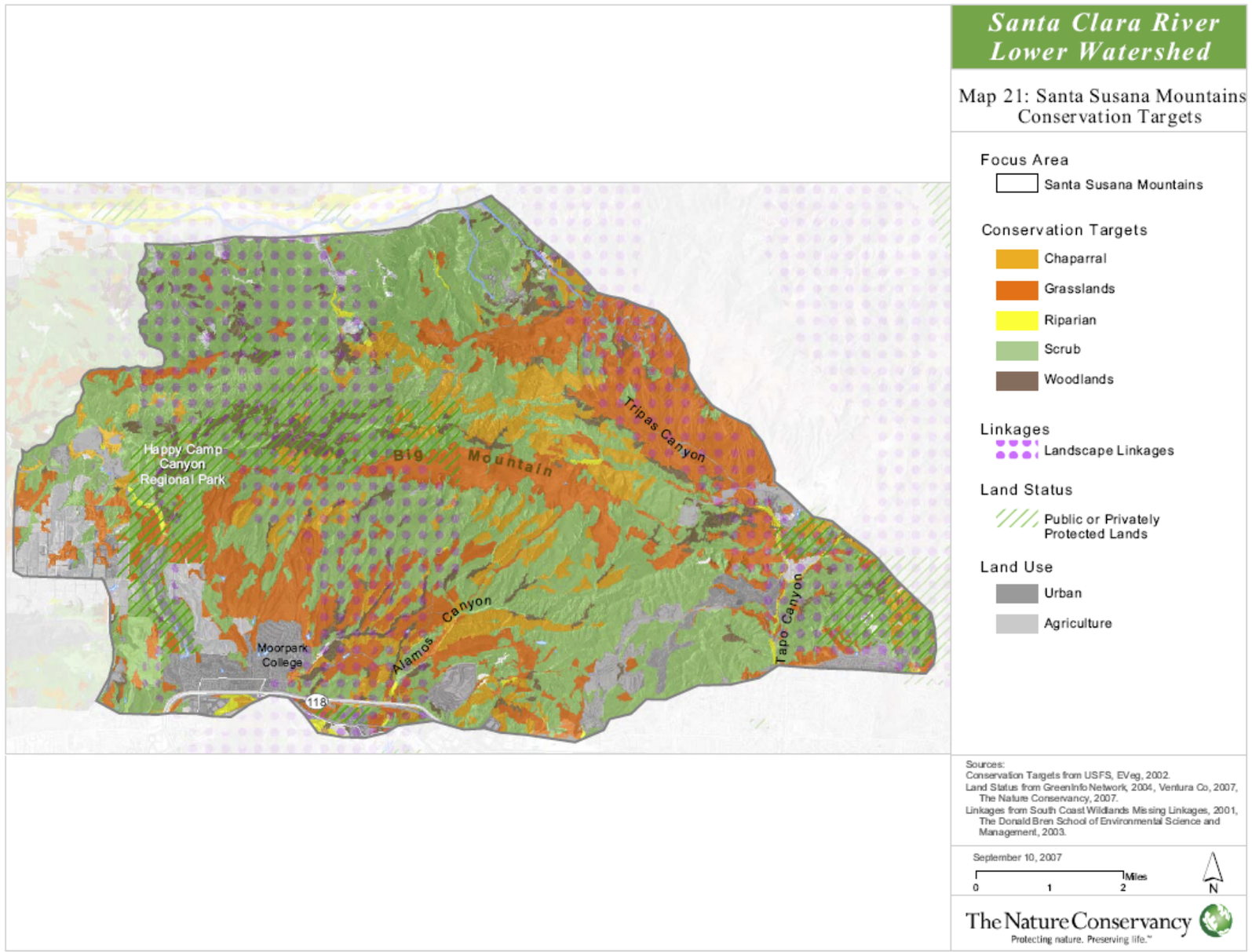

Santa Clara River
Lower Watershed
Map 16: Santa Paula Creek
Conservation Targets
Focus Area
Santa Paula Creek
Conservation Targets
Chaparral
Grasslands
Riparian
Scrub
Woodlands
Linkages
Landscape Linkages
Land Status
Public or Privately
Protected Lands
Land Use
Urban
Agriculture
Sespe Condor
Sanctuary
Sisar Canyon
Santa Paula Canyon
Steckel
Park
Santa Paula Creek
150
Sources:
Conservation Targets from USFS, EVeg, 2002.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007,
The Nature Conservancy, 2007.
Linkages from South Coast Wildlands Missing Linkages, 2001,
The Donald Bren School of Environmental Science and
Management, 2003.
September 10, 2007
0
1
2
Miles
N
The Nature Conservancy
Protecting nature. Preserving life.™

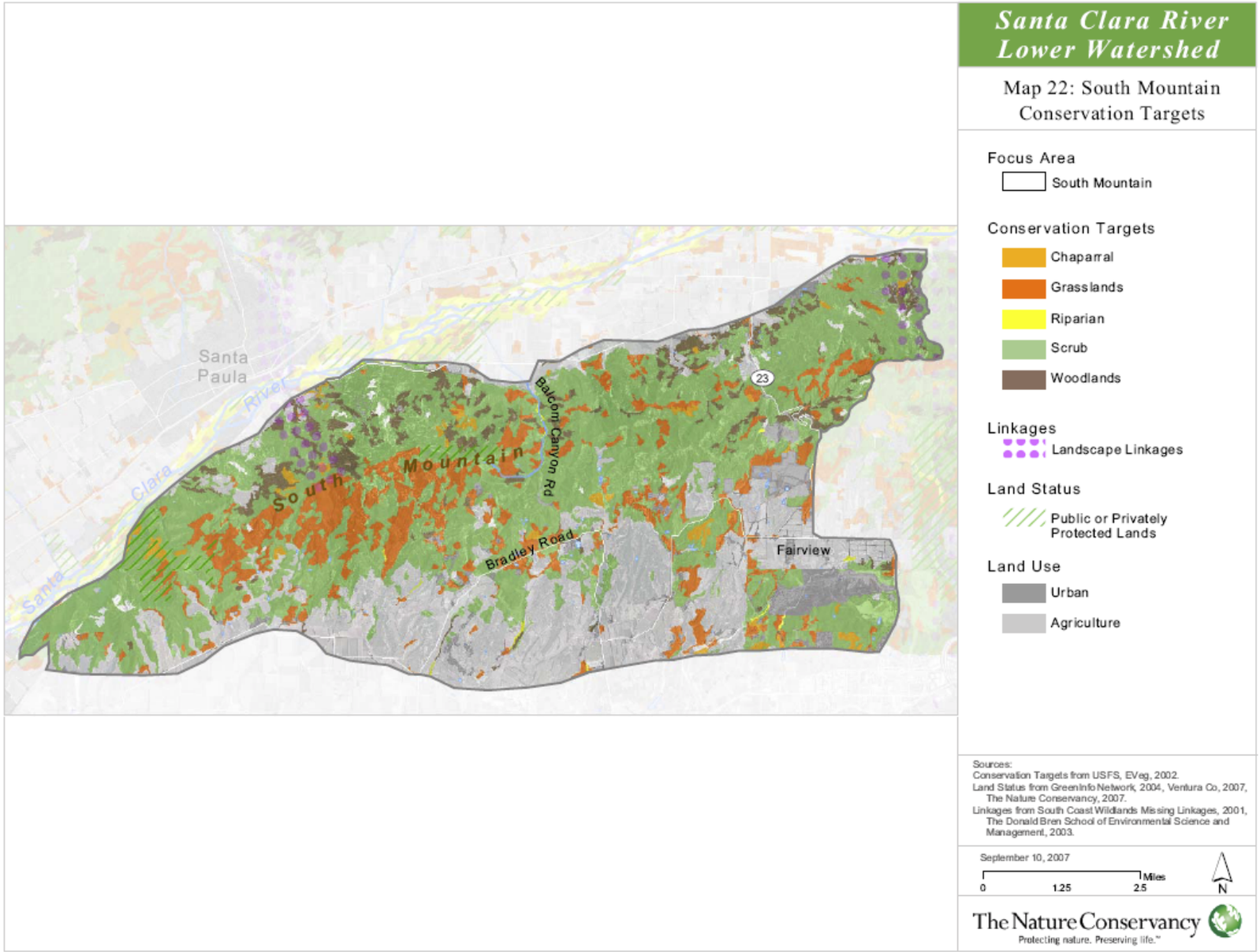

Santa Clara River
Lower Watershed
Map 17: Foothills
Conservation Targets
Focus Area
Foothills
Conservation Targets
Chaparral
Grasslands
Riparian
Scrub
Woodlands
Linkages
Landscape Linkages
Land Status
Public or Privately
Protected Lands
Land Use
Urban
Agriculture
Sources:
Conservation Targets from USFS, EVeg, 2002.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007,
The Nature Conservancy, 2007.
Linkages from South Coast Wildlands Missing Linkages, 2001,
The Donald Bren School of Environmental Science and
Management, 2003.
September 10, 2007
0
0.5
1
Miles
N
The Nature Conservancy
Protecting nature. Preserving life.™
Timber
Canyon
Orcutt
Canyon
Boulder
Creek
126

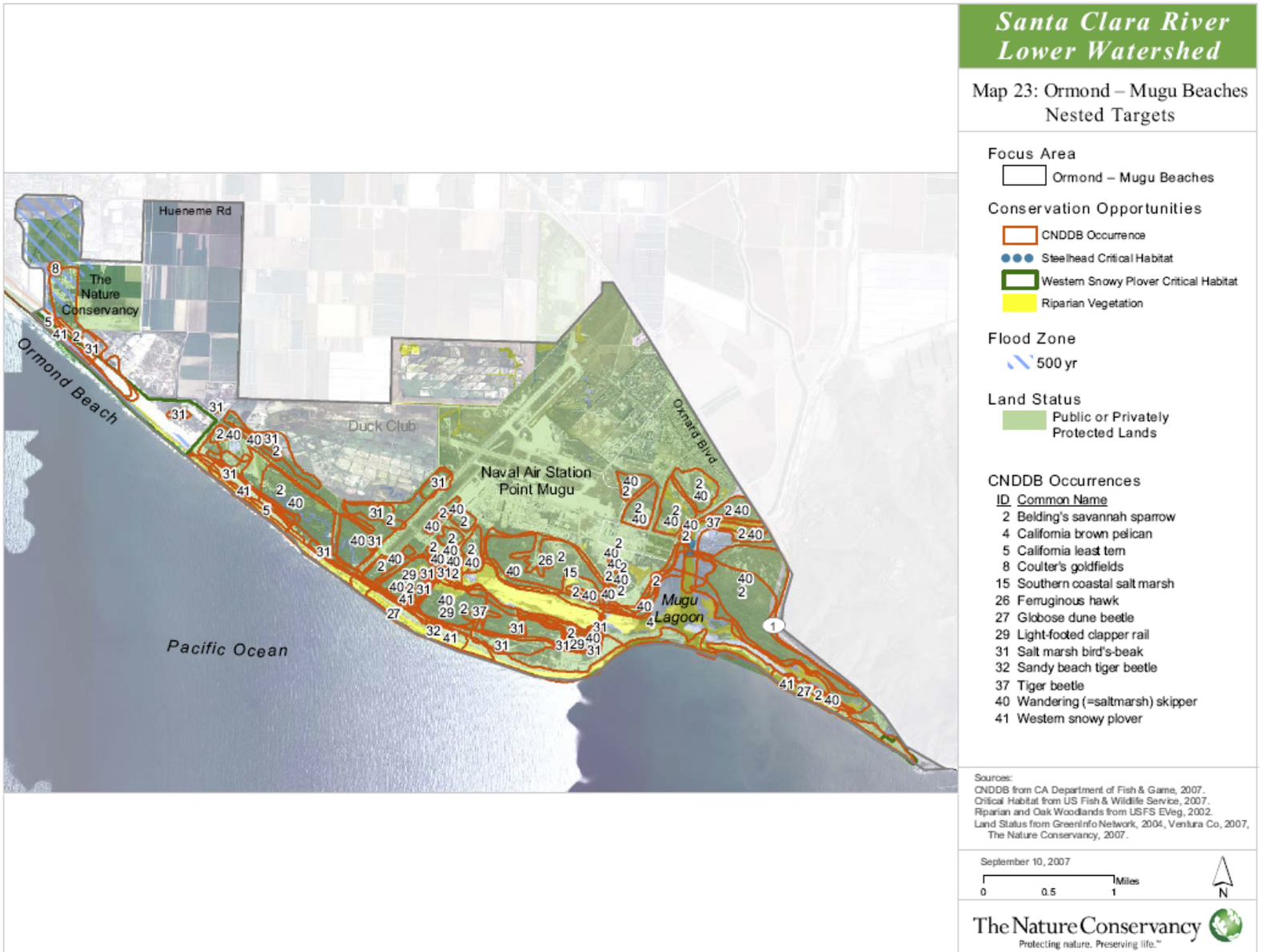

Santa Clara River
Lower Watershed
Map 18: Sespe Creek
Conservation Targets
Focus Area
Sespe Creek
Conservation Targets
Chaparral
Grasslands
Riparian
Scrub
Woodlands
Linkages
Landscape Linkages
Land Status
Public or Privately
Protected Lands
Land Use
Urban
Agriculture
33
Sespe Condor
Sanctuary
see inset
Sespe Condor
Sanctuary
Tar Creek
Sespe Creek
Miles
0
1.25
2.5
Sources:
Conservation Targets from USFS, EVeg, 2002.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007,
The Nature Conservancy, 2007.
Linkages from South Coast Wildlands Missing Linkages, 2001,
The Donald Bren School of Environmental Science and
Management, 2003.
September 10, 2007
Miles
0
2.5
5
N
The Nature Conservancy
Protecting nature. Preserving life.™


Santa Clara River
Lower Watershed
Map 19: Pole Creek
Conservation Targets
Focus Area
Pole Creek
Conservation Targets
Chaparral
Grasslands
Riparian
Scrub
Woodlands
Linkages
Landscape Linkages
Land Status
Public or Privately
Protected Lands
Land Use
Urban
Agriculture
Hopper Canyon
National Wildlife
Refuge
Sulphur Mtn
Pole Creek
Fillmore
126
Sources:
Conservation Targets from USFS, EVeg, 2002.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007,
The Nature Conservancy, 2007.
Linkages from South Coast Wildlands Missing Linkages, 2001,
The Donald Bren School of Environmental Science and
Management, 2003.
September 10, 2007
0
0.5
1
Miles
N
The Nature Conservancy
Protecting nature. Preserving life.™

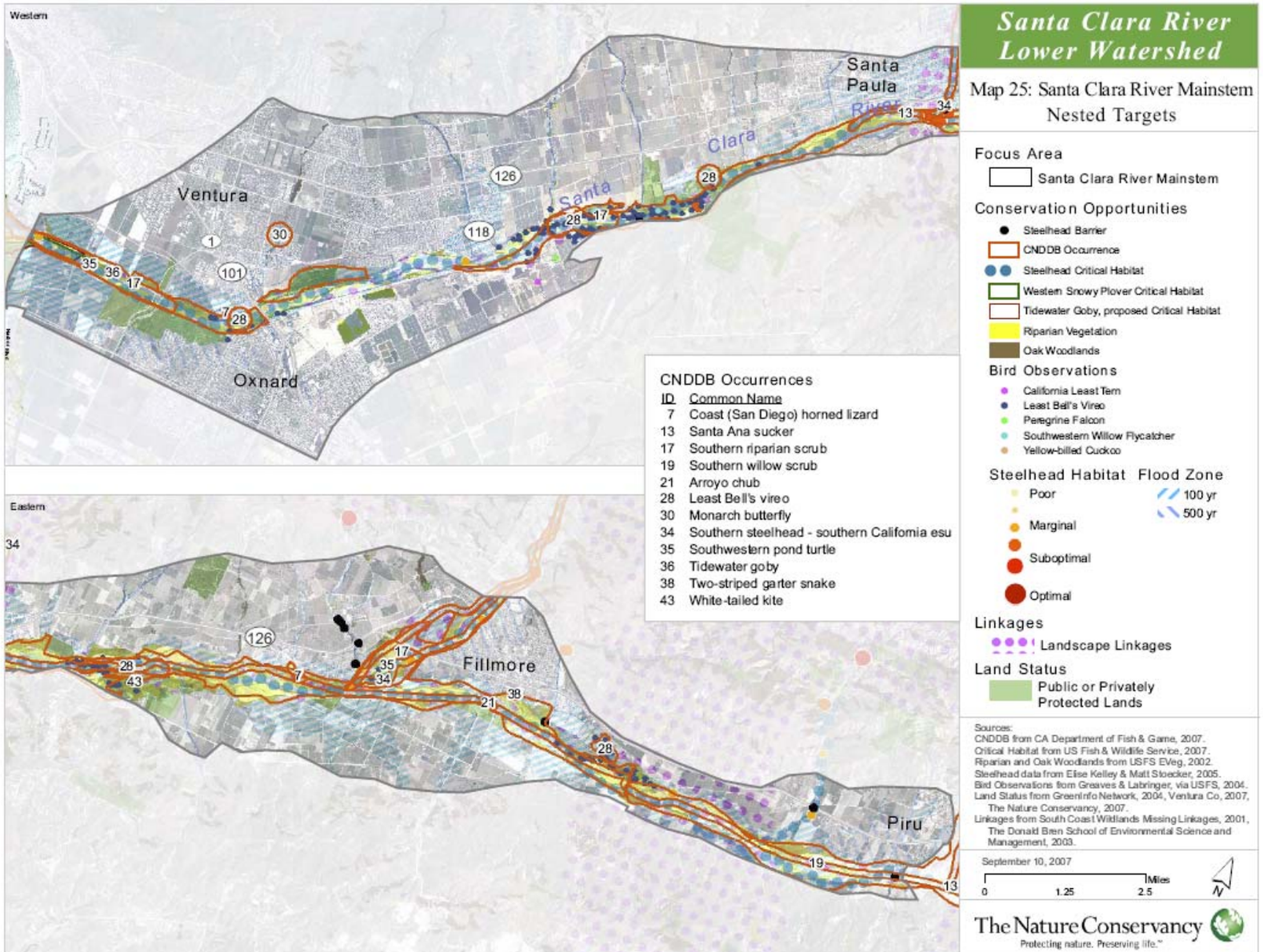

Santa Clara River
Lower Watershed
Map 20: Hopper Creek
Conservation Targets
Focus Area
Hopper Creek
Conservation Targets
Chaparral
Grasslands
Riparian
Scrub
Woodlands
Linkages
Landscape Linkages
Land Status
Public or Privately
Protected Lands
Land Use
Urban
Agriculture
Hopper Mountain
National Wildlife
Refuge
Hopper
Creek
Tom's Canyon
Piru
126
Sources:
Conservation Targets from USFS, EVeg, 2002.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007,
The Nature Conservancy, 2007.
Linkages from South Coast Wildlands Missing Linkages, 2001,
The Donald Bren School of Environmental Science and
Management, 2003.
September 10, 2007
0
0.5
1
Miles
N
The Nature Conservancy
Protecting nature. Preserving life.™

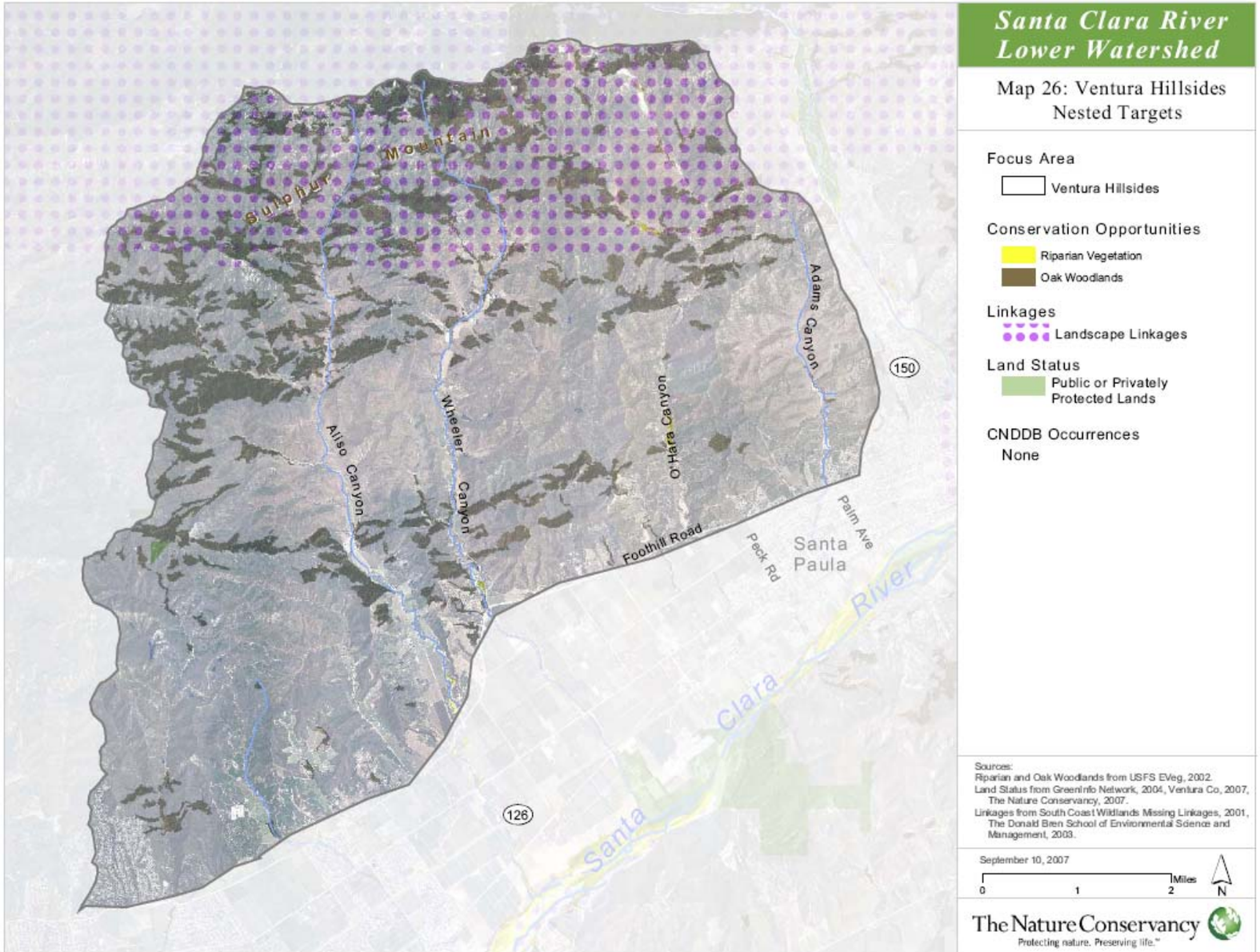

Santa Clara River
Lower Watershed
Map 21: Santa Susana Mountains
Conservation Targets
Focus Area
Santa Susana Mountains
Conservation Targets
Chaparral
Grasslands
Riparian
Scrub
Woodlands
Linkages
Landscape Linkages
Land Status
Public or Privately
Protected Lands
Land Use
Urban
Agriculture
Happy Camp
Canyon
Regional Park
Big
Mountain
Tripas Canyon
Moorpark
College
Alamos
Canyon
Tapo Canyon
118
Sources:
Conservation Targets from USFS, EVeg, 2002.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007,
The Nature Conservancy, 2007.
Linkages from South Coast Wildlands Missing Linkages, 2001,
The Donald Bren School of Environmental Science and
Management, 2003.
September 10, 2007
0
1
2
Miles
N
The Nature Conservancy
Protecting nature. Preserving life.™

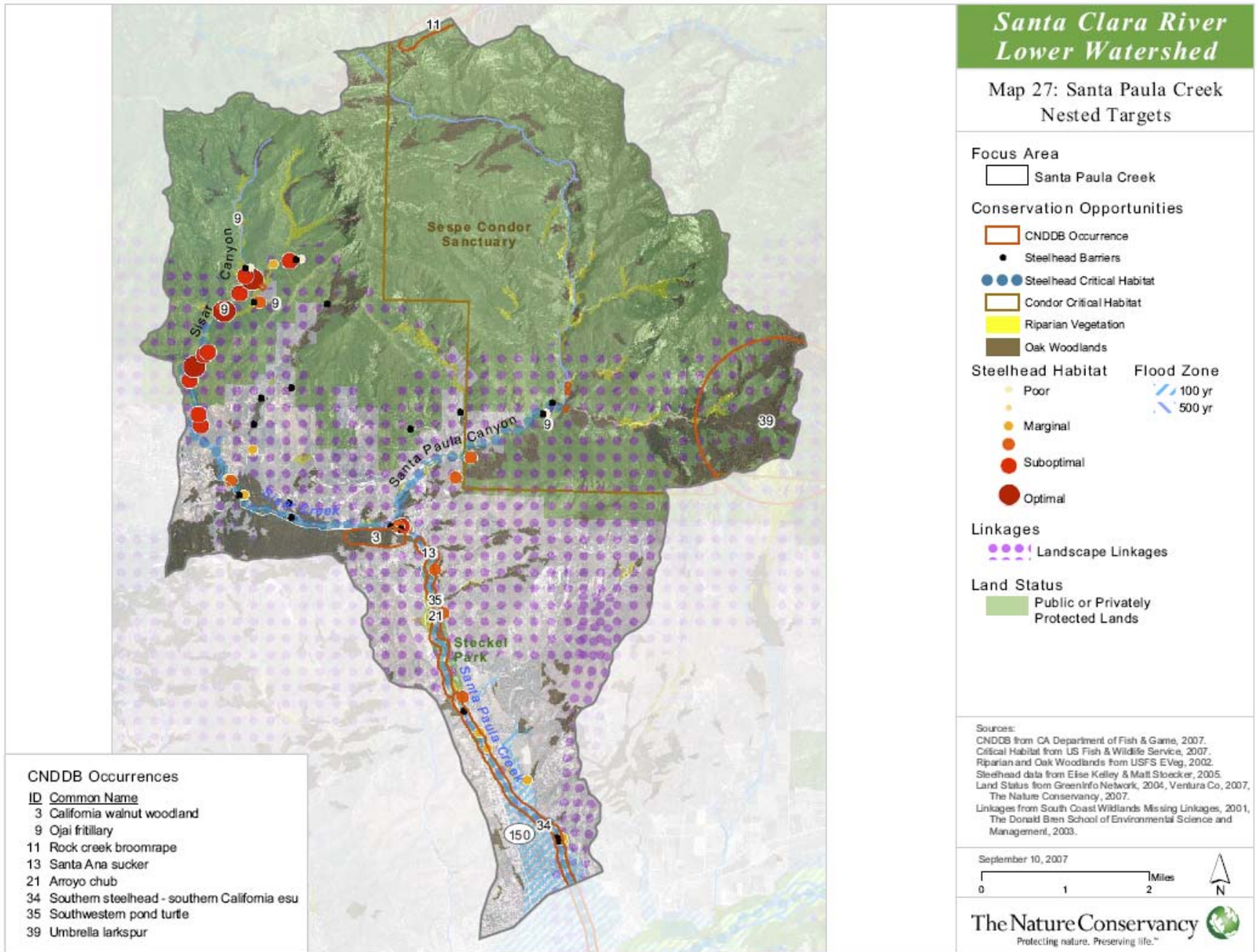

Santa Clara River Lower Watershed
Map 22: South Mountain Conservation Targets
Focus Area
South Mountain
Conservation Targets
Chaparral
Grasslands
Riparian
Scrub
Woodlands
Linkages
Landscape Linkages
Land Status
Public or Privately Protected Lands
Land Use
Urban
Agriculture
Santa Paula
Santa Clara River
South Mountain
Balcom Canyon Rd
Bradley Road
Fairview
23
Sources:
Conservation Targets from USFS, EVeg, 2002.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007, The Nature Conservancy, 2007.
Linkages from South Coast Wildlands Missing Linkages, 2001, The Donald Bren School of Environmental Science and Management, 2003.
September 10, 2007
0
1.25
2.5
Miles
N
The Nature Conservancy
Protecting nature. Preserving life.™

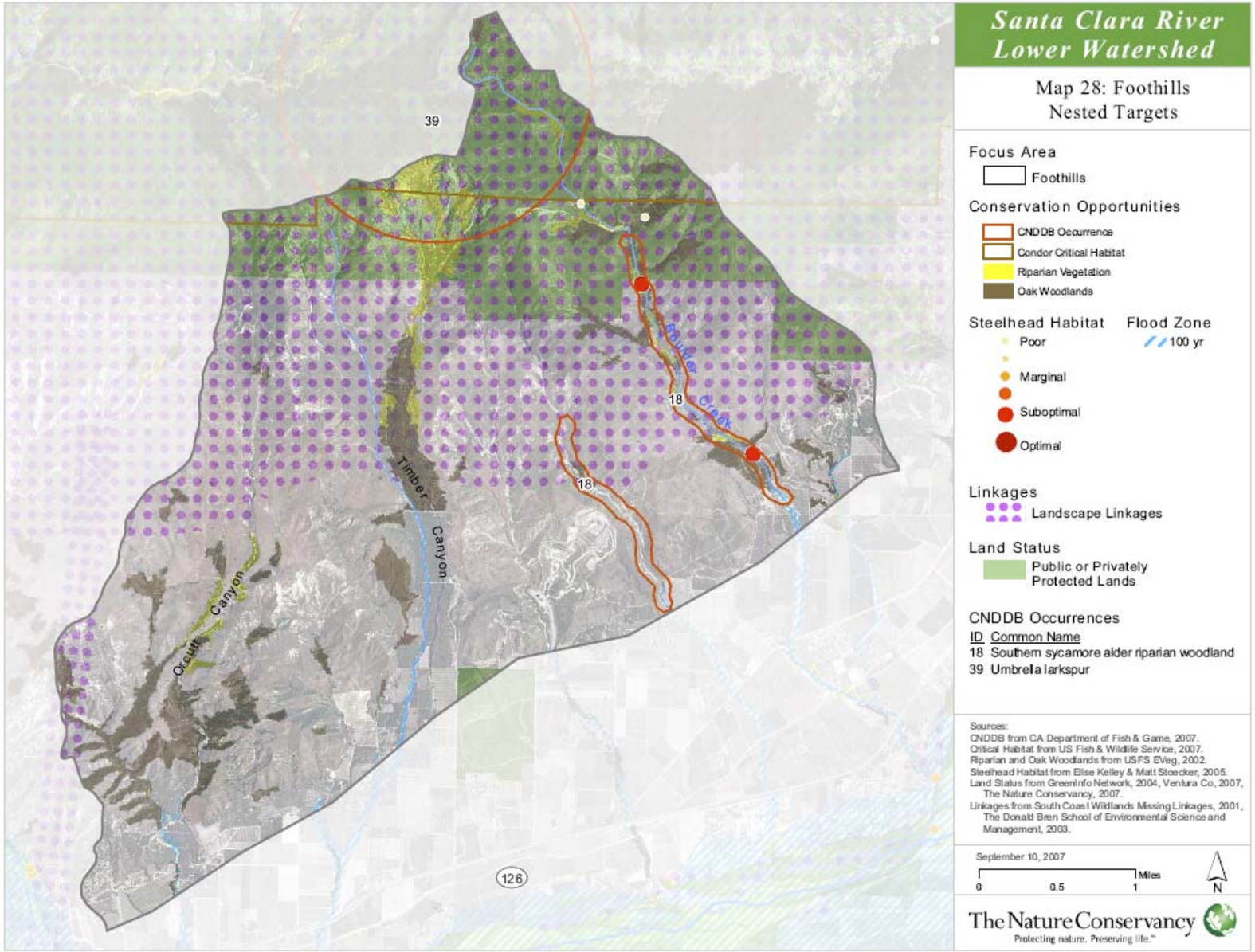

Santa Clara River
Lower Watershed
Map 23: Ormond – Mugu Beaches
Nested Targets
Hueneme Rd
The Nature Conservancy
Ormond Beach
Duck Club
Naval Air Station
Point Mugu
Oxnard Blvd
Mugu Lagoon
Pacific Ocean
Focus Area
Ormond – Mugu Beaches
Conservation Opportunities
CNDDB Occurrence
Steelhead Critical Habitat
Western Snowy Plover Critical Habitat
Riparian Vegetation
Flood Zone
500 yr
Land Status
Public or Privately Protected Lands
CNDDB Occurrences
ID Common Name
2 Belding's savannah sparrow
4 California brown pelican
5 California least tern
8 Coulter's goldfields
15 Southern coastal salt marsh
26 Ferruginous hawk
27 Globose dune beetle
29 Light-footed clapper rail
31 Salt marsh bird's-beak
32 Sandy beach tiger beetle
37 Tiger beetle
40 Wandering (=saltmarsh) skipper
41 Western snowy plover
Sources:
CNDDB from CA Department of Fish & Game, 2007.
Critical Habitat from US Fish & Wildlife Service, 2007.
Riparian and Oak Woodlands from USFS EVeg, 2002.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007, The Nature Conservancy, 2007.
September 10, 2007
0
0.5
1
Miles
N
The Nature Conservancy
Protecting nature. Preserving life.™

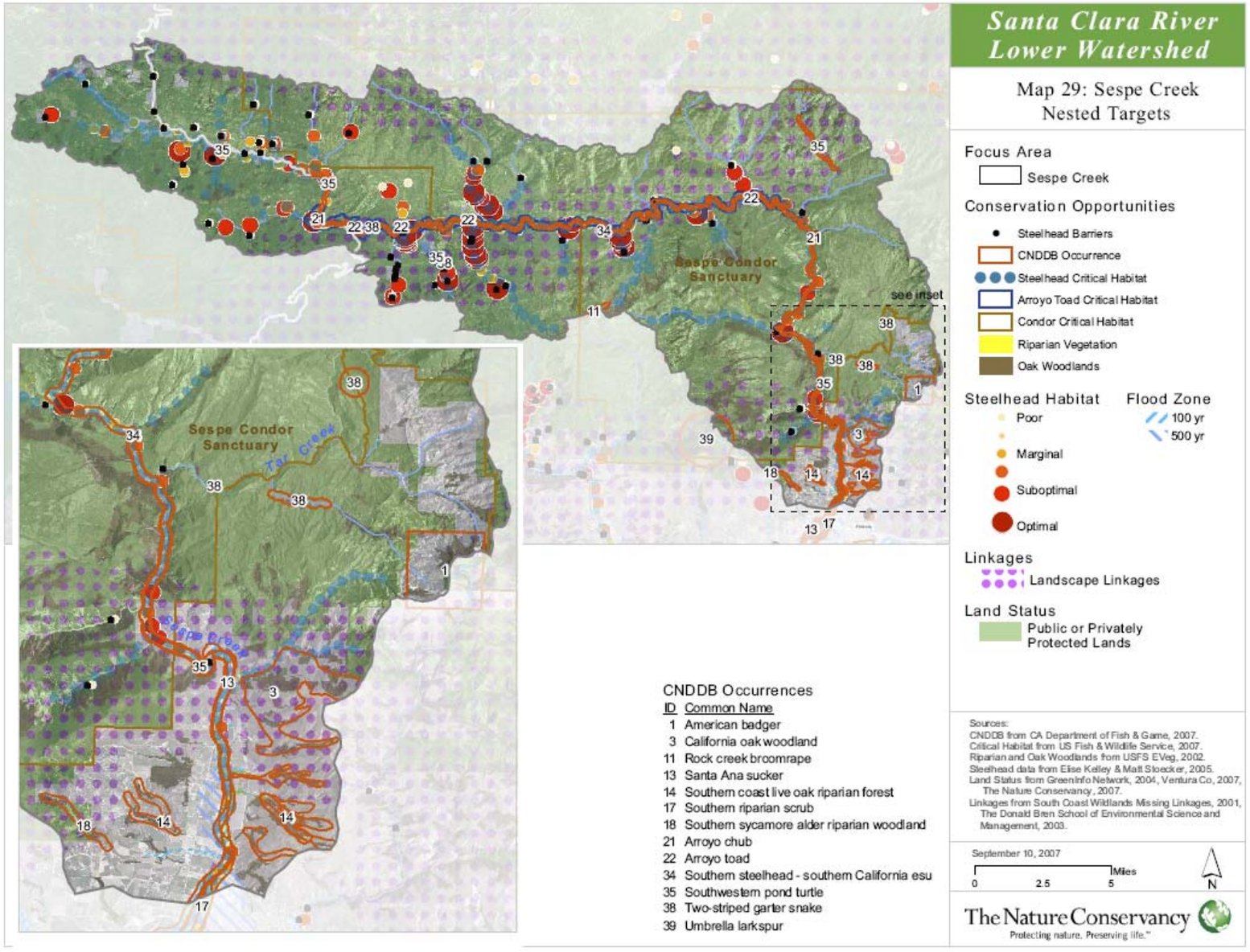

Santa Clara River
Lower Watershed
Map 24: McGrath Beach - Estuary
Nested Targets
Santa Clara River
Santa Clara River Estuary
McGrath State Beach
Pacific Ocean
Harbor Blvd
2
23
5
32
33
20
33
Focus Area
McGrath Beach - Estuary
Conservation Opportunities
CNDDB Occurrence
Steelhead Critical Habitat
Ventura Marsh Milk Vetch Critical Habitat
Western Snowy Plover Critical Habitat
Tidewater Goby, proposed Critical Habitat
Riparian Vegetation
Steelhead Habitat
Poor
Marginal
Suboptimal
Optimal
Flood Zone
100 yr
500 yr
Land Status
Public or Privately Protected Lands
CNDDB Occurrences
ID Common Name
2 Belding's savannah sparrow
5 California least tern
20 Ventura marsh milk-vetch
23 Burrowing owl
32 Sandy beach tiger beetle
33 Silvery legless lizard
Sources:
CNDDB from CA Department of Fish & Game, 2007.
Critical Habitat from US Fish & Wildlife Service, 2007.
Steelhead data from Elise Kelley & Matt Stoecker, 2005
Land Status from GreenInfo Network, 2004, Ventura Co, 2007, The Nature Conservancy, 2007.
September 10, 2007
0
0.25
0.5
Miles
N
The Nature Conservancy
Protecting nature. Preserving life.™

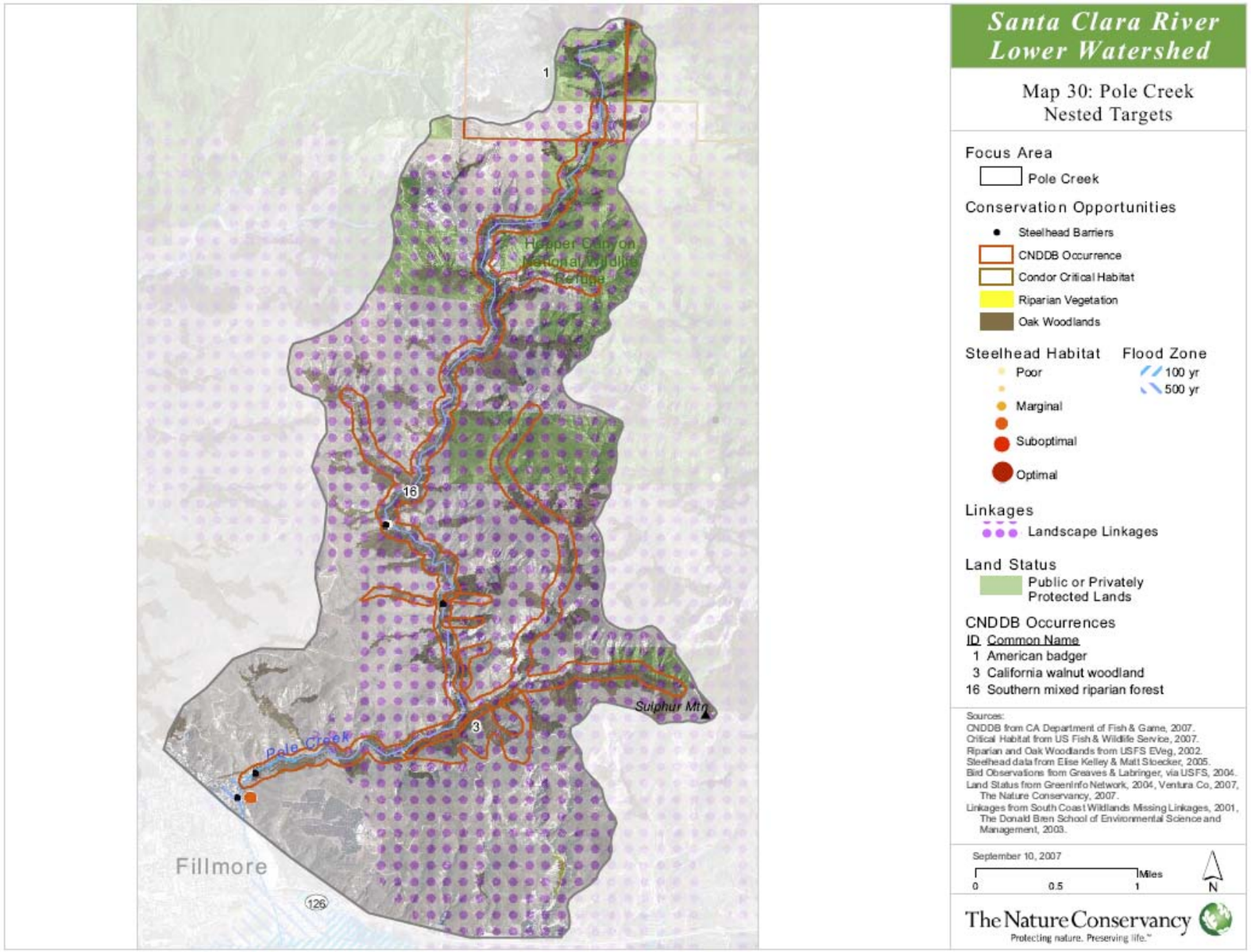

Western
Eastern
Ventura
Oxnard
Fillmore
Piru
Santa Paula River
Santa Clara River Lower Watershed
Map 25: Santa Clara River Mainstem Nested Targets
CNDDB Occurrences
ID Common Name
7 Coast (San Diego) horned lizard
13 Santa Ana sucker
17 Southern riparian scrub
19 Southern willow scrub
21 Arroyo chub
28 Least Bell's vireo
30 Monarch butterfly
34 Southern steelhead - southern California esu
35 Southwestern pond turtle
36 Tidewater goby
38 Two-striped garter snake
43 White-tailed kite
Focus Area
Santa Clara River Mainstem
Conservation Opportunities
Steelhead Barrier
CNDDB Occurrence
Steelhead Critical Habitat
Western Snowy Plover Critical Habitat
Tidewater Goby, proposed Critical Habitat
Riparian Vegetation
Oak Woodlands
Bird Observations
California Least Tern
Least Bell's Vireo
Peregrine Falcon
Southwestern Willow Flycatcher
Yellow-billed Cuckoo
Steelhead Habitat
Poor
Marginal
Suboptimal
Optimal
Flood Zone
100 yr
500 yr
Linkages
Landscape Linkages
Land Status
Public or Privately Protected Lands
Sources:
CNDDB from CA Department of Fish & Game, 2007.
Critical Habitat from US Fish & Wildlife Service, 2007.
Riparian and Oak Woodlands from USFS EVeg, 2002.
Steelhead data from Elise Kelley & Matt Stoecker, 2005.
Bird Observations from Greaves & Labringer, via USFS, 2004.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007, The Nature Conservancy, 2007.
Linkages from South Coast Wildlands Missing Linkages, 2001, The Donald Bren School of Environmental Science and Management, 2003.
September 10, 2007
Miles
0
1.25
2.5
The Nature Conservancy
Protecting nature. Preserving life.™

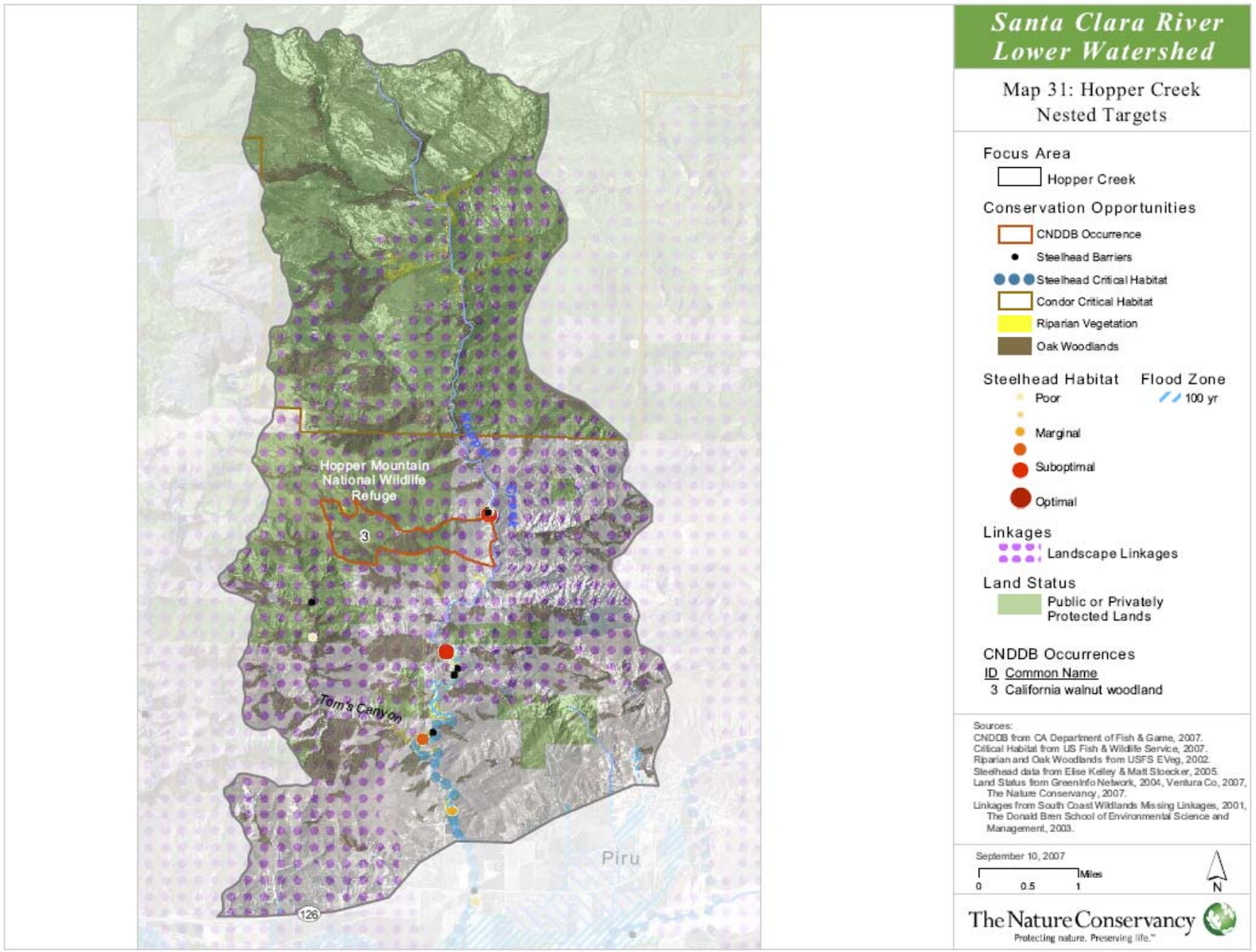

Santa Clara River
Lower Watershed
Map 26: Ventura Hillsides
Nested Targets
Focus Area
Ventura Hillsides
Conservation Opportunities
Riparian Vegetation
Oak Woodlands
Linkages
Landscape Linkages
Land Status
Public or Privately
Protected Lands
CNDDB Occurrences
None
Sulphur Mountain
Aliso Canyon
Wheeler Canyon
O'Hara Canyon
Adams Canyon
Foothill Road
Peck Rd
Palm Ave
Santa Paula
Santa Clara River
150
126
Sources:
Riparian and Oak Woodlands from USFS EVeg, 2002.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007, The Nature Conservancy, 2007.
Linkages from South Coast Wildlands Missing Linkages, 2001, The Donald Bren School of Environmental Science and Management, 2003.
September 10, 2007
0
1
2
Miles
N
The Nature Conservancy
Protecting nature. Preserving life.™

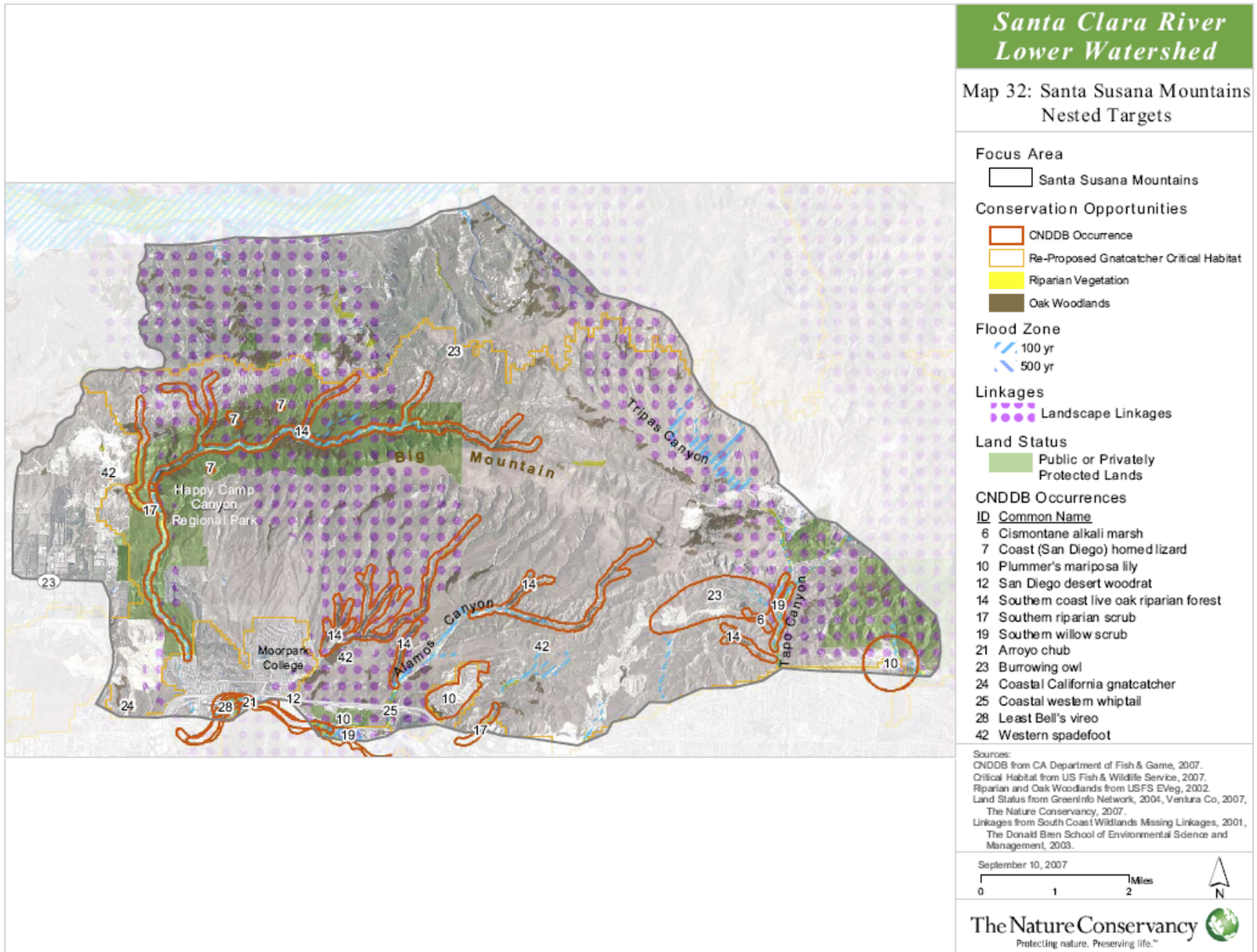

Santa Clara River
Lower Watershed
Map 27: Santa Paula Creek
Nested Targets
Focus Area
Santa Paula Creek
Conservation Opportunities
CNDDB Occurrence
Steelhead Barriers
Steelhead Critical Habitat
Condor Critical Habitat
Riparian Vegetation
Oak Woodlands
Steelhead Habitat
Poor
Marginal
Suboptimal
Optimal
Flood Zone
100 yr
500 yr
Linkages
Landscape Linkages
Land Status
Public or Privately
Protected Lands
Sespe Condor
Sanctuary
Sisar Canyon
Santa Paula Canyon
Steckel
Park
Santa Paula Creek
CNDDB Occurrences
ID Common Name
3 California walnut woodland
9 Ojai fritillary
11 Rock creek broomrape
13 Santa Ana sucker
21 Arroyo chub
34 Southern steelhead - southern California esu
35 Southwestern pond turtle
39 Umbrella larkspur
Sources:
CNDDB from CA Department of Fish & Game, 2007.
Critical Habitat from US Fish & Wildlife Service, 2007.
Riparian and Oak Woodlands from USFS EVeg, 2002.
Steelhead data from Elise Kelley & Matt Stoecker, 2005.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007, The Nature Conservancy, 2007.
Linkages from South Coast Wildlands Missing Linkages, 2001, The Donald Bren School of Environmental Science and Management, 2003.
September 10, 2007
Miles
0
1
2
N
The Nature Conservancy
Protecting nature. Preserving life.™

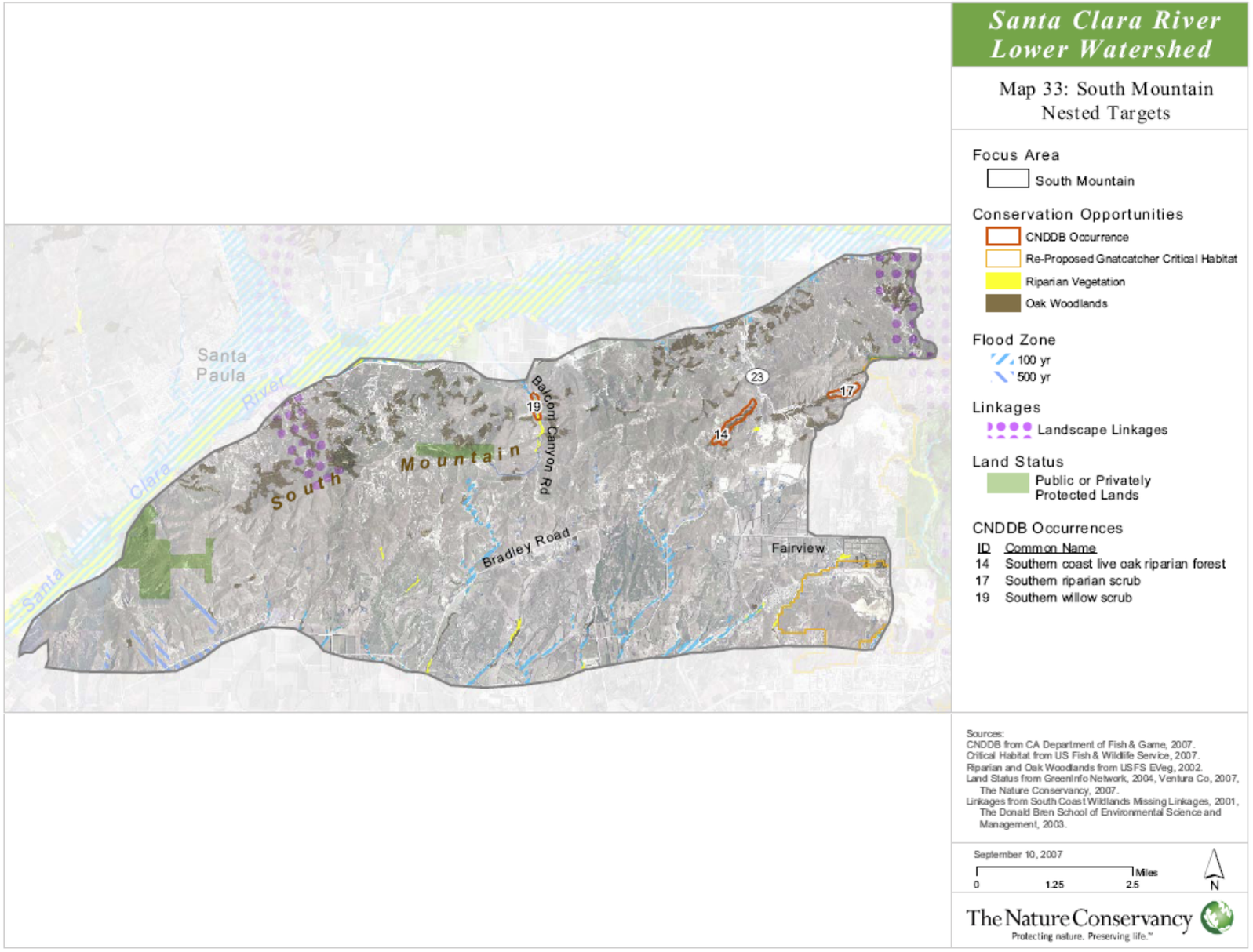

Santa Clara River
Lower Watershed
Map 28: Foothills
Nested Targets
Focus Area
Foothills
Conservation Opportunities
CNDDB Occurrence
Condor Critical Habitat
Riparian Vegetation
Oak Woodlands
Steelhead Habitat
Poor
Marginal
Suboptimal
Optimal
Flood Zone
100 yr
Linkages
Landscape Linkages
Land Status
Public or Privately Protected Lands
CNDDB Occurrences
ID Common Name
18 Southern sycamore alder riparian woodland
39 Umbrella larkspur
Sources:
CNDDB from CA Department of Fish & Game, 2007.
Critical Habitat from US Fish & Wildlife Service, 2007.
Riparian and Oak Woodlands from USFS EVeg, 2002.
Steelhead Habitat from Elise Kelley & Matt Stoecker, 2005.
Land Status from GreenInfo Network, 2004, Ventura Co., 2007, The Nature Conservancy, 2007.
Linkages from South Coast Wildlands Missing Linkages, 2001, The Donald Bren School of Environmental Science and Management, 2003.
September 10, 2007
0
0.5
1
Miles
N
The Nature Conservancy
Protecting nature. Preserving life.™
39
18
18
Timber Canyon
Oxnard Canyon
Bouquet Creek
126


Santa Clara River
Lower Watershed
Map 29: Sespe Creek
Nested Targets
Focus Area
Sespe Creek
Conservation Opportunities
Steelhead Barriers
CNDDB Occurrence
Steelhead Critical Habitat
Arroyo Toad Critical Habitat
Condor Critical Habitat
Riparian Vegetation
Oak Woodlands
Steelhead Habitat
Poor
Marginal
Suboptimal
Optimal
Flood Zone
100 yr
500 yr
Linkages
Landscape Linkages
Land Status
Public or Privately
Protected Lands
Sespe Condor
Sanctuary
see inset
Tar Creek
Sespe Creek
CNDDB Occurrences
ID Common Name
1 American badger
3 California oak woodland
11 Rock creek broomrape
13 Santa Ana sucker
14 Southern coast live oak riparian forest
17 Southern riparian scrub
18 Southern sycamore alder riparian woodland
21 Arroyo chub
22 Arroyo toad
34 Southern steelhead - southern California esu
35 Southwestern pond turtle
38 Two-striped garter snake
39 Umbrella larkspur
Sources:
CNDDB from CA Department of Fish & Game, 2007.
Critical Habitat from US Fish & Wildlife Service, 2007.
Riparian and Oak Woodlands from USFS EVeg, 2002.
Steelhead data from Elise Kelley & Matt Stoecker, 2005.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007, The Nature Conservancy, 2007.
Linkages from South Coast Wildlands Missing Linkages, 2001, The Donald Bren School of Environmental Science and Management, 2003.
September 10, 2007
Miles
0
2.5
5
N
The Nature Conservancy
Protecting nature. Preserving life.™


Santa Clara River
Lower Watershed
Map 30: Pole Creek
Nested Targets
Focus Area
Pole Creek
Conservation Opportunities
Steelhead Barriers
CNDDB Occurrence
Condor Critical Habitat
Riparian Vegetation
Oak Woodlands
Steelhead Habitat
Poor
Marginal
Suboptimal
Optimal
Flood Zone
100 yr
500 yr
Linkages
Landscape Linkages
Land Status
Public or Privately
Protected Lands
CNDDB Occurrences
ID Common Name
1 American badger
3 California walnut woodland
16 Southern mixed riparian forest
Sources:
CNDDB from CA Department of Fish & Game, 2007.
Critical Habitat from US Fish & Wildlife Service, 2007.
Riparian and Oak Woodlands from USFS EVeg, 2002.
Steelhead data from Elise Kelley & Matt Stoecker, 2005.
Bird Observations from Greaves & Labringer, via USFS, 2004.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007, The Nature Conservancy, 2007.
Linkages from South Coast Wildlands Missing Linkages, 2001, The Donald Bren School of Environmental Science and Management, 2003.
September 10, 2007
Miles
0
0.5
1
N
The Nature Conservancy
Protecting nature. Preserving life.™
Hopper Canyon National Wildlife Refuge
Sulphur Mtn
Pole Creek
Fillmore
126
1
16
3


Santa Clara River
Lower Watershed
Map 31: Hopper Creek
Nested Targets
Focus Area
Hopper Creek
Conservation Opportunities
CNDDB Occurrence
Steelhead Barriers
Steelhead Critical Habitat
Condor Critical Habitat
Riparian Vegetation
Oak Woodlands
Steelhead Habitat
Poor
Marginal
Suboptimal
Optimal
Flood Zone
100 yr
Linkages
Landscape Linkages
Land Status
Public or Privately
Protected Lands
CNDDB Occurrences
ID Common Name
3 California walnut woodland
Sources:
CNDDB from CA Department of Fish & Game, 2007.
Critical Habitat from US Fish & Wildlife Service, 2007.
Riparian and Oak Woodlands from USFS EVeg, 2002.
Steelhead data from Elise Kelley & Matt Stoecker, 2005.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007, The Nature Conservancy, 2007.
Linkages from South Coast Wildlands Missing Linkages, 2001, The Donald Bren School of Environmental Science and Management, 2003.
September 10, 2007
Miles
0
0.5
1
N
The Nature Conservancy
Protecting nature. Preserving life.™
Hopper Mountain
National Wildlife
Refuge
3
Tom's Canyon
Piru
126


Santa Clara River
Lower Watershed
Map 32: Santa Susana Mountains
Nested Targets
Focus Area
Santa Susana Mountains
Conservation Opportunities
CNDDB Occurrence
Re-Proposed Gnatcatcher Critical Habitat
Riparian Vegetation
Oak Woodlands
Flood Zone
100 yr
500 yr
Linkages
Landscape Linkages
Land Status
Public or Privately
Protected Lands
CNDDB Occurrences
ID Common Name
6 Cismontane alkali marsh
7 Coast (San Diego) horned lizard
10 Plummer's mariposa lily
12 San Diego desert woodrat
14 Southern coast live oak riparian forest
17 Southern riparian scrub
19 Southern willow scrub
21 Arroyo chub
23 Burrowing owl
24 Coastal California gnatcatcher
25 Coastal western whiptail
28 Least Bell's vireo
42 Western spadefoot
Sources:
CNDDB from CA Department of Fish & Game, 2007.
Critical Habitat from US Fish & Wildlife Service, 2007.
Riparian and Oak Woodlands from USFS EVeg, 2002.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007, The Nature Conservancy, 2007.
Linkages from South Coast Wildlands Missing Linkages, 2001, The Donald Bren School of Environmental Science and Management, 2003.
September 10, 2007
Miles
0 1 2
N
The Nature Conservancy
Protecting nature. Preserving life.™
Big Mountain
Happy Camp Canyon Regional Park
Moorpark College
Alamos Canyon
Tapo Canyon
Tripas Canyon


Santa Clara River Lower Watershed
Map 33: South Mountain Nested Targets
Focus Area
South Mountain
Conservation Opportunities
CNDDB Occurrence
Re-Proposed Gnatcatcher Critical Habitat
Riparian Vegetation
Oak Woodlands
Flood Zone
100 yr
500 yr
Linkages
Landscape Linkages
Land Status
Public or Privately Protected Lands
CNDDB Occurrences
ID Common Name
14 Southern coast live oak riparian forest
17 Southern riparian scrub
19 Southern willow scrub
Santa Paula
Clara River
Santa
South Mountain
Balcom Canyon Rd
Bradley Road
Fairview
19
23
17
14
Sources:
CNDDB from CA Department of Fish & Game, 2007.
Critical Habitat from US Fish & Wildlife Service, 2007.
Riparian and Oak Woodlands from USFS EVeg, 2002.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007, The Nature Conservancy, 2007.
Linkages from South Coast Wildlands Missing Linkages, 2001, The Donald Bren School of Environmental Science and Management, 2003.
September 10, 2007
0
1.25
2.5
Miles
N
The Nature Conservancy
Protecting nature. Preserving life.™

Conservation Challenges

Threats

Threats destroy, degrade, or impair conservation targets by detrimentally affecting some aspect of a target's viability (Low, 2003). Using the Five-S Framework, we analyzed threats in two steps. The first step identified stresses affecting the conservation targets. The second step focused on the sources of those stresses.

Stresses are the unnatural disturbances that negatively affect the viability or health of a conservation target, such as loss or degradation of vegetation and/or habitat, impaired water quality, and decrease in populations of focal species. Once we had identified the stresses, we ranked each stress based on the severity of damage anticipated under current conditions in the next ten years and on the expected geographic scope of that damage.

Often the sources of stresses, or those activities that cause stresses, contribute to several stresses in varying degrees. Examples of sources that contribute to the stresses listed above are incompatible urban development, resource extraction, and invasive plants and animals, respectively. We ranked sources based on the degree that they contributed to each stress and on the irreversibility of the stress's impacts.

Our analysis revealed six critical threats in the project area: incompatible urban development, altered fire regime, bank stabilization and channelization, invasive plants, aquatic barriers, and climate change. Of these six critical threats, one — incompatible urban development — ranked "very high," while the remaining five ranked "high." (See Table 5.) All three critical threats identified in the upper watershed — incompatible urban development, altered fire regime, and invasive plants — were also identified in the lower watershed, indicating the need for watershed-scale strategies targeted at these threats. The following explanation explores the potential effects of the critical high-ranking threats with an emphasis on their occurrence within the lower Santa Clara River watershed.

Incompatible Urban Development — Very High

Urban development includes housing and business development, subdivision into ranchettes (less than 40 acres in size), and associated road and infrastructure construction. It is incompatible when it adversely affects the functionality of a conservation target. Roads act as barriers to plant and animal dispersal and movement and create zones of disturbance along their edges. Incompatible development causes one or more of the following stresses: habitat destruction, habitat fragmentation, and habitat degradation. These stressors in turn affect biodiversity and the abundance of native plants, tend to reduce population size, can reduce genetic diversity, often alter the structure of ecosystems, and disturb soils. Furthermore, subdivision of large tracts of lands can increase the urban-wildland interface, leading to problems such as increased human-wild animal interaction and altered fire regime (see below). Development can alter a watershed's hydrology by increasing the coverage of impermeable surfaces, which, in turn, increases runoff and decreases soil moisture.

In the project area, fragmentation and disturbance caused by incompatible development and associated road construction is presently occurring at the boundaries of Los Padres National Forest and the Santa Monica Mountains National Recreation Area, as well as in riparian areas, along the coast, and across potential wildlife corridors. (See Map 34, Urban Development.) Incompatible urban development poses a threat to all conservation targets and negatively affects the entire project area.

Altered Fire Regime — High

Fire regime is based on fire frequency, duration, geographic scope, and burn intensity. A natural fire regime is one that has not been changed by human activity. The historical fire regime of southern California has been altered by the growing population. Changes in fire regime differ by vegetation community as well as by proximity to human land use (e.g., proximity to homes and roads).

Fire is a natural and essential process in this semi-arid region. (See Map 35, Fire Regime.) Many plant species have adapted to fire, and some require it in order to reproduce. In many of the higher-elevation areas, suppression of fire has resulted in an accumulation of forest fuels. When fires get out of control, the increase in fuel load often contributes to larger, more intense fires that are harder to combat. (See Map 36, Fire Condition.) More intense fires threaten not only housing and businesses in nearby communities, but the habitats of many species, even those naturally adapted to fire. Intense fires also threaten natural ecological processes, including the hydrologic cycle, nutrient availability, species dispersal, and a natural community's susceptibility to infiltration by invasive species. In an effort to combat these intense fires, fire management in nearby Los Padres National Forest has shifted from fire suppression, which was used in the early 1900s, to annual prescribed burnings of 25,000 acres to control biomass available for fire fuel loads (Borchert, 2004).

Human activities can also have the opposite effect by increasing fire frequency. Human-ignited fires multiply as the urban-wildlands interface increases and more people come into contact with open lands. Overly frequent fire can also pose a threat to native diversity by favoring regeneration of non-native habitat types. For example, recurring human-caused fire in areas featuring coastal sage scrub and chaparral may preclude post-fire recovery of shrubs and trigger a grass-fire cycle that perpetuates itself and results in wholesale habitat conversion from shrub land to grassland.

In the project area, virtually every natural community except the coastal strip is affected by either increased or decreased fire frequency and intensity.

Bank Stabilization and Channelization — High

Bank stabilization and/or channelization occur along the river bank in order to protect property and infrastructure from flooding. Bank stabilization can include engineered levees, placement of rock, groins, and other stream-deflecting structures. Channelization occurs when an entire reach of a river or stream is confined in a concrete canal to convey water through a particular area. Stabilization and/or channelization can decrease the amount of riparian habitat surrounding rivers and creeks, adversely affecting riparian-dependent focal bird species and other associated species. Further, the structures can change the hydrologic regime of the river by increasing the velocity of flows. Artificial banks can also deflect flows, changing their direction in ways that can create additional flood hazards on the opposite bank. Moreover, by disconnecting rivers from their floodplains, stabilization and/or channelization can disrupt a river's natural flood capacity, alter sediment transport, and increase flow velocities, scouring, and bank erosion.

In the project area, bank stabilization and channelization most often occur near developed areas along the Santa Clara River. As a result, the aquatic or in-river habitat for aquatic vertebrates, including the endangered southern steelhead (*Oncorhynchus mykiss*), is often degraded.

Invasive Plants — High

Invasive plants threaten the viability of all conservation targets. The types of invasive plants vary throughout the watershed, but their impacts are generally similar.

Invasive plants can

- *Decrease quality or quantity of habitat* — Invasive plants can out-compete and replace native vegetation, resulting in the loss of food resources or other habitat attributes for native wildlife.

Decrease water quantity — Invasive plant species, such as *Arundo donax*, eucalyptus, and tamarisk, can consume more water than native plants, reducing water in the riverbed as well as groundwater (VCRCD, 2006).

- *Decrease water quality* — Major invasive plant infestations that replace native plant canopy can reduce shade in the riparian zones. The resulting increased water temperatures lead to decreased dissolved oxygen, to the detriment of native aquatic vertebrates (VCRCD, 2006).

- *Alter fire regimes* — Invasive plants interrupt natural fire regimes by altering the extent and vertical density of fuels. Along the riparian corridor, arundo can cause fires to spread quickly, burn more intensely, and carry ground-level burns to the mature overstory canopies. In the uplands, eucalyptus also tends to burn more intensely, making fires more difficult to extinguish.

- *Alter geomorphology* — Large stands of invasive plants in channels may trap sediment and narrow the stream channels, potentially causing downstream erosion and increasing flooding (VCRCD, 2006).

Invasive plants also pose threats and costs to humans. For example, some riparian pest plants can exacerbate hazards of flooding and bank erosion. It is common for the riverbed to be scoured during big storm flows. Large masses of scoured *Arundo donax* (a giant grass species with competitive advantages, including shallower roots than native riparian vegetation) have been known to accumulate under bridges and in culverts, backing up stream flows and flooding adjacent properties (VCRCD, 2006).

Arundo, a very common problem in the Santa Clara River, thrives in wet areas but can survive in various conditions. (See Map 37, Invasive Plants.) Its rapid rate of growth regardless of resource availability makes it a highly competitive invasive (Coffman, 2007). Arundo reproduces mainly by vegetative means, sprouting from pieces of transported plant material. This makes eradication of the plant upstream a necessary first step toward controlling arundo in the watershed.

Invasive plants occur throughout the project area and vary by habitat type. Some examples include Mexican fan palm (*Washingtonia robusta*), Peruvian peppertree (*Schinus molle*), tamarisk (*Tamarix ramosissima*), Tasmanian blue gum (*Eucalyptus globulus*), tree of heaven (*Ailanthus altissima*), castor bean (*Ricinus communis*), myoporum (*Myoporum laetum*), pampas grass (*Cortaderia jubata* and *Cortaderia selloana*), poison hemlock (*Conium maculatum*), Spanish broom (*Spartium junceum*), sweet fennel (*Foeniculum vulgare*), tree tobacco (*Nicotiana glauca*), cape ivy (*Delairea odorata* and *Senecio mikaniodes*), greater periwinkle (*Vinca major*), Italian thistle (*Carduus pycnocephalus*), perennial pepperweed (*Lepidium larifolium*), summer mustard (*Hirschfeldia incana*), and tocalote (*Centaurea melitensis*) (County of Ventura, 2006).

While they ranked only "medium" in our threat analysis, invasive animals also threaten the project area. Invasive animals compete with native species for food, water, and habitat, can transmit diseases, and often are direct predators of native plants and animals. A list of those animals that can be found throughout the lower watershed and coastal areas is provided in Appendix D, *Invasive Animals Threatening Native Santa Clara River Riparian Species*.

Aquatic Barriers — High

Aquatic barriers include anthropogenic (man-made) in-stream structures as well as natural impediments that block the movement or migration of aquatic animals throughout the Santa Clara River. Examples of man-made barriers include dams, road crossings, diversions, flood control channels, inadequate flow releases, and poor water quality. Examples of natural barriers include downed trees, accumulated woody debris, and sediment. Natural barriers are often transient, changing with stream flow, but while they exist, they can disrupt migration of aquatic animals upstream and downstream.

Barriers can lead directly to the fragmentation and loss of aquatic habitat and may completely prevent access to sections of a tributary or river that are essential to an aquatic species' lifecycle. Habitat fragmentation caused by barriers can, in turn, lead to reduced population size, reduced genetic diversity, and increased risk of extirpation from a stream system. Aquatic barriers affect not only individual aquatic species, but also the plants and animals that depend on them.

In the Santa Clara River, the effects of aquatic barriers are particularly salient when viewed from the perspective of the endangered southern steelhead. Dams and diversions have blocked the majority of the prime steelhead spawning and over-summer rearing habitat in the main stems and upstream tributaries of most of the major watersheds in southern California, including the Santa Clara River (NOAA, 2007). Since the main stem Santa Clara serves mainly as a migration corridor for anadromous fish such as steelhead, their success in the Santa Clara River and tributaries is dependent on the mitigation of man-made barriers on the main stem. The Vern Freeman Diversion, located on the main stem, is considered the most significant barrier to steelhead passage in the lower watershed (Stoecker, 2005).

Climate Change — High

Climate change is a threat that will affect every conservation target in our project area. In evaluating the impacts of climate change on our project area, we limited our timeline to a decade, which potentially fails to capture the longer-term impacts associated with climate change. While the scope of climate change impacts is beyond the scope of this plan, it is important to note some of the known consequences for the project area.

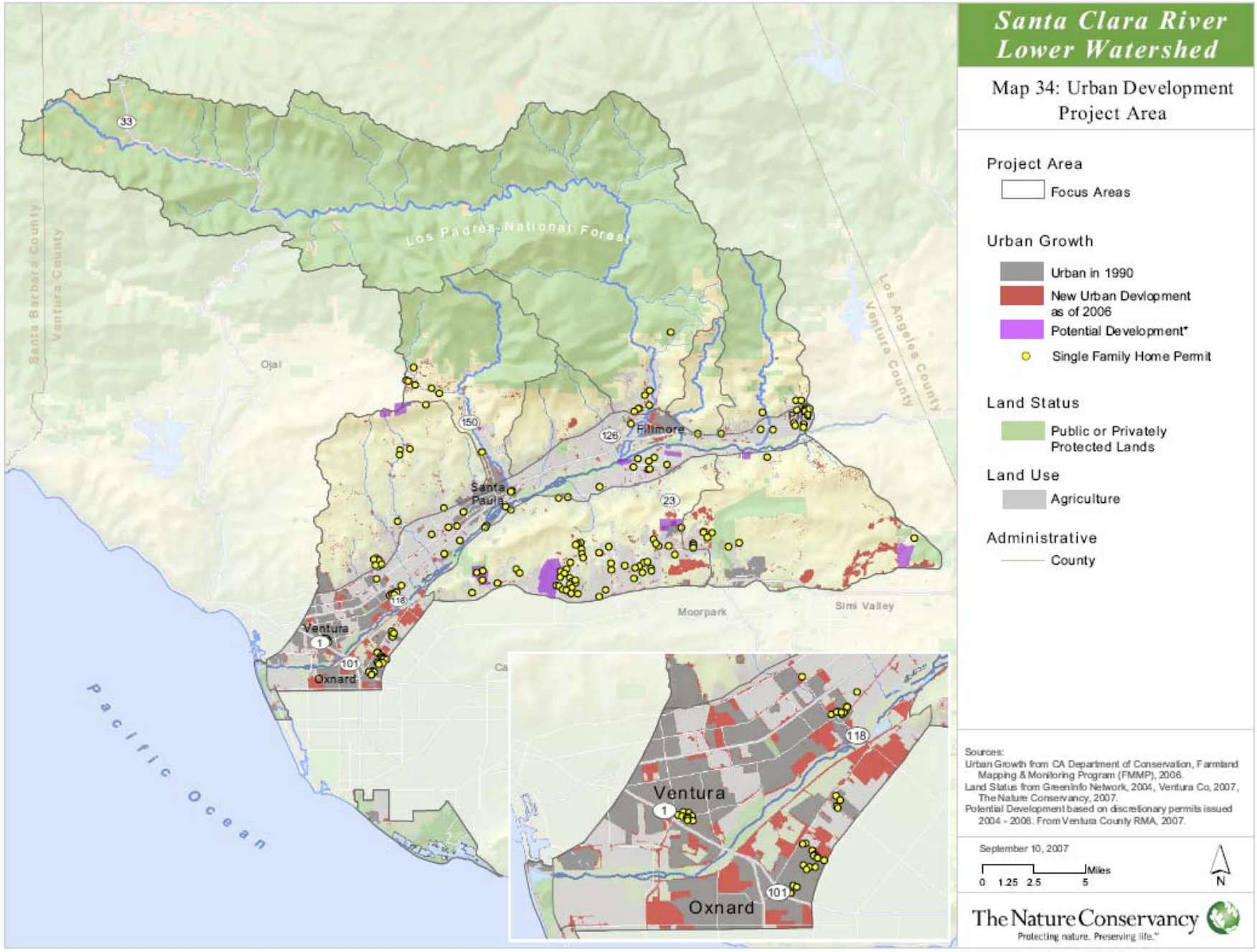
The main stem of the Santa Clara River will likely experience changes in flow regime due to increased periods of drought and/or more severe rain events (Hayhoe et al 2004). As a result, the system could experience more extreme fluctuations in water flow, leading to further scouring of the riparian zone and loss in habitat for aquatic vertebrates. Increased flows could increase the threat of bank stabilization and/or channelization as state and local governments attempt to protect infrastructure and agricultural lands from flooding.

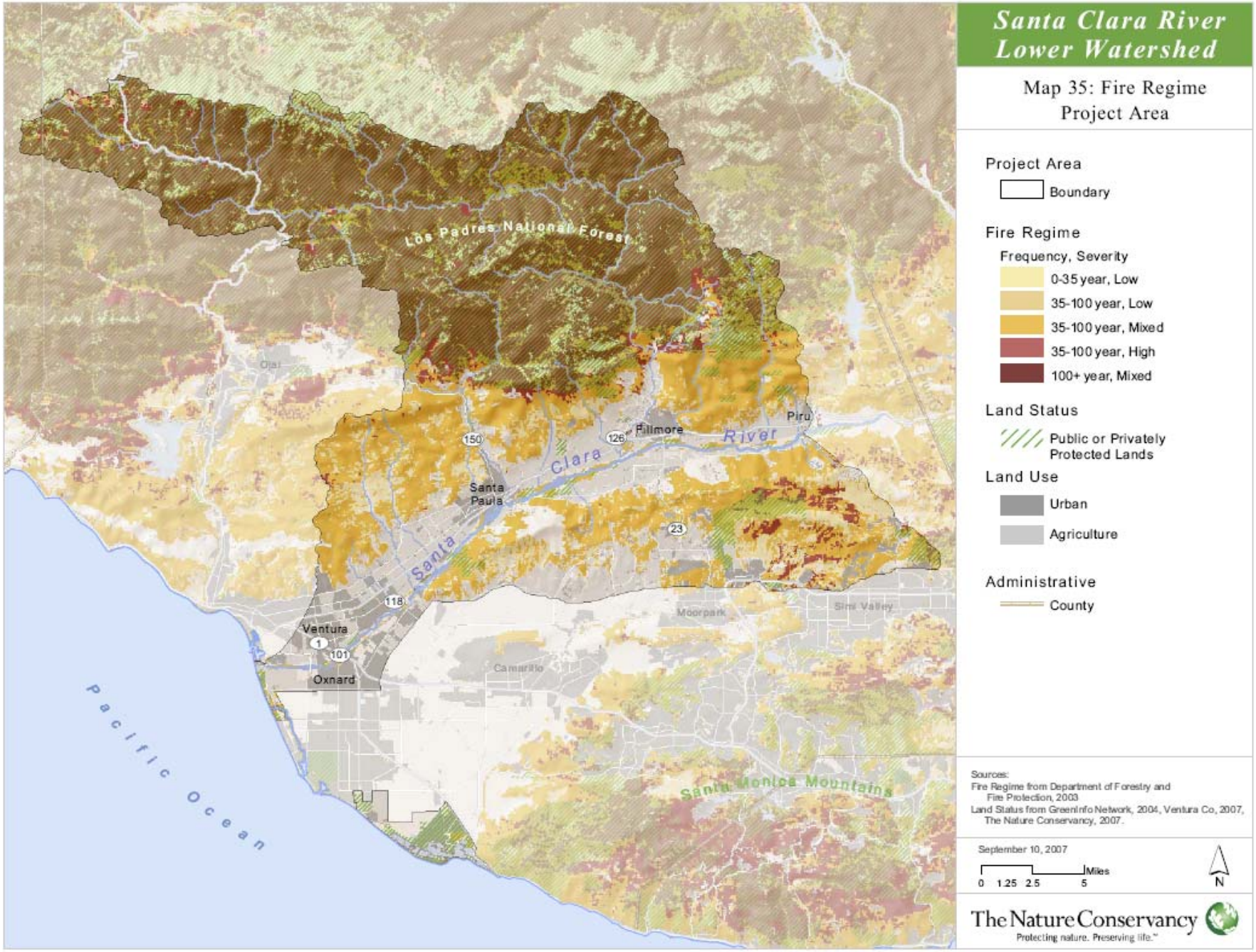
Along the coast, the warming of the oceans and melting of above-water ice and glaciers will lead to a rise in sea level affecting the coastal areas of McGrath Beach, the Santa Clara River estuary, Ormond Beach, and Point Mugu. Areas on the coast will be threatened by the rising sea, and strategies to prevent the loss of important habitat must include the acquisition of land at a greater distance from the beach.

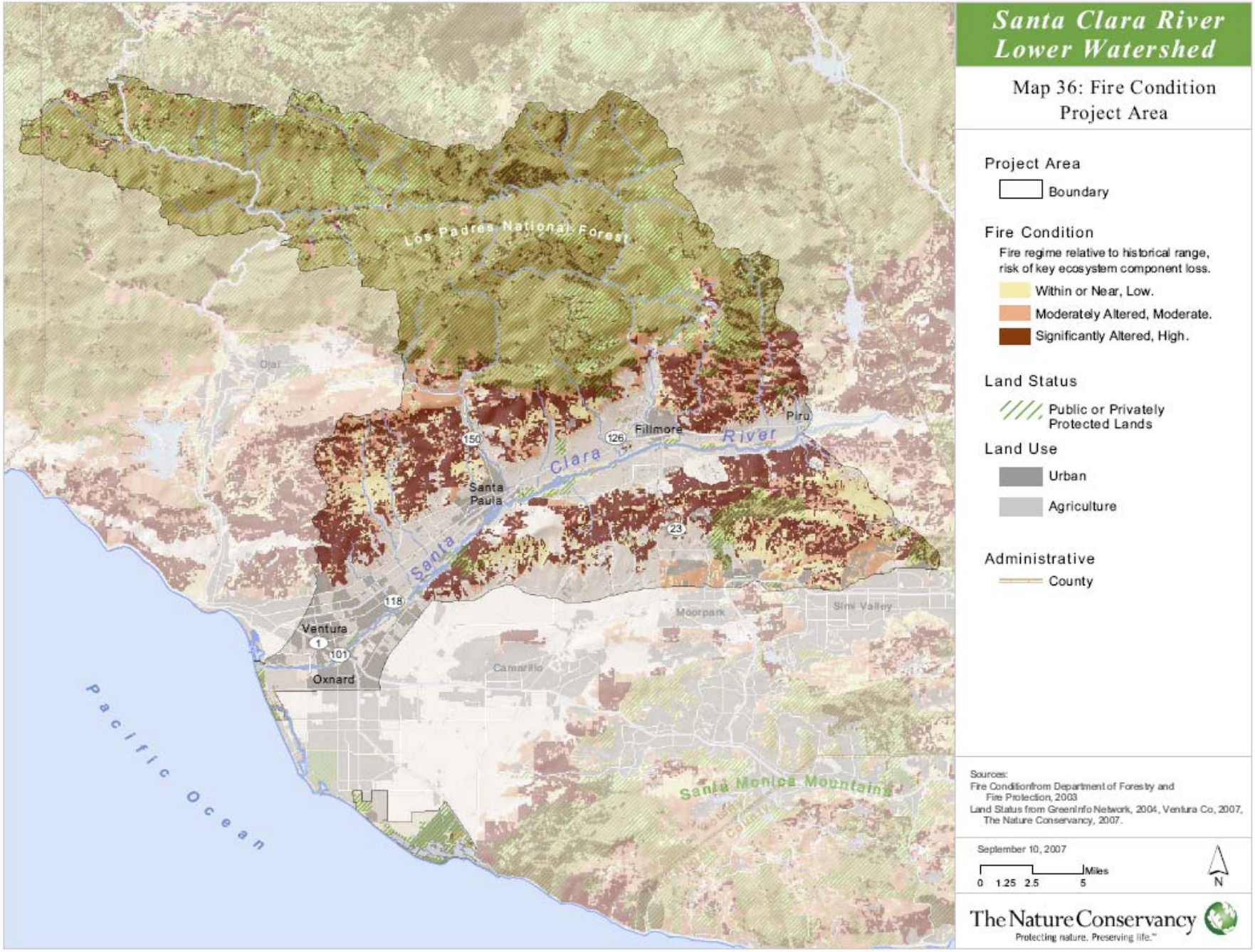
Terrestrial species of both plants and animals may try to adapt to a warming climate by moving higher in elevation to track suitable habitat conditions. This movement could lead to fragmentation and loss of biodiversity in vegetation communities and result in degradation or loss of habitat within linkages between core habitats. Timing and success of species reproduction is likely to be affected. Longer-lived species with limited reproductive output or dispersal capabilities (for example, oaks) may be less able to adapt to the shifting climatic conditions. Specific impacts of climate change are difficult to predict, adding to the difficulty of environmental policy and planning decisions. (See Map 38, Climate Change Induced Sea Level Rise.)

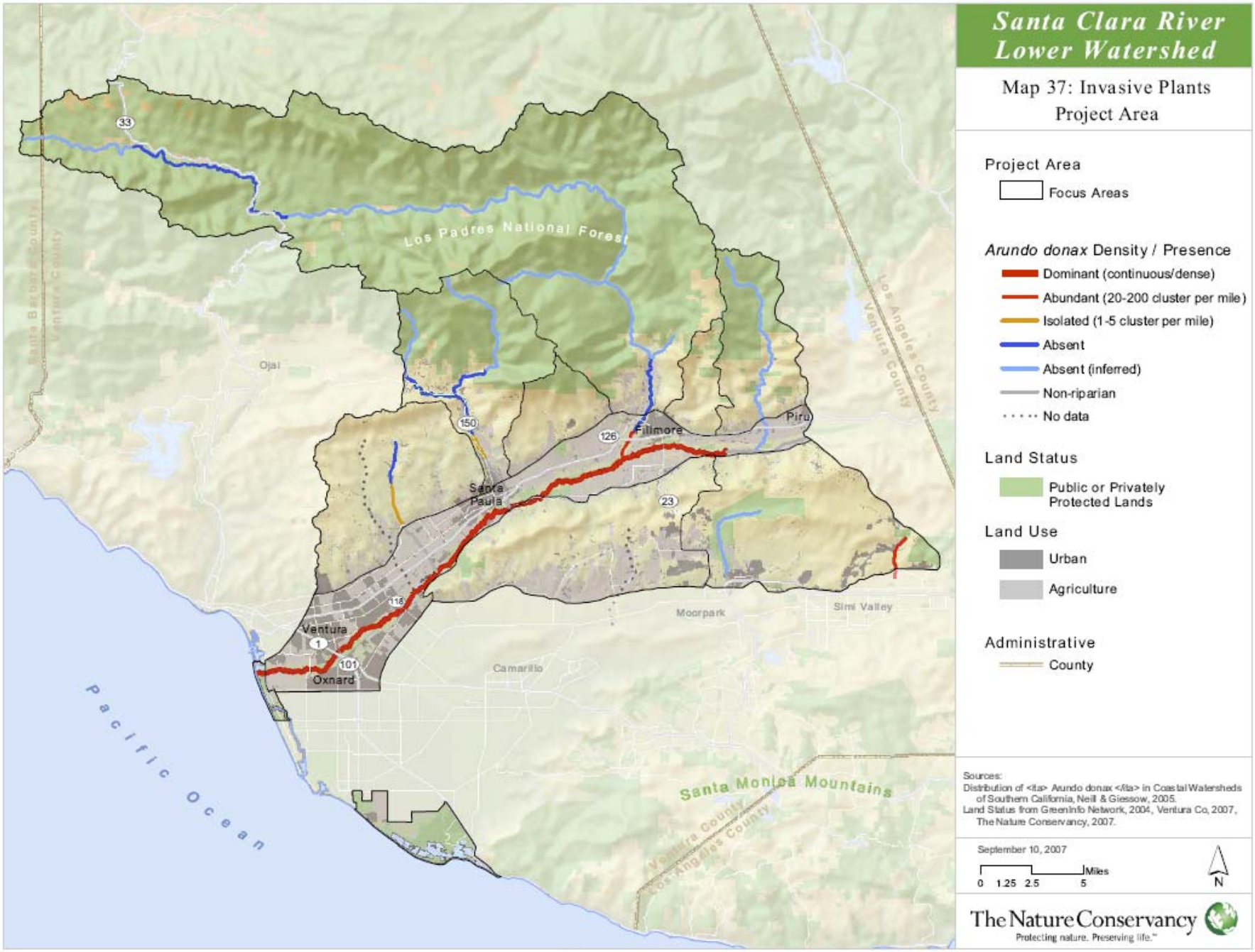
Table 6: Threat Summary

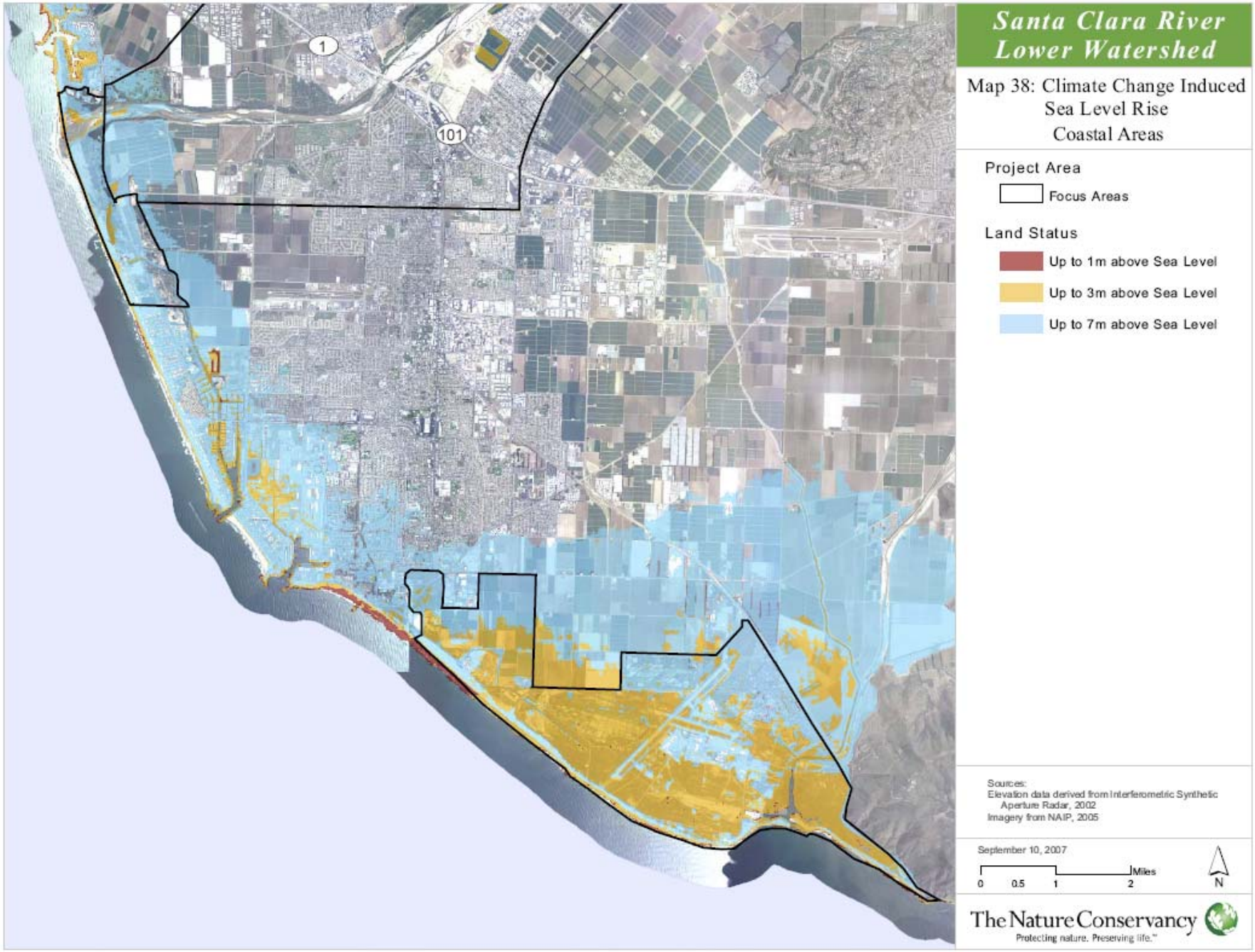
Threats Across Systems Project-specific threats		Coastal Communities	Riparian Forest and Scrub Communities	Grasslands	Coastal Sage Scrub Communities	Oak Woodlands	Chaparral Communities	Aquatic Vertebrates	Wide Ranging Terrestrial Vertebrates	Overall Threat Rank
1	Incompatible urban development	Very High	Medium	High	Very High	Medium	High	High	Very High	Very High
2	Altered fire regime	-	Medium	High	High	High	High	-	-	High
3	Bank stabilization/channelization	-	Medium	-	-	-	-	Very High	-	High
4	Aquatic barriers	-	-	-	-	-	-	Very High	-	High
5	Invasive plants	Medium	Medium	High	Medium	High	Medium	-	-	High
6	Climate change	High	Low	Low	Medium	Medium	Medium	Medium	Medium	High
7	Sewer treatment plant effluent	-	-	-	-	-	-	High	-	Medium
8	Polluted condor food sources (lead shot, micro-trash)	-	-	-	-	-	High	-	-	Medium
9	Invasive animals (African clawed frog, sunfish, bullfrog, NZ mud snail, cowbird)	-	Medium	-	Medium	-	-	Medium	-	Medium
10	Incompatible Grazing	-	-	Medium	-	Medium	-	-	-	Medium
11	Resource Extraction	-	Low	-	-	-	-	Medium	-	Low
12	Incompatible recreational use	Medium	Low	-	-	-	-	-	-	Low
13	Halaco Superfund site	Medium	-	-	-	-	-	-	-	Low
14	Agricultural/Urban runoff	Low	-	-	-	-	-	-	-	Low
Threats Status for Targets and Site		High	Medium	High	High	High	High	Very High	High	Very High


Santa Clara River
Lower Watershed
Map 34: Urban Development
Project Area
Project Area
Focus Areas
Urban Growth
Urban in 1990
New Urban Development
as of 2006
Potential Development*
Single Family Home Permit
Land Status
Public or Privately
Protected Lands
Land Use
Agriculture
Administrative
County
Sources:
Urban Growth from CA Department of Conservation, Farmland
Mapping & Monitoring Program (FMMP), 2006.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007,
The Nature Conservancy, 2007.
Potential Development based on discretionary permits issued
2004 - 2006. From Ventura County RMA, 2007.
September 10, 2007
Miles
0 1.25 2.5 5
N
The Nature Conservancy
Protecting nature. Preserving life.™
Los Padres National Forest
Santa Barbara County
Ventura County
Los Angeles County
Ventura County
Ojai
Fillmore
Santa
Paula
Moorpark
Simi Valley
Ventura
Oxnard
Pacific Ocean
33
150
126
23
118
1
101


Santa Clara River
Lower Watershed
Map 35: Fire Regime
Project Area
Project Area
Boundary
Fire Regime
Frequency, Severity
0-35 year, Low
35-100 year, Low
35-100 year, Mixed
35-100 year, High
100+ year, Mixed
Land Status
Public or Privately Protected Lands
Land Use
Urban
Agriculture
Administrative
County
Los Padres National Forest
Fillmore
Piru
Santa Paula
Santa Clara River
Ventura
Oxnard
Pacific Ocean
Santa Monica Mountains
Moorpark
Simi Valley
Camarillo
Sources:
Fire Regime from Department of Forestry and Fire Protection, 2003
Land Status from GreenInfo Network, 2004, Ventura Co, 2007, The Nature Conservancy, 2007.
September 10, 2007
Miles
0 1.25 2.5 5
N
The Nature Conservancy
Protecting nature. Preserving life.™


Santa Clara River
Lower Watershed
Map 36: Fire Condition
Project Area
Project Area
Boundary
Fire Condition
Fire regime relative to historical range, risk of key ecosystem component loss.
Within or Near, Low.
Moderately Altered, Moderate.
Significantly Altered, High.
Land Status
Public or Privately Protected Lands
Land Use
Urban
Agriculture
Administrative
County
Los Padres National Forest
Ojai
Fillmore
Piru
Santa Clara River
Santa Paula
Ventura
Oxnard
Moorpark
Simi Valley
Camarillo
Santa Monica Mountains
Pacific Ocean
150
126
23
118
1
101
Sources:
Fire Conditionfrom Department of Forestry and Fire Protection, 2003
Land Status from GreenInfo Network, 2004, Ventura Co, 2007, The Nature Conservancy, 2007.
September 10, 2007
0 1.25 2.5 5 Miles
N
The Nature Conservancy
Protecting nature. Preserving life.™


Santa Clara River
Lower Watershed
Map 37: Invasive Plants
Project Area
Project Area
Focus Areas
Arundo donax Density / Presence
Dominant (continuous/dense)
Abundant (20-200 cluster per mile)
Isolated (1-5 cluster per mile)
Absent
Absent (inferred)
Non-riparian
No data
Land Status
Public or Privately Protected Lands
Land Use
Urban
Agriculture
Administrative
County
Sources:
Distribution of <ita> Arundo donax </ita> in Coastal Watersheds of Southern California, Neill & Giessow, 2005.
Land Status from GreenInfo Network, 2004, Ventura Co, 2007, The Nature Conservancy, 2007.
September 10, 2007
0 1.25 2.5 5 Miles
N
The Nature Conservancy
Protecting nature. Preserving life.™
Los Padres National Forest
Santa Barbara County
Ventura County
Los Angeles County
Ojai
Fillmore
Piru
Santa Paula
Moorpark
Simi Valley
Ventura
Oxnard
Camarillo
Pacific Ocean
Santa Monica Mountains
33
150
126
23
118
1
101


Santa Clara River
Lower Watershed
Map 38: Climate Change Induced
Sea Level Rise
Coastal Areas
Project Area
Focus Areas
Land Status
Up to 1m above Sea Level
Up to 3m above Sea Level
Up to 7m above Sea Level
1
101
Sources:
Elevation data derived from Interferometric Synthetic
Aperture Radar, 2002
Imagery from NAIP, 2005
September 10, 2007
0
0.5
1
2
Miles
N
The Nature Conservancy
Protecting nature. Preserving life.™

Conservation Vision

The Nature Conservancy's long-term conservation vision for the project area is to

- Protect and enhance quality representations of each natural community conservation target and the characteristic variation within those communities.
- Protect and enhance populations of aquatic vertebrate and wide-ranging terrestrial vertebrate conservation targets, as well as the sensitive plant and animal species that rely on the Santa Clara River and coastal areas for all or a portion of their life cycles.
- Connect protected natural communities and populations, in large part through the conservation of the wildlife linkages that connect the Santa Monica Mountains to Los Padres National Forest.
- Abate threats to the viability of conservation targets.

The following sections provide conservation strategies to accomplish, on different time scales and over diverse geographies, this conservation vision.

Conservation Strategies

Conservation strategies are tools used to abate threats to conservation goals and targets and/or to enhance target viability. The most effective strategies tend to be those that are highly leveraged and accomplish multiple goals.

The following *Conservation Strategies Matrix* (Table 7) shows the threats that each strategy addresses. Strategies were ranked based on their potential to abate multiple and high-ranking threats. The strategies with the highest potential impact, *i.e.* those expected to be most effective, are shown in red, followed by yellow, light green, and dark green. The rankings reveal the following three top strategies: (1) land acquisition, (2) public planning, and (3) policy implementation by the California Department of Fish and Game, the U.S. Army Corps of Engineers, and the U.S. Fish and Wildlife Service.

The strategies for the project area are

Land Acquisition

Acquire land to protect target-rich, rare, and highly threatened sites as well as wildlife linkages. Acquisition can be accomplished through fee acquisition, conservation easements, and flood inundation easements. Land acquisition can be used to prevent incompatible urban development, prevent or remove bank stabilization and/or channelization, remove invasive plants, help address issues of climate change, prevent resource extraction, remove invasive animals, and address incompatible grazing.

Land-Use Planning

Encourage land-use planning that supports conservation goals, such as compatible-use zoning, habitat-sensitive setbacks, and buffering policies. Land-use planning can be accomplished by working with planners and government officials in the cities of Oxnard, Ventura, Santa Paula, and Fillmore and in Ventura County.

Public Planning

Engage in public planning processes such as general plan updates to promote conservation goals.

Initiative Planning — Promote local initiatives to help fund and/or create an open space district to protect priority lands.

Land-use planning efforts would create change on a landscape scale, affecting the entire area encompassed in a particular planning process. Creating a comprehensive mitigation plan for Ventura County would provide better opportunities for restoration in the watershed. Land use planning in the public arena can prevent incompatible urban and industrial development in an entire area, promote alternatives to bank stabilization and/or channelization in the floodplain, prevent resource extraction within the county.

Land-Use Policy

Encourage policies and projects and help mitigate unavoidable impacts. Also, encourage policy that supports conservation goals such as maintaining or increasing native species biodiversity and historical hydrologic regimes, protecting critical habitat and sensitive species, and maintaining connectivity and quality habitat. This can be done by working with agencies that have land-use or management authority, including the Ventura County Water Protection District, California Department of Fish and Game, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, Local Agency Formation Committee, U.S. Forest Service, California Department of Transportation, Environmental Protection Agency, Regional Water Quality Control Board, and regional water districts.

Land-use policy engagement could address many threats on a project-by-project basis. The greatest impacts would be to prevent incompatible urban development, bank stabilization and/or channelization, aquatic barriers, and resources extraction projects.

Public Advocacy and Education

Public advocacy and education can be a powerful force for achieving conservation goals. Properly directed resources can be used for conservation activities that involve and educate the public and local officials about the importance of a healthy watershed and beach area. The Ventura County Resource Conservation District is already holding stakeholder meetings to see how best to accomplish such outreach (Marty Melvin, VCRD, personal communication). An involved and educated public can provide critical support for conservation in a variety of ways, from controlling the spread of invasive species and preventing incompatible recreational use on sensitive lands to making the public's views on conservation known to elected officials.

Scientific Investigation

Foster research to fill gaps in data, explore more effective conservation strategies, monitor target viability, and provide recommendations on ways to further the conservation vision. This can be done by performing studies and research projects that are prioritized to address the questions that are most relevant to management of the project area. Efforts should be focused on the local — that is, the watershed — level. (Issues such as climate change and its impacts are understood on a global scale but not at the practical level for use by organizations and policy makers.) It is also important to coordinate these efforts so that available funds are used efficiently. Findings should be made publicly available on *www.santaclarariverparkway.org* or a similar web site and presented to local policy-makers where appropriate. Scientific investigation would help us better understand the consequences of altered fire regimes, invasive plants and animals, and environmental contamination (e.g. the Halaco site).

Land Management

Manage land either to protect or to restore it to a more natural and historical state. This can be done through restoration, invasive species control, and/or maintaining site security.

Restoration —The act of restoring converted and degraded natural communities to a more historical state. This can be done by planting native species, restoring hydrologic regimes that benefit native species as well as humans, and preventing or cleaning up pollution.

Invasive Species Control —Remove invasive plant and animal infestations and reduce or reverse their adverse effects on the environment.

Site Security — Controlled access to conservation properties through measures such as fencing and active management can protect sites from unwanted incompatible recreational use, dumping of trash, and arson or accidental fires. It can also protect sensitive habitats and/or nesting sites of native animal species.

Table 7: Strategies Matrix

	Incompatible Urban Development	Altered Fire Regime	Bank Stabilization / Channelization	Invasive Plants	Aquatic Barriers	Climate Change	Polluted Food Sources	Sewer Treatment Plant Effluent	Incompatible Recreational Use	Resource Extraction	Halaco Site	Invasive Animals	Incompatible Grazing
Threat Rank>	Very High	High	High	High	High	Medium	Medium	Medium	Low	Low	Low	Low	Low
Strategies													
Land Acquisition													
Land Use Planning													
Public Planning													
Initiative Planning													
Land Use Policy													
VCWPD													
DFG/ACOE/USFWS													
L.A.FCO													
USFS													
Caltrans													
EPA													
RWQCB													
Water Districts													
Public Advocacy/Education													
Scientific Investigation													
Land Management													
Restoration													
Invasive Species Control													
Site Security													

Strategic Impact	
Very High	
High	
Medium	
Low	

Measures of Conservation Success

Conservation actions implement the aforementioned strategies to achieve the conservation vision. Success, the final step of the Five-S Framework, will be measured based on the progress made in accomplishing the following short-term and long-term actions.

Short-Term Success

The Nature Conservancy and its partners will concentrate on accomplishing the following objectives during the next five years:

Land Acquisition

- Acquire or otherwise protect 25 percent of lands in the Santa Monica-Sierra Madre Linkage . These acquisitions will serve as part of the primary corridors identified by South Coast Wildlands and UCSB.
- Acquire or otherwise protect 25 percent of currently unprotected Nature Conservancy-designated Tier 1 riparian habitat that supports our target communities and populations of target species (e.g., aquatic vertebrates, southwestern willow flycatcher, and least Bell's vireo).
- Acquire or otherwise protect 25 percent of Nature Conservancy-designated Tier 1 habitat of the following species: arroyo toad, Ventura marsh milk vetch, western snowy plover, California condor, red-legged frog, least Bell's vireo, Lyon's pentachaeta, and tidewater goby.
- Acquire or otherwise protect 250 acres of upland habitat in coastal areas to mitigate potential impacts of sea level rise on existing communities.

Land-Use Planning

- Engage planning departments in Ventura County and the cities of Oxnard, Ventura, Santa Paula, and Fillmore, as appropriate, with the goal of halting the loss of key habitat and protecting the conservation goals identified in this plan.
- Involve CalTrans in planning that will minimize the impact to key habitat and linkages and/or engage them in direct conservation of existing linkages.
- Work to gain federal funding to complete the Santa Clara River Feasibility Study that is being undertaken by the Ventura County Watershed Protect District, L.A. County, and the U.S. Army Corps of Engineers. The study will develop a model of the river's hydrology, hydraulics, and sediment transport, and it will help in future land-use planning and policy decisions.
- Gain planning department recognition of the Santa Monica-Sierra Madre linkage and other linkages in the project area to ensure they are accommodated in future subdivisions and land-use plans.
- Encourage Ventura County and local agencies to reduce future development and levee construction along flood zones.
- Create and fund an open space district in Ventura County.

Land-Use Policy

- Promote the use of non-structural flood and erosion control methods on the river and its main tributaries with the county watershed protection districts. Engage the farm community and other stakeholders in developing a floodplain conservation program. Focus on setbacks and inundation easements.

- Support the California Department of Forestry and Fire Protection and the U.S. Forest Service in appropriate fire management practices in areas containing critical habitat, threatened and endangered species, and wildlife linkages.
- Encourage the State Coastal Conservancy to expand the River Parkway project to the L.A. County line.
- Support the California Department of Fish and Game in establishing an approved Conceptual Area Protection Plan (CAPP) for key conservation targets such as the Santa Clara River and Ormond Beach wetlands.
- Work with appropriate agencies to tackle issues related to river aggregate mining policies, with the goal of eliminating mining where it may negatively affect conservation targets.
- Work with the U.S. Forest Service to protect important steelhead habitat, including removal of migration barriers within its boundaries.
- With partners, promote an agricultural conservation program in Ventura County in locations where maintaining agricultural use is beneficial to natural systems.

Public Advocacy and Education

- Increase available funding sources and local capacity for education and outreach.
- Hold public outreach events and involve local businesses, schools, and organizations in advocating watershed stewardship.
- Support programs to educate hunters on the effects of lead bullets on California condor mortality via secondary poisoning. Support programs to educate hunters on options for alternative ammunition. Educate the public on the harmful effects of micro-trash in California condor diets.

Scientific Investigation

- Identify and map habitat with high suitability for target species and of each targeted natural community and appropriate sub-targets.
- Identify and map parcel-specific protection priorities in the Santa Monica-Sierra Madre Linkage and other linkages. Prioritize potential land protection areas identified to aid in linkage and habitat patch connectivity. Integrate protection priorities with this conservation plan.
- Support investigations of the Santa Clara estuary that will determine its functionality and identify restoration needs, if any, with the State Coastal Conservancy (SCC) taking the lead.
- Monitor and advocate the successful resolution of the Halaco site contamination issue. Investigate potential impacts of the Halaco site on soil and water quality and the steps to take in protecting surrounding coastal habitats (with SCC taking the lead).
- Investigate *local* effects of climate change on invasive species, altered fire regime, wildlife movement, sea-level rise, and species-species relationships. Integrate this information with future adaptations of this and the upper Santa Clara River watershed conservation plans.

Land Management

Restoration

- Develop a restoration plan for 1,000 acres at The Nature Conservancy's Hanson property on the Santa Clara River.
- Participate in the completion of the Restoration Feasibility Study for the lower Santa Clara River watershed being conducted by the State Coastal Conservancy.
- Support the State Coastal Conservancy's restoration planning on the Santa Clara River and Ormond Beach.

- Support the completion of the State Coastal Conservancy's historical ecology study for Ventura County.
- Complete one aquatic barrier removal project

Invasive Control

- Incorporate findings from 2007 report by Stillwater Sciences and URS Corporation in restoration plans for prioritizing arundo removal in the lower Santa Clara River watershed.
- Enhance cow-bird trapping program currently operating in the lower Santa Clara River watershed.
- Respond to newly established invasive plant and animal species.
- Remove ice plant and myoporum on 277 acres at Ormond Beach.
- Remove ice plant and other invasive species at McGrath State Beach and within the Santa Clara River estuary.

Site Security

- Fence snowy plover and California least tern breeding grounds at coastal areas
- Reduce incompatible recreational use, evict squatters, and prevent dumping of trash in acquired lands
- Develop and implement management plan for all properties owned by The Nature Conservancy.
- Ensure that past restoration areas remain free of invasives.

Long-Term Success

Over the next ten years, The Nature Conservancy and its partners will concentrate on reaching the following objectives:

Land Acquisition

- Complete protection of the Santa Monica-Sierra Madre Linkage.
- Acquire or otherwise protect 50 percent of the currently unprotected Nature Conservancy-designated Tier 1 target riparian habitat that supports populations of targeted species.
- Acquire or otherwise protect 50 percent of the currently unprotected Nature Conservancy-designated Tier 1 target plant communities (e.g., woodlands, sage scrub, and chaparral).
- Support the Santa Clara River Parkway Project in acquiring lands along the main stem of the Santa Clara River.

Land-Use Planning

- Encourage incorporation of conservation goals in the plans, processes, and procedures of the planning departments of Ventura County, local cities, and CalTrans.
- Work to re-authorize the Save Open-Space and Agricultural Resources (SOAR) initiative, or similar legislation, as expiration dates near.
- Support the development of a regional vision plan that defines all vital Ventura County habitat areas, such as the *Compact for a Sustainable Ventura County,* which is already under way through the leadership of the]Ventura County Civic Alliance.

Land-Use Policy

- Form a cooperative with local agencies, including the Ventura County Watershed Protection District, U.S. Fish and Wildlife Service, California Department of Fish and Game, U.S. Army Corps of Engineers, and U.S. Forest Service, to work on policy issues affecting conservation targets.
- Promote the establishment of a best-practices fire management plan that will promote protection of conservation targets.

Public Advocacy and Education

- Work with the Friends of the Santa Clara River and others to continue promoting education, volunteer opportunities and consensus-oriented watershed management.
- Assist State Coastal Conservancy in identifying or creating a long-term management entity for conservation lands along the lower Santa Clara River.

Scientific Investigation

- Create and implement monitoring plans for target species.
- Support efforts to identify, study, and approve suitable biological controls for invasive plant species, especially arundo and tamarisk.
- Investigate and enhance fire management plans for natural communities located within different landscapes.
- Establish a working group of land managers, scientists and government agency staff to address the various threats affecting the watershed and strategies for continued involvement in conservation.

Land Management

Restoration

- Identify, plan, prioritize, and implement restoration of key conservation sites, such as those mentioned in the Santa Clara River Parkway Project.

Invasives Control

- Reduce invasive plant cover and increase native plant cover in all managed sites within the project area.
- Establish a comprehensive invasive species control program in the project area.

Site Security

- Increase bird breeding success by continued fencing of snowy plover and California least tern breeding grounds in coastal areas.
- Reduce incompatible recreational use, evict squatters, and prevent dumping of trash in acquired lands.

References and Suggested Readings

AMEC Earth & Environmental. 2005. *Santa Clara River Enhancement and Management Plan (SCREMP).* Prepared for Ventura County Watershed Protection District, Los Angeles County Department of Public Works, and SCREMP Project Steering Committee. CA.

AMEC Earth & Environmental, Inc. 2005. *Santa Clara River Arundo and Tamarisk Removal Program – Long-term Implementation Plan*. Santa Barbara, CA.

American Bird Conservancy. no date. *Domestic cat predation in California, Florida, and Hawaii.* Retrieved August 2007 from *http://www.abcbirds.org/cats/states/index.htm*.

American Rivers. 2005. *America's most endangered rivers of 2005. Ten rivers reaching the crossroads in the next 12 months*. Washington D.C.

Barnhart, R. A. 1986. *Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Pacific Southwest) – steelhead.* U.S. Fish and Wildlife Service Biological Report 82(11.60) U.S. Army Corps of Engineers, TR EL-82-4. 21 pp.

Biogeographic Data Branch. 2007. *California Natural Diversity Database (CNDDB)* (gov) [ds45]. California Dept. of Fish and Game. Biogeographic Information and Observation System (BIOS). June 2007. Retrieved July 2007 from *http://bios.dfg.ca.gov*.

Biogeographic Data Branch. 2007. *California Wildlife Habitat Relationships (CWHR) System*. California Dept. of Fish and Game. Retrieved September 2007 from *http://www.dfg.ca.gov/biogeodata/cwhr/morecwhr.asp*.

Birosik, S. (2006). *State of the watershed—Report on surface water quality. The Santa Clara River watershed.* Los Angeles, CA: California Regional Water Quality Control Board – Los Angeles Region.

Borchert, M., A. Lopez, S. Bauer and T. Knowd. 2004. *Field Guide to coastal sage scrub and chaparral alliances of Los Padres National Forest*. Prepared for the United States Department of Agriculture and the United States Forest Service. CA.

California Department of Fish and Game. 2007. *Invasive, nuisance and exotic species: domestic cats and wildlife.* Retrieved August 2007 from *http://www.dfg.ca.gov/invasives/dom_cat/*.

California Department of Fish and Game. 2007. *Invasive, nuisance and exotic species: New Zealand mud snail.* Retrieved August 2007 from *http://www.dfg.ca.gov/invasives/mudsnail/*.

California Department of Forestry and Fire Protection. 2007. *The Cal fire mission.* Retrieved August 2007 from *http://www.fire.ca.gov*.

Casterline, M., E. Fegraus, E. Fujioka, L. Hagan, C. Mangiardi, M. Riley, and H. Tiwari. 2003. *Wildlife corridor design and implementation in southern Ventura County*. Prepared for the Bren School of Environmental Science and Management. Santa Barbara, CA.

Conservation Biology Institute (CBI). 2005. *Ecological impact assessment of urban development on the Santa Clara River watershed, California.* Corvallis, OR.

Court, D., J. Glatzer, S. Hard, K. Keith, J. McDonald, and F. Ogushi. 2000. *Prioritizing sites along the Santa Clara River for conservation of threatened and endangered species*. Santa Barbara, CA.

Cox, Robin, Henry Little, Wendy Millet, and Christine Tam. 2001. *Lower Santa Clara River Focus Plan*. CA: The Nature Conservancy.

Entrix, Inc. 2004. *VWRF discharge beneficial uses on the distribution and utilization of the Santa Clara River estuary tidewater goby (*Eucyclogobius newberryi*)*. Prepared for Nautilus Environmental. Ventura, CA.

Fish Passage Forum. 2005. *Fish passage improvement in California's watersheds. Assessments and recommendations by the fish passage forum*. San Francisco, CA: State Coastal Conservancy.

Friends of the Santa Clara River. no date. *Friends of the Santa Clara River*. Retrieved August 2007 from *http://www.fscr.org/*.

Gallo J., Conservation Services. 2006. *Heritage Valley Parks 2005 protocol surveys for least bell's vireo and southwest willow flycatcher and wildlife surveys*. Santa Barbara, CA.

Gould, G. 2001. *Western snowy plover* [ds15]. U.S. Fish and Wildlife Service. Biogeographic Information and Observation System (BIOS). May 2001. Retrieved July 7, 2007 from *http://bios.dfg.ca.gov***.**

Harrison, L. R., E. A. Keller, E. Kelley, L.A.K. Mertes. 2006. *Minimum flow requirements for southern steelhead passage on the Lower Santa Clara River, CA*. Prepared for The Nature Conservancy. University of California, Santa Barbara. Santa Barbara, CA

Hayhoe, Katharine, Daniel Cayan, Christopher B. Field, Peter C. Frumhoff, Edwin P. Maurer, Norman L. Miller, Susanne C. Moser, Stephen H. Schneider, Kimberly Nicholas Cahill, Elsa E. Cleland, Larry Dale, Ray Drapek, R. Michael Hanemann, Laurence S. Kalkstein, James Lenihan, Claire K. Lunch, Ronald P. Neilson, Scott C. Sheridan, Julia H. Verville. 2004. Emissions Pathways, Climate Change, and Impacts on California**.** *Proceedings of the National Academy of Sciences of the United States of America*, Vol. 101, No. 34 (Aug. 24, 2004), pp. 12422-12427

Josselyn, M., T. DeGraff, and J. Dreier. 2007. *Final biological assessment, Ormond Beach, City of Oxnard, Ventura County, California*. Prepared for Aspen Environmental Group. San Rafael, CA.

Labinger, Z., and J. Greaves. 2001. *Summary report of avian studies (1994 – 1999) following the Arco/Four Corners January 17, 1994 oil spill on the Santa Clara River, California*. Prepared by Bio Logic Consulting for the United States Fish and Wildlife Service, Ventura Field Office, Ventura, California.

Light Blue Line. no date. *Lightblueline*. Retrieved September 2007 from *http://www.lbline.org/***.**

Low, Greg. 2003. *Landscape-scale conservation: a practitioner's guide* (4th ed.). The Nature Conservancy.

Matsumoto, Sandi, and E.J. Remson. 2006. *Santa Clara River Upper Watershed Conservation Plan*. The Nature Conservancy. Ventura, CA .

McKinney, T. 1994. *Least Bell's vireo – final critical habitat,* USFWS [ds142]. U.S. Fish and Wildlife Service, Carlsbad Fish and Wildlife Office. Biogeographic Information and Observation System (BIOS). February 1994. Retrieved July 7, 2007 from *http://bios.dfg.ca.gov***.**

McKinney, T. 2005. *Arroyo toad – final critical habitat* [ds129]. U.S. Fish and Wildlife Service, Carlsbad Fish and Wildlife Office. Biogeographic Information and Observation System (BIOS). April 2005. Retrieved July 7, 2007 from *http://bios.dfg.ca.gov*.

Merrifield, M. 2005. *Global Mediterranean Assessment Workspace*. October 2005. Retrieved August 30, 2007 from *http://conserveonline.org/workspaces/global.med.assessment*.

National Marine Fisheries Service (NOAA). 2006. *2006 Report to Congress: Pacific Coastal Salmon Recovery Fund FY 2000-2005*. Seattle, WA.

National Marine Fisheries Service (NOAA), Southwest Regional Office. 2007. *2007 Federal Recovery Outline for the Distinct Population Segment of Southern California Coast Steelhead*. Long Beach, CA.

NatureServe. 2007. *NatureServe Explorer: an online encyclopedia of life [web application]*. Version 6.2. NatureServe, Arlington, Virginia. Retrieved July 3, 2007 from *http://www.natureserve.org/explorer*.

Nautilus Environmental and Kamman Hydrology and Engineering, Inc. 2005. *Comprehensive analysis of enhancements and impacts associated with discharge of treated effluent from the Ventura Water Reclamation Facility to the Santa Clara River estuary: toxicology, ecology, and hydrology*. Prepared for the City of San Buenaventura and the Ventura Water Reclamation Facility. Nautilus Environmental. San Diego, CA.

Neill, Bill, and Jason Giessow 2004. *Distribution of* Arundo donax *in coastal watersheds of Southern California*. October 2004. Retrieved on August 24, 2007 from *http://www.smslrwma.org/invasives/Arundo/ADRegionalMap.html*.

Penrod, K., C. Cabañero, P. Beier, C. Luke, W. Spencer, E. Rubin, R. Sauvajot, S. Riley, and D. Kamradt. 2006. *South Coast missing linkages project: a linkage design for the Santa Monica-Sierra Madre connection*. Produced by South Coast Wildlands, Idyllwild, CA. *www.scwildlands.org*, in cooperation with National Park Service, Santa Monica Mountains Conservancy, California State Parks, and The Nature Conservancy.

Penrod, K., R. Hunter, and M. Merrifield. 2001. *Missing linkages: restoring connectivity to the California landscape, conference proceedings*. Co-sponsored by California Wilderness Coalition, The Nature Conservancy, U.S. Geological Survey, Center for Reproduction of Endangered Species, and California State Parks.

Philip Williams & Associates, Ltd. 2004. *Ormond Beach wetland restoration feasibility plan: hydrologic and geomorphic conditions report*. (*Draft*). San Francisco, CA.

Save Our Open-Space & Agricultural Resources. 2005. *How SOAR works*. Retrieved on August 30, 2007, from *http://soarusa.org/albout.html*.

Smith, R. 2006. *Annual report for western snowy plover recovery permit TE-071216-0*. Submitted to United States Fish and Wildlife Service January 17, 2007. Ventura, CA.

Smith, R. 2005. *Annual report for western snowy plover recovery permit TE-071216-0*. Submitted to United States Fish and Wildlife Service January 31, 2007. Ventura, CA.

Smith, R. 2004. Annual report for Western Snowy Plover recovery permit TE-071216-0. Submitted to United States Fish and Wildlife Service January 31, 2007. Ventura, CA.

South Coast Wildlands in conjunction with the Upper Santa Clara Biodiversity Working Group. 2006. *Wildlands of the Santa Clara River watershed: restoring and maintaining the integrity and health of the river and its watershed.* Idyllwild, CA.

Southern California Association of Governments (SCAG). 2006. *The state of the region 2006. Measuring regional progress.* December 2006. Retrieved August 30, 2007, from *http://www.scag.ca.gov/publications/pdf/2006/SOTR06/SOTR06_FullReport_lores.pdf***.**

Southern California Wetlands Recovery Project (SCWRP). 2001. *Regional restoration strategy.* Retrieved August 20, 2007, from *http://www.scwrp.org/regional_strategy.htm***.**

State Coastal Conservancy. 2006. *The Santa Clara River Parkway: the Santa Clara River.* Retrieved July 2007 from *http://www.santaclarariverparkway.org/theriver* .

State of California Fisheries Program Branch. 2003. *Heritage and Wild Trout Program.* Retrieved on August 30, 2007 from *http://www.dfg.ca.gov/fish/Resources/WildTrout/index.asp.*

State of California Resources Agency, California Wildlife Conservation Board. 2001. *The Oak Woodlands Conservation Act of 2001 – program application and guidelines.* Sacramento, CA. *http://www.wcb.ca.gov/Applications/pdf/Application_Oak%20_Program.pdf*

Stillwater Sciences. 2005. *Santa Clara River Parkway floodplain restoration feasibility study: assessment of geomorphic processes (DRAFT REPORT).* Prepared for the California State Coastal Conservancy. August 2005. Berkeley, CA.

Stillwater Sciences. 2007. *Santa Paula Creek Watershed Planning Project: Geomorphology and Channel Stability Assessment.* Berkeley, CA and Seattle, WA.

Stillwater Sciences & URS Corporation. 2007. *Riparian vegetation mapping and preliminary classification of the lower Santa Clara River and major tributaries, Ventura County, California. Volume I.* Prepared for the California State Coastal Conservancy and the Santa Clara River Trustee Council.

Stoecker, Matt, and Elise Kelley. 2005. *Santa Clara River Steelhead Trout: Assessment and Recovery Opportunities*. Prepared for The Nature Conservancy and The Santa Clara River Trustee Council. Ventura, CA.

The Advent Group, Inc. 2004. *Chloride threshold recommendations for the protection of aquatic life in the upper Santa Clara River*. Prepared for The County Sanitation Districts of Los Angeles County. Whittier, CA:

The Nature Conservancy. 2003. *The Five-S Framework for Site Conservation: A Practitioner's Handbook for Site Conservation Planning and Measuring Conservation Success.* (Volume I, 3rd ed).

The Nature Conservancy. 2004. *Southern California marine ecoregional assessment.* San Francisco, CA:

The Nature Conservancy. 2007. *Conservation action planning: developing strategies, taking action, and measuring success at any scale. Overview of basic practices.* www.nature.org/aboutus/howwework/cbd/files/cbd.pdf.

United Water Conservation District. 2005. *Urban Water Management System for the Oxnard – Hueneme System.* Ventura County, CA.

University of California Cooperative Extension. 2006. *The Santa Clara River Watershed Times: watershed news inaugural issue*. Retrieved July 2007 from celosangeles.ucdavis.edu/newsletterfiles/Santa_Clara_River_Watershed_Times10398.pdf.

U.S. Fish and Wildlife Service. 2006. *Final critical habitat for the California red-legged frog (Rana aurora draytonii)* [ds246]. April 2006. U.S. Fish and Wildlife Service. Biogeographic Information and Observation System (BIOS). Retrieved July 7, 2007 from bios.dfg.ca.gov.

USGS Nonindigenous Aquatic Species. 2007. *Databases and Queries*. Retrieved August 2007 from nas.er.usgs.gov/.

Ventura County Planning Division. 2006. *Guide to Native and Invasive Streamside Plants: Restoring Riparian Habitats in Ventura County and Along the Santa Clara River in Los Angeles County*. Ventura, CA.

Ventura County Planning Division. May 2006. *Wetland project permitting guide. Permitting stream and wetland projects in Ventura County and along the Santa Clara River in Los Angeles County*. Ventura, CA.

Ventura County Planning Division. 2007. *Ventura County Oak Woodlands Management Plan*. Ventura, CA:

Ventura County Resource Conservation District. 2006. *Upper Santa Clara River Watershed Arundo / Tamarisk Removal Plan*. Ventura, CA. http://vcrcd.org/pages/scarp.html

Ventura County Watershed Protection District. 2005. *Integrated Watershed Protection Plan. Fiscal Year 2005, Zone 2*. Ventura, CA.

Wildlife Health Center, University of California Davis. 2005. *California Wildlife: Conservation Challenges. (California's Wildlife Action Plan)*. Prepared for the California Department of Fish and Game.

APPENDIX A: ENDANGERED, THREATENED AND RARE SPECIES OF THE LOWER SANTA CLARA WATERSHED

Species	Status	NatureServe	Location	Source
Plants				
Abram's oxytheca (*Oxytheca parishii* var. *abramsii*)	Rare	G4?T2/S2.2	Sespe Creek watershed	CNDDB
Flax-like monardella (*Monardella linoides* ssp. *oblonga*)	Rare	G5T2/S2.2	Upper Sespe Creek watershed	CNDDB
Orcutt's yellow pincushion (*Chaenactis glabriuscula* var. *orcuttiana*)	Rare	G5T3/S2.1	SCR estuary and surrounding area	CNDDB
Ojai fritillary (*Fritillaria ojaiensis*)	Rare	G1/S1.2	Sespe Creek sub basin; Uplands adjacent to river in Ventura County, Santa Paula Creek watershed	SCWRP website SCREMP (2005) CNBBD South Coast (2006)
Pale yellow layia (*Layia heterotricha*)	Rare	G2G3/S2S3.1	Sespe Creek sub basin Santa Paula Creek, Ventura hillsides, and surrounding area	SCWRP website CNDDB South Coast (2006)
Palmer's mariposa lily (*Calochortus palmeri var. palmeri*)	Rare	G2T2/S2.1	Sespe Creek subbasin	SCWRP website South Coast (2006)
Salt marsh bird's beak (*Cordylanthus maritimus* ssp. *maritimus*)	Federally endangered (1978) CA endangered (1979)	G4?T2/S2.1	SCR estuary, Ormond Beach, Coastal – just north of Point Mugu	SCREMP (2005) CNDDB South Coast (2006) Ormond Bio. Assess. (2007)
Umbrella larkspur (*Delphinium umbraculorum*)	Rare	G2G3/S2S3.3	Santa Paula Creek, Ventura hillsides and surrounding area	CNDDB
Ventura marsh milkvetch (*Astragalus pychnostachyus* var. *lanosissimus*)	Federally endangered (1999) CA endangered (2001)	G2T1/S1.1	Alkali marsh near mouth of river	SCREMP (2005) CNDDB
Invertebrates				
Sandy beach (Hairy-necked) tiger beetle (*Cicindela hirticollis gravida*)	Rare	G5T2/S1	Southern foredune, alluvial scrub, Coastal – just north of Point Mugu	SCREMP (2005) CNDDB

APPENDIX A: ENDANGERED, THREATENED AND RARE SPECIES OF THE LOWER SANTA CLARA WATERSHED (continued)

Species	Status	NatureServe	Location	Source
Fish				
Arroyo chub (*Gila Orcuttii*)	CA species of special concern	G2/S2	Active channel from mouth of river to LA county aqueduct crossing; Estuary	SCREMP (2005) Nautilus Env. (2005) CNDDB South Coast (2006)
Santa Ana sucker (*Catostomus santaanae*)	Federally threatened (2000), CA species of special concern **SCR population is not included in the federally threatened listing, as it is thought to be an introduced population**	G1/S1	Active channel from Santa Paula east to Acton; Sespe Creek sub-basin; Estuary	SCREMP (2005) SCWRP website Nautilus Env. (2005) CNDDB
Southern steelhead (*Oncorhynchus mykiss*)	Federally endangered (1997), CA species of special concern	G5T2Q/S2	Active channel from mouth of rive to Piru Creek, including Sespe and Santa Paula Creeks; Estuary	SCREMP (2005) SCWRP website Nautilus Env. (2005) South Coast (2006)
Tidewater goby (*Eucyclogobius newberryi*)	Federally endangered (1994), CA species of special concern	G3/S2S3	Critical Habitat: SCR estuary; Coastal, near Ormond Beach and Point Mugu	SCREMP (2005) Nautilus Env. (2005) South Coast (2006) CNDDB
Amphibians				
Arroyo toad (*Bufo californicus*)	Federally endangered (1994), CA species of special concern	G2G3/S2S3	Critical habitat: Sespe Creek, Piru Creek, Santa Paula Creek	BIOS SCWRP website CNDDB South Coast (2006)
California red-legged frog (*Rana aurora draytonii*)	Federally threatened (1996), CA species of special concern	G4T2T3/S2S3	Critical habitat: Piru Creek; Sespe Creek, Santa Paula Creek; SCR estuary and surrounding areas	BIOS SCWRP website CNDDB South Coast (2006)
Mountain yellow-legged frog (*Rana muscosa*)	Candidate for federal listing (2003), CA species of special concern	G2T1/SNR	Sespe Creek, Piru Creek	South Coast (2006) CNDDB

APPENDIX A: ENDANGERED, THREATENED AND RARE SPECIES OF THE LOWER SANTA CLARA WATERSHED (continued)

Species	Status	NatureServe	Location	Source
Reptiles				
Coast (San Diego) horned lizard (*Phrynosoma coronatum blainvillei*)	CA species of special concern	G4G5/SNR	Alluvial scrub, coastal sage scrub, riparian woodland and forest; Santa Paula Creek, River mouth, confluence of Sespe Creek, Piru Creek	SCREMP (2005) SCWRP website South Coast (2006) CNDDB
Coast patched-nose snake (*Salvadora hexalepis virgultea*)	CA species of special concern	G5T4/S2S3	Alluvial scrub and coastal sage scrub from Santa Paula Creek east to Acton	SCREMP (2005)
Southern rubber boa (*Charina bottae umbratica*)	CA threatened (1971)	G5T2T3/S2S3	Near Sespe Creek	South Coast (2006)
South coast garter snake (*Thamnophis sirtalis*)	CA species of special concern	G5T1T2/S1S2	Estuary	Nautilus Env. (2005)
Southwestern pond turtle (*Emys marmorata pallida*)	CA species of special concern	G3G4T2T3Q/S2	Sespe Creek, Santa Paula Creek, SCR estuary and surrounding area, Briggs Road Property, Fagan Creek, Fagan Canyon	SCREMP (2005) SCWRP website CNDDB South Coast (2006)
Two striped garter snake (*Thamnophis hammondii*)	CA species of special concern	G4S2	Riparian scrub and woodlands, freshwater marsh; Sespe Creek, Santa Paula Creek	SCREMP (2005) SCWRP website South Coast (2006)
Birds				
Bank swallow (*Riparia riparia*)	CA threatened (1989)	G5/S2S3	Vertical banks, cliffs adjacent to the river	SCREMP (2005) CNDDB South Coast (2006)
Belding's savannah sparrow (*Passerculus sandwichensis beldingi*)	CA endangered (1974)	G5T3/S3	Alkali marsh near river mouth; SCR estuary, Ormond Beach, coastal north of Point Mugu	SCREMP (2005) South Coast (2006)
Belted kingfisher (*Ceryle alcyon*)	CA species of special concern	G5/S5	L & G Reference sites I and II as well as Affected sites 3 and 4*	Labinger & Greaves (2001)
Burrowing owl (*Athene cunicularia*)	CA species of special concern	G4S2	SCR estuary and surrounding areas	CNDDB
California condor (*Gymnogyps californianus*)	Federally endangered (1967) CA endangered (1971)	G1S1	Critical Habitat: Upper portions of Sespe, Piru, and Santa Paula subbasins	CNDDB SCWRP website South Coast (2206)
California least tern (*Sternula antillarum* ssp. *browni*)	Federally endangered (1970) CA endangered (1971)	G4T2T3Q/S2S3	SCR mouth to McGrath Lake; Ormond Beach, near Point Mugu; near United Water recharge ponds	Nautilus Env. (2005) SCREMP (2005) Labinger & Greaves (2001) CNDDB
California spotted owl (*Strix occidentalis occcidentalis*)	CA species of special concern	G3T3/S3	Upper Sespe and Piru Creeks	South Coast (2006)
Coastal California gnatcatcher (*Polioptila californica californica*)	Federally Threatened (1993) CA Species of special concern	G3T2/S2	Proposed Critical Habitat: Santa Susana Mountains; Ventura hillsides	CNDDB, South Coast (2006)

APPENDIX A: ENDANGERED, THREATENED AND RARE SPECIES OF THE LOWER SANTA CLARA WATERSHED (continued)

Species	Status	NatureServe	Location	Source
Cooper's hawk (*Accipiter cooperii*)	CA species of special concern	G5/S3	SCR estuary; riparian scrub, woodlands, and forests; found throughout L & G study site*, Mainstem on SCR near Ventura-LA county boundary	Nautilus Env. (2005) SCREMP (2005) Labinger & Greaves (2001) South Coast (2006) CNDDB
Elegant tern (*Sterna [Thalasseus] elegans*)	CA species of special concern	G2/S1	SCR estuary; beach, southern foredune, alkali marsh, active channel near the river mouth	Nautilus Env. (2005) SCREMP (2005)
Great blue heron (*Ardea erodias*)	CA species of special concern	G5/S4	Most common in lower SCR near coastline, United Water recharge ponds, Sespe Creek confluence	Labinger & Greaves (2001)
Great egret (*Casmerodius [Ardea] albus*)	CA species of special concern	G5/S4	East Fillmore to the river mouth	Labinger & Greaves (2001)
Least Bell's vireo (*Vireo bellii pusillus*)	Federally endangered (1986) CA endangered (1980)	G5T2/S2	Critical habitat: on the mainstem of the SCR near the county line; mule fat scrub, riparian scrub, willow riparian woodlands from near river mouth to Bouquet Canyon Road; Sespe Creek confluence, Santa Paula Creek	BIOS SCREMP (2005) SCWRP website Labinger & Greaves (2001) CNDDB South Coast (2006)
Loggerhead shrike (*Lanius ludovicianus*)	CA species of special concern	G4/S4	Riparian Scrub, woodlands, and forests; L & G Reference site I*, across the river from Ellsworth Barranca	SCREMP (2005) Labinger & Greaves (2001)
Long-billed curlew (*Numenius americanus*)	CA species of special concern	G5/S2	SCR estuary; active channel near river mouth	Nautilus Env. (2005) SCREMP (2005)
Northern harrier (*Circus cyaneus*)	CA species of special concern	G5/S3	SCR estuary; riparian scrub, woodlands, and forests up to the mouth of Soledad Canyon	Nautilus Env. (2005) SCREMP (2005)
Peregrine falcon (*Falco peregrinus*)	Federally delisted (1999) CA endangered (1971)	G4/S2B	L & G Reference site I* near Saticoy, known to occur regularly on Ventura/Oxnard coastline	Labinger & Greaves (2001)
Sharp-shinned hawk (*Accipiter striatus*)	CA species of special concern	G5/S3	SCR estuary; Riparian Scrub, woodlands, and forests	Nautilus Env. (2005) SCREMP (2005)
Southwestern willow flycatcher (*Empidonax traillii extimus*)	Federally endangered (1995) CA endangered (1991)	G5T1T2/S1	Willow riparian woodland, cottonwood/willow riparian forest; Sespe Creek confluence, Santa Paula Creek	SCREMP (2005) SCWRP website Labinger & Greaves (2001)
Tricolored blackbird (*Agelaius tricolor*)	CA species of special concern	G2G3/S2	Fillmore Fish Hatchery	Labinger & Greaves (2001)
Western least bittern (*Ixobrychus exilis hesperes*)	CA species of special concern	G5T3T4/S1	Alkali marsh, freshwater marsh	SCREMP (2005)

APPENDIX A: ENDANGERED, THREATENED AND RARE SPECIES OF THE LOWER SANTA CLARA WATERSHED (continued)

Species	Status	NatureServe	Location	Source
Western snowy plover (*Charadrius alexandrinus nivosus*)	Federally threatened (1993) CA species of special concern	G4T3/S2	Critical habitat: SCR estuary; Ormond beach; McGrath State Beach, near Point Mugu	BIOS Nautilus Env. (2005) SCREMP (2005) South Coast (2006)
Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)	Candidate for federal listing (2006), CA endangered (1998)	G5T3Q/S1	Willow riparian woodland, cottonwood/willow riparian forest, SCR estuary and surrounding areas	SCREMP (2005) Labinger & Greaves (2001) CNDDB South Coast (2006)
White-faced ibis (*Plegadis chihi*)	CA species of special concern	G5/S1	SCR estuary; Alkali marsh, active channel near the river mouth; commonly seen near Fillmore Fish Hatchery	Nautilus Env. (2005) SCREMP (2005) Labinger & Greaves (2001)
White-tailed kite (*Elanus leucurus*)	CA fully protected	G5/S3	Riparian scrub, woodlands, and forests; Found throughout L & G study site*	SCREMP (2005) Labinger & Greaves (2001) CNDDB South Coast (2006)
Yellow-breasted chat (*Icteria virens*)	CA species of special concern	G5/S3	Estuary; riparian scrub, woodlands, and forests; Throughout L & G study area* (patchy distribution)	Nautilus Env. (2005) SCREMP (2005) Labinger & Greaves (2001) CNDDB
Yellow warbler (*Dendroica petechia brewsteri*)	CA species of special concern	G5T3?/S2	Riparian scrub, woodlands, and forests; SCR estuary; Throughout L & G study area*	SCREMP (2005) Nautilus Env. (2005) Labinger & Greaves (2001) CNDDB
Mammals				
American badger (*Taxidea taxus*)	CA species of special concern	G5/S4	Between Sespe and Piru Creeks near Dominguez Canyon	South Coast (2006) CNDDB
Mountain lion (*Puma* [*Felis*] *concolor*)	CA species of special concern	G5/S5	River wide, except areas of urban development	SCREMP (2005)
Pallid bat (*Antrozous pallidus*)	CA species of special concern	G5/S3	Along the SCR, near the Santa Paula and Sespe Creek drainages	CNDDB
Townsend's big-eared bat (*Corynorhnus townsendii townsendii*)	CA species of special concern	G4T3T4/S2S3	May forage in riparian woodlands and scrub land along entire river	SCREMP (2005)
Western mastiff (western bonneted) bat (*Eumops perotis*)	CA species of special concern	G5/S3?	May forage in riparian woodlands and scrub land along entire river	SCREMP (2005) CNDDB

For the purposes of this report, a species who's status is listed as "**Rare**" is defined as a species that is not listed as endangered, threatened, or a CA species of special concern, yet still holds a state conservation status ranking of 2 or less.

***Locations described within Labinger and Greaves (2001)**

- Study site: Portions of the main SCR river channel from Valencia, Los Angeles County downstream to Ventura, Ventura County
- Reference site I: West of Santa Paula downstream to Highway 118
- Reference site II: East of Santa Paula from Balcom Canyon downstream to the 12th street bridge
- Affected site 3: From Chiquito Canyon downstream approximately 3 miles
- Affected site 4: From ½ downstream from the Las Brisas Bridge upstream approximately 2 miles

Interpreting NatureServe Conservation Status Ranks:

The conservation status of a species or community is designated by a number from 1 to 5, preceded by a letter reflecting the appropriate geographic scale of the assessment (G = Global, N = National, S = Subnational, T = subspecies or variety).

The numbers have the following meaning:

1 = critically imperiled
2 = imperiled
3 = vulnerable to extirpation or extinction
4 = apparently secure
5 = demonstrably widespread, abundant, and secure
.1 - .3 = A greater level of detail for better prioritization; meaning of number is the same as above
? = inexact numeric rank
NR = rank not yet assessed (for example, "SNR" means that a subnational rank has not yet been assigned)

Qualifiers:

B = conservation status refers to the breeding population within that geographic scale
Q = questionable taxonomy (taxonomic distinctiveness of this entity at the current level is questionable)

APPENDIX B: ENDANGERED, THREATENED AND RARE SPECIES OF MCGRATH, ORMOND, AND MUGU

Species	Status	NatureServe	Location	Sources
Plants				
California sea-blite (*Suaeda californica*)	Federally endangered (1994)	G1/S1.1	Ormond Beach	Ormond Bio. Assess. (2007)
Coulter's goldfields (*Lasthenia glabrata* ssp. *coulteri*)	Rare	G4?T3/S2.1	Coastal, just north of Point Mugu, Ormond Beach	CNDDB Ormond Bio. Assess. (2007)
Salt marsh bird's beak (*Cordylanthus maritimus* ssp. *maritimus*)	Federally endangered (1978) CA endangered (1979)	G4?T2/S2.1	SCR estuary, Ormond Beach, Coastal – just north of Point Mugu	SCREMP (2005) CNDDB South Coast (2006) Ormond Bio. Assess. (2007)
Ventura marsh milkvetch (*Astragalus pychnostachyus* var. *lanosissimus*)	Federally endangered (1999) CA endangered (2001)	G2T1/S1.1	Alkali marsh near mouth of river	SCREMP (2005) CNDDB
Woolly sea-blite (*Suaeda taxifolia*)	Rare	G3?S2S3	Ormond Beach	Ormond Bio. Assess. (2007)
Invertebrates				
California brackish water snail (*Tryonia imitator*)	Rare	G2G3/S2S3	Coastal, just north of Point Mugu	CNDDB
Globose dune beetle (*Coelus globosus*)	CA species of special concern	G1/S1	SCR estuary and surrounding areas	CNDDB
Tiger beetle (*Cicindela senilis frosti*)	Rare	G4T1/S1	Coastal, just north of Point Mugu; Ormond Beach	CNDDB Ormond Bio. Assess. (2007)
Wandering (Saltmarsh) skipper (*Panoquina errans*)	Rare	G4G5/S1	Coastal just north of Point Mugu	CNDDB
Fish				
Tidewater goby (*Eucyclogobius newberryi*)	Federally endangered (1994), CA species of special concern	G3/S2S3	Critical Habitat: SCR estuary; Coastal, near Ormond Beach and Point Mugu	SCREMP (2005) Nautilus Env. (2005) South Coast (2006) CNDDB Ormond Bio. Assess. (2007)
Reptiles				
South coast garter snake (*Thamnophis sirtalis*)	CA species of special concern	G5T1T2/S1S2	Estuary; Ormond Beach	Nautilus Env. (2005) Ormond Bio. Assess. (2007)

APPENDIX B: ENDANGERED, THREATENED AND RARE SPECIES OF MCGRATH, ORMOND, AND MUGU (continued)

Species	Status	NatureServe	Location	Sources
Birds				
Belding's savannah sparrow (*Passerculus sandwichensis beldingi*)	CA endangered (1974)	G5T3/S3	Alkali marsh near river mouth; SCR estuary, Ormond Beach, coastal north of Point Mugu	SCREMP (2005) South Coast (2006) Ormond Bio. Assess. (2007)
Burrowing owl (*Athene cunicularia*)	CA species of special concern	G4S2	SCR estuary and surrounding areas; Ormond Beach	CNDDB Ormond Bio. Assess. (2007)
California brown pelican (*Pelecanus occidentalis californicus*)	Federally endangered (1970) CA endangered (1971)	G4T3/S1S2	Coastal, just north of Point Mugu, Ormond Beach	CNDDB Ormond Bio. Assess (2007)
California horned lark (*Eremophila alpestris actia*)	CA species of special concern	G5T3Q/S3	Ormond Beach	Ormond Bio. Assess. (2007)
California least tern (*Sternula antillarum* ssp. *browni*)	Federally endangered (1970) CA endangered (1971)	G4T2T3Q/S2S3	SCR mouth to McGrath Lake; Ormond Beach, near Point Mugu; near United Water recharge ponds	Nautilus Env. (2005) SCREMP (2005) Labinger & Greaves (2001) CNDDB Ormond Bio. Assess (2007)
Cooper's hawk (*Accipiter cooperii*)	CA species of special concern	G5/S3	SCR estuary; riparian scrub, woodlands, and forests; found throughout L & G study site*, Mainstem on SCR near Ventura-LA county boundary	Nautilus Env. (2005) SCREMP (2005) Labinger & Greaves (2001) South Coast (2006) CNDDB
Double-crested cormorant (*Phalacrocorax auritus*)	CA species of special concern	G5/S3	Ormond Beach	Ormond Bio. Assess. (2007)
Ferruginous hawk (*Buteo regalis*)	CA species of special concern	G4/S3S4	Coastal, just north of Point Mugu	CNDDB
Great blue heron (*Ardea herodias*)	CA species of special concern	G5/S4	Most common in lower SCR near coastline, United Water recharge ponds, Sespe Creek confluence; Ormond Beach	Labinger & Greaves (2001) Ormond Bio. Assess. (2007)
Great egret (*Casmerodius [Ardea] albus*)	CA species of special concern	G5/S4	East Fillmore to the river mouth; Ormond Beach	Labinger & Greaves (2001) Ormond Bio. Assess. (2007)
Least Bell's vireo (*Vireo bellii pusillus*)	Federally endangered (1986) CA endangered (1980)	G5T2/S2	Critical habitat: on the mainstem of the SCR near the county line; mule fat scrub, riparian scrub, willow riparian woodlands from near river mouth to Bouquet Canyon Road; Sespe Creek confluence, Santa Paula Creek; Point Mugu	BIOS SCREMP (2005) SCWRP website Labinger & Greaves (2001) CNDDB South Coast (2006) Ormond Bio. Assess. (2007)
Light footed clapper rail (*Rallus longirostris levipes*)	Federally endangered, (1970) CA endangered (1971)	G5T1T2/S1	Coastal habitat near Laguna Point	CNDDB

APPENDIX B: ENDANGERED, THREATENED AND RARE SPECIES OF MCGRATH, ORMOND, AND MUGU (continued)

Species	Status	NatureServe	Location	Sources
Loggerhead shrike (*Lanius ludovicianus*)	CA species of special concern	G4/S4	Riparian Scrub, woodlands, and forests; L & G Reference site I*, across the river from Ellsworth Barranca; Ormond Beach	SCREMP (2005) Labinger & Greaves (2001) Ormond Bio. Assess. (2007)
Long-billed curlew (*Numenius americanus*)	CA species of special concern	G5/S2	SCR estuary; active channel near river mouth; Ormond Beach	Nautilus Env. (2005) SCREMP (2005) Ormond Bio Assess. (2007)
Merlin (*Falco columbarius*)	CA species of special concern	G5/S3	Ormond Beach	Ormond Bio. Assess. (2007)
Mountain plover (*Charadrius montanus*)	CA species of special concern	G2/S2?	Ormond Beach	Ormond Bio. Assess. (2007)
Northern harrier (*Circus cyaneus*)	CA species of special concern	G5/S3	SCR estuary; riparian scrub, woodlands, and forests up to the mouth of Soledad Canyon; Ormond Beach	Nautilus Env. (2005) SCREMP (2005) Ormond Bio. Assess. (2007)
Peregrine falcon (*Falco peregrinus*)	Federally delisted (1999) CA endangered (1971)	G4/S2B	L & G Reference site I* near Saticoy, known to occur regularly on Ventura/Oxnard coastline, Ormond beach	Labinger & Greaves (2001) Ormond Bio. Assess. (2007)
Sharp-shinned hawk (*Accipiter striatus*)	CA species of special concern	G5/S3	SCR estuary; Riparian Scrub, woodlands, and forests; Ormond Beach	Nautilus Env. (2005) SCREMP (2005) Ormond Bio. Assess. (2007)
Tricolored blackbird (*Agelaius tricolor*)	CA species of special concern	G2G3/S2	Fillmore Fish Hatchery; Ormond Beach	Labinger & Greaves (2001) Ormond Bio. Assess. (2007)
Western snowy plover (*Charadrius alexandrinus nivosus*)	Federally threatened (1993) CA species of special concern	G4T3/S2	Critical habitat: SCR estuary; Ormond beach; McGrath State Beach, near Point Mugu	BIOS Nautilus Env. (2005) SCREMP (2005) South Coast (2006) Ormond Bio. Assess. (2007)
White-faced ibis (*Plegadis chihi*)	CA species of special concern	G5/S1	SCR estuary; Alkali marsh, active channel near the river mouth; commonly seen near Fillmore Fish Hatchery; Ormond Beach	Nautilus Env. (2005) SCREMP (2005) Labinger & Greaves (2001) Ormond Bio. Assess. (2007)
White-faced ibis (*Plegadis chihi*)	CA species of special concern	G5/S1	SCR estuary; Alkali marsh, active channel near the river mouth; commonly seen near Fillmore Fish Hatchery; Ormond Beach	Nautilus Env. (2005) SCREMP (2005) Labinger & Greaves (2001) Ormond Bio. Assess. (2007)

APPENDIX B: ENDANGERED, THREATENED AND RARE SPECIES OF MCGRATH, ORMOND, AND MUGU (continued)

Species	Status	NatureServe	Location	Sources
Mammals				
Meadow (Stephens') vole (*Microtus californicus stephensi*)	CA species of special concern	G5T1T2/S1S2	Coastal, just north of Point Mugu	CNDDB
San Diego black-tailed jackrabbit (*Lepus californicus bennettii*)	CA species of special concern	G5T3?/S3?	Ormond Beach	Ormond Bio. Assess. (2007)
Southern California saltmarsh shrew (*Sorex ornatus salicornicus*)	CA species of special concern	G5T1?/S1	Coastal, just north of Point Mugu, Ormond Beach	CNDDB Ormond Bio. Assess. (2007)

For the purposes of this report, a species who's status is listed as "**Rare**" is defined as a species that is not listed as endangered, threatened, or a CA species of special concern, yet still holds a state conservation status ranking of 2 or less.

***Locations described within Labinger and Greaves (2001)**

- Study site: Portions of the main SCR river channel from Valencia, Los Angeles County downstream to Ventura, Ventura County
- Reference site I: West of Santa Paula downstream to Highway 118
- Reference site II: East of Santa Paula from Balcom Canyon downstream to the 12th street bridge
- Affected site 3: From Chiquito Canyon downstream approximately 3 miles
- Affected site 4: From ½ downstream from the Las Brisas Bridge upstream approximately 2 miles

Interpreting NatureServe Conservation Status Ranks:

The conservation status of a species or community is designated by a number from 1 to 5, preceded by a letter reflecting the appropriate geographic scale of the assessment (G = Global, N = National, S = Subnational, T = subspecies or variety).

The numbers have the following meaning:

1 = critically imperiled
2 = imperiled
3 = vulnerable to extirpation or extinction
4 = apparently secure
5 = demonstrably widespread, abundant, and secure
.1 - .3 = A greater level of detail for better prioritization; meaning of number is the same as above
? = inexact numeric rank
NR = rank not yet assessed (for example, "SNR" means that a subnational rank has not yet been assigned)

Qualifiers:

B = conservation status refers to the breeding population within that geographic scale
Q = questionable taxonomy (taxonomic distinctiveness of this entity at the current level is questionable)

APPENDIX C: CLEAN WATER ACT SECTION 303(d) LIST OF IMPAIRED WATERBODIES ON THE SANTA CLARA RIVER

Location	Pollutant	Source	TMDL Completion Date
Hopper Creek	Sulfates	Nonpoint/Point	2019
Hopper Creek	Total Dissolved Solids	Nonpoint/Point	2019
McGrath Beach	Coliform Bacteria	Point	2003
McGrath Lake	Fecal Coliform	Nonpoint/Point	2019
McGrath Lake	Chlordane	Nonpoint	2019
McGrath Lake	DDT	Nonpoint	2019
McGrath Lake	Dieldrin	Nonpoint	2019
McGrath Lake	PCB's in sediment	Nonpoint	2019
McGrath Lake	Sediment Toxicity	Nonpoint	2019
Ormond Beach (J Street, Oxnard Drain, Arnold Road)	Indicator Bacteria	Nonpoint	2008
Pole Creek (Tributary to SCR Reach 3)	Sulfates	Nonpoint	2019
Pole Creek (Tributary to SCR Reach 3)	Total Dissolved Solids	Nonpoint	2019
Santa Clara River Estuary	ChemA	Unknown	2019
Santa Clara River Estuary	Coliform Bacteria	Nonpoint	2019
Santa Clara River Estuary	Toxaphene	Nonpoint	2019
SCR Reach 1 (Estuary to Highway 101 bridge)	Toxicity	Unknown	2019
SCR Reach 3 (Freeman Diversion to A Street)	Chloride	Nonpoint/Point	2003
SCR Reach 3 (Freeman Diversion to A Street)	Ammonia	Nonpoint/Point	2004
SCR Reach 3 (Freeman Diversion to A Street)	Total Dissolved Solids	Nonpoint/Point	2019
Sespe Creek (From 500 feet below the confluence with Little Sespe Creek to the headwaters)	Chloride	Nonpoint	2019
Sespe Creek (From 500 feet below the confluence with Little Sespe Creek to the headwaters)	pH	Nonpoint	2019
Wheeler Canyon/Todd Barranca	Nitrate and Nitrite	Nonpoint	2004
Wheeler Canyon/Todd Barranca	Sulfates	Nonpoint	2019
Wheeler Canyon/Todd Barranca	Total Dissolved Solids	Nonpoint	2019

APPENDIX D: INVASIVE ANIMALS THREATENING NATIVE SANTA CLARA RIVER RIPARIAN SPECIES

Invasive Animal	Native species threatened by the invasive	Location in SCR	Source
Invertebrates			
New Zealand mudsnail (*Potamopyrgus antipodarum*)	Southern steelhead (through the food chain), physical characteristics of streams they invade	Piru creek near Pyramid dam, Ormond Beach, Malibu Creek	USGS, Ormond Beach Biological Assessment
Fish			
Black bullhead (*Ameiurus melas*)	Southern steelhead	Sespe	Stoecker and Kelley (2005), USGS
Bluegill (*Lepomis macrochirus*)	Tidewater goby, native ranid frogs	Upstream from the estuary	Nautilus Environmental (2004), USGS
Carp (several species)	Tidewater goby (indirectly)	Upstream from the estuary	Nautilus Environmental (2004)
Catfish: Blue catfish (*Ictalarus furcatus*), Channel catfish (*Ictalarus punctatus*)	Tidewater goby	Upstream from the estuary; Lake Piru	Missing Links: Sierra Madre—Santa Monica, Nautilus Environmental (2004), USGS
Green sunfish (*Lepomis cyanellus*)	Tidewater goby, Southern steelhead, native ranid frogs (California red-legged frog)	Estuary; Upper portions of SCR river system; Sespe	Missing Links: Sierra Madre—Santa Monica, Nautilus Environmental (2004), USGS, Stoecker and Kelley (2005)
Large-mouth bass (*Micropterus salmoides*)	Southwestern pond turtle, Tidewater goby, Southern steelhead	Upstream from the estuary	Santa Clara River Parkway, Nautilus Environmental (2004)
Owen's sucker (*Catostomus fumeiventris*)	Santa Ana sucker (possible hybridization)	SCR drainage	USGS
Speckled dace (*Rhinichthys osculus*)	Arroyo chub (through hybridization)	SCR drainage	USGS
Amphibians			
African clawed frog (*Xenopus laevis*)	California red-legged frog, Tidewater Goby, Arroyo chub, Threespine stickleback, other native fish, insects, toads and frogs	Estuary, mouth, and upstream; Vern Freeman Diversion, Hedrick Ranch Nature Area, Briggs Road Property, Fagan Canyon Ponds	SCWRP, Nautilus Environmental (2004), USGS
North-American bullfrog (*Rana catesbeiana*)	Southwestern pond turtle, California red-legged frog, Southern steelhead	Santa Paula Creek, Hedrick Ranch Nature Area	Santa Clara River Parkway, SCWRP
Birds			
Brown-headed cowbird (*Molothrus ater*)	Lest Bell's vireo, Southwestern willow flycatcher	Mouth of Santa Paula Creek	SCWRP
Mammals			
Domestic cat (*Felis silvestris catus*)	California Least Tern, Western Snowy Plover, other focal bird species, reptiles, rodents, and amphibians	Urban/residential interfaces throughout the watershed	CDFG, American Bird Conservancy

Sources: American Bird Conservancy: ***http://www.abcbirds.org/cats/states/index.htm***
CDFG (cats): ***http://www.dfg.ca.gov/hcpb/species/nuis_exo/dom_cat/cats_wildlife.shtml***
CDFG (mud snails): ***http://www.dfg.ca.gov/fishing/html/Administration/MudSnail/Mudsnail_0.htm***
Santa Clara River Parkway: ***http://www.santaclarariverparkway.org/theriver/species/wpt***
Santa Clara Watershed Times: ***http://celosangeles.ucdavis.edu/newsletterfiles/Santa_Clara_River_Watershed_Times10398.pdf***
Southern California Wetlands Recovery Project (SCWRP): ***http://www.wrpinfo.scc.ca.gov/***
USGS Nonindigenous Aquatic Species webpage: ***http://nas.er.usgs.gov/***



The Nature Conservancy's mission is to

Preserve the plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive.