PART 2 – BACKGROUND (THROUGH 2014)

2.1 Location and Relationship to Surrounding Areas

2.1.1 Goleta Slough

Goleta Slough is located in southern Santa Barbara County between the Santa Ynez Mountains and the Pacific Ocean. The Slough is the northernmost example of a large Southern California estuary and represents the northern limit of distribution for several plant and animal species (Zedler, 1982). It includes the Goleta Slough Ecological Reserve and the Goleta Slough State Marine Conservation Area, both of which are managed by the California Department of Fish and Wildlife (CDFW). The general location of the Slough is shown in Figure 2-1, General Location of the GSEMP Area.

In addition to its biological importance, Goleta Slough provides many other functions and values including floodwater storage capacity, filtering of pollutants contained in stormwater runoff, open space, and educational and scientific opportunities. The area is also rich in cultural and historic resources. The Slough is designated an Environmentally Sensitive Habitat Area (ESHA) in planning documents, as are most of the creeks that drain into it.

The Slough's watershed is about 45 square miles and includes the drainages of seven creeks: Atascadero, Carneros, Las Vegas, Maria Ygnacia, San Jose, San Pedro and Tecolotito Creeks (See Figure 2-14, Watersheds). Goleta Slough was historically an embayment of approximately 18 square miles in size. The name "Goleta" means schooner in Spanish, reflecting the history of the area when Goleta Slough was a bay with boats sailing inland close to what is now Hollister Avenue.

2.1.2 Goleta Slough Ecosystem

The 2,250-acre Goleta Slough Ecosystem area was identified by the Goleta Slough Management Committee (GSMC) in the mid-1990s. The primary determinant of what to include in the Ecosystem was if an area was historically within the tidally influenced basin of the Slough. Contiguous freshwater wetland habitats and upland habitats were also included. The Ecosystem includes the Slough and portions of the seven creeks that drain into it. Much of the area lies within the Coastal Zone.

Some of the GSEMP area is developed with urban uses including the Santa Barbara Airport, Goleta Sanitary District plant, Goleta West Sanitary District plant, multi-family housing and commercial and industrial uses. Major features and subareas of the Ecosystem are shown in Figures 2-2W and 2-2E. The western figure includes the subareas or basins in the Slough itself. These terms were first used in the CDFW 1988 *Draft Goleta Slough Ecological Reserve Management Plan* are still used today and throughout this report.

Figure 2-3 shows the existing boundary of the Goleta Slough Ecosystem Management Plan area.

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Figure 2-1 General Location of GSEMP Area

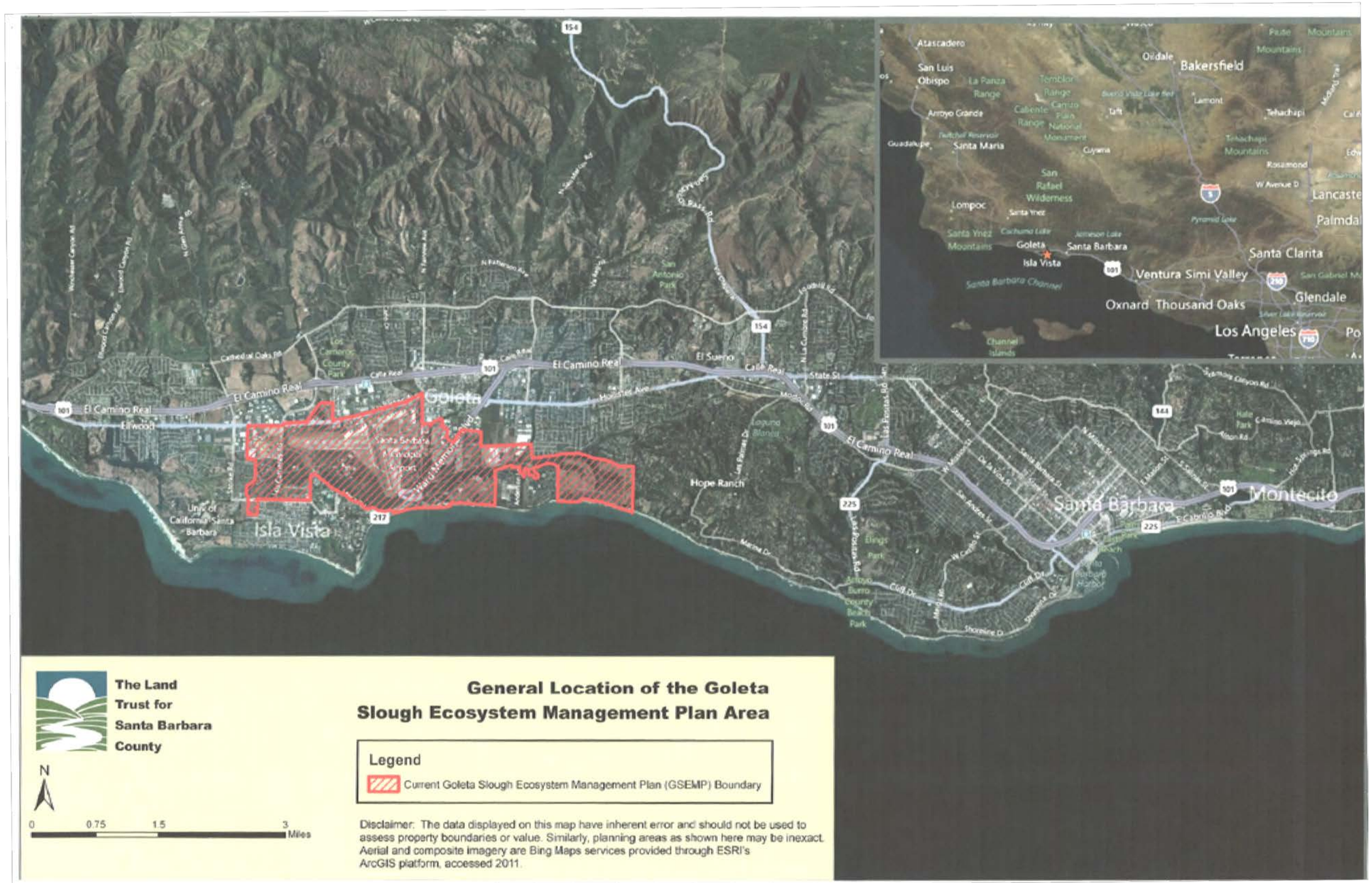

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Figure 2-2W Major Features and Subareas, West

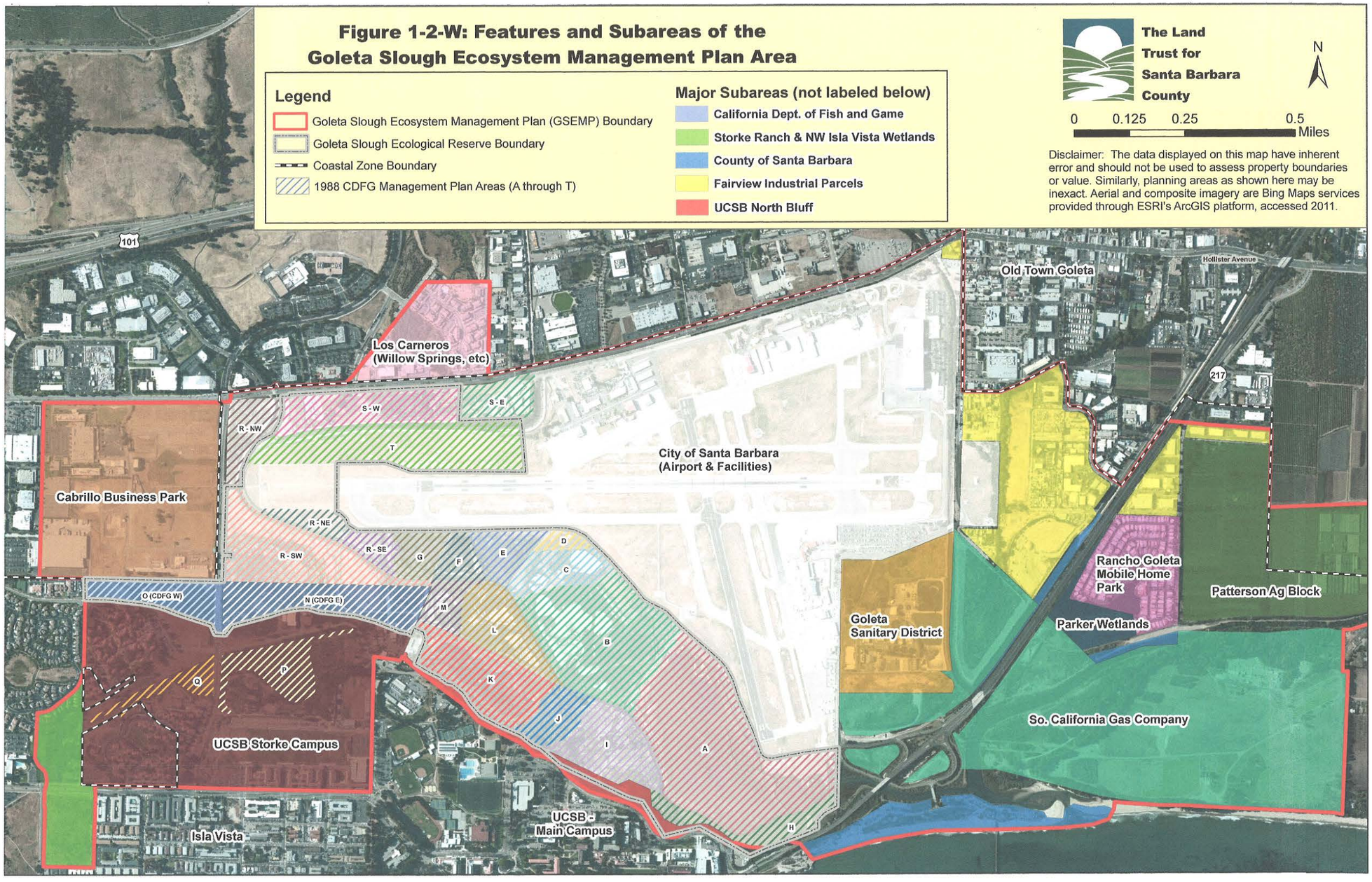

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Figure 2-2E Major Features and Subareas, East

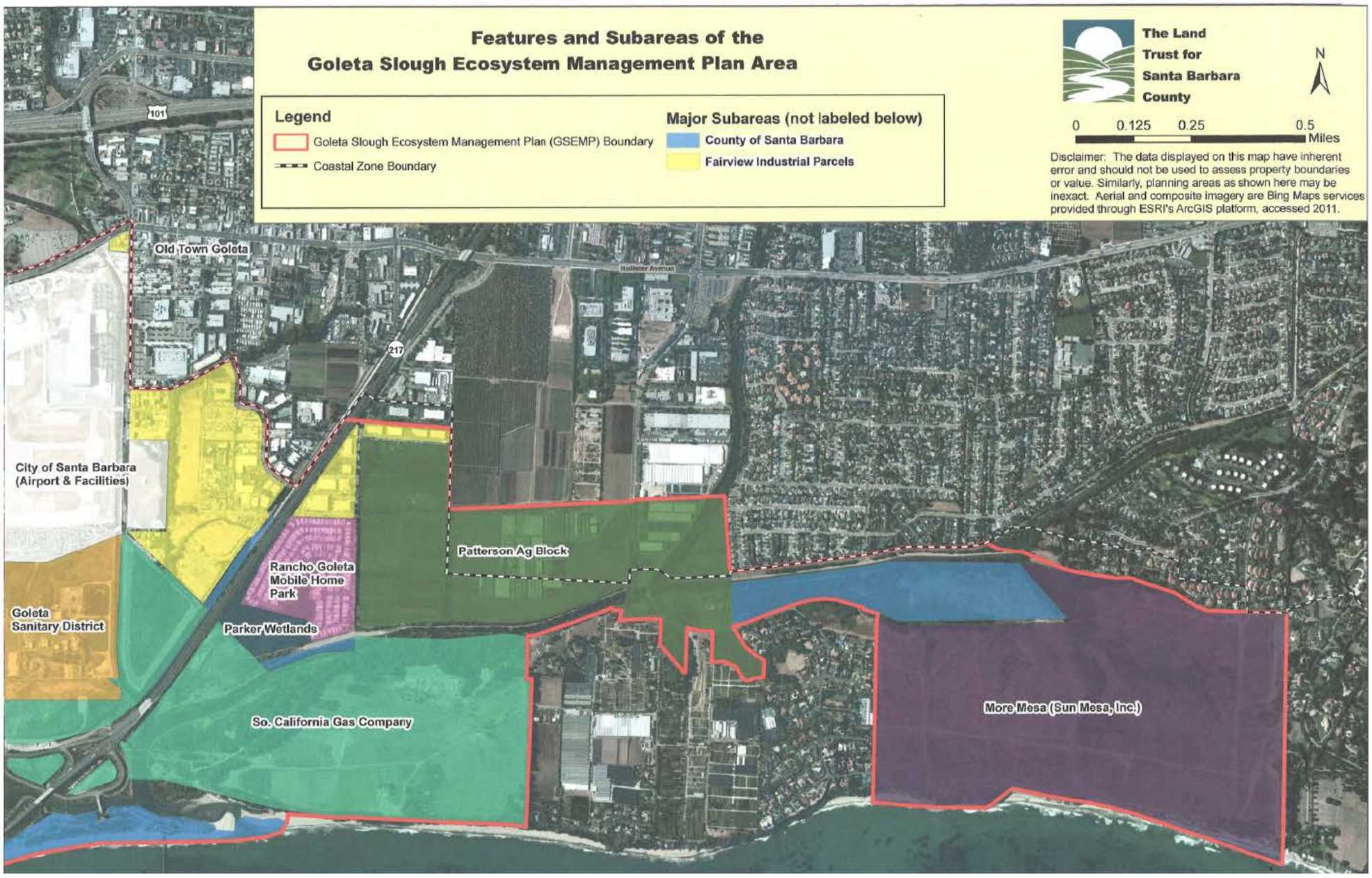

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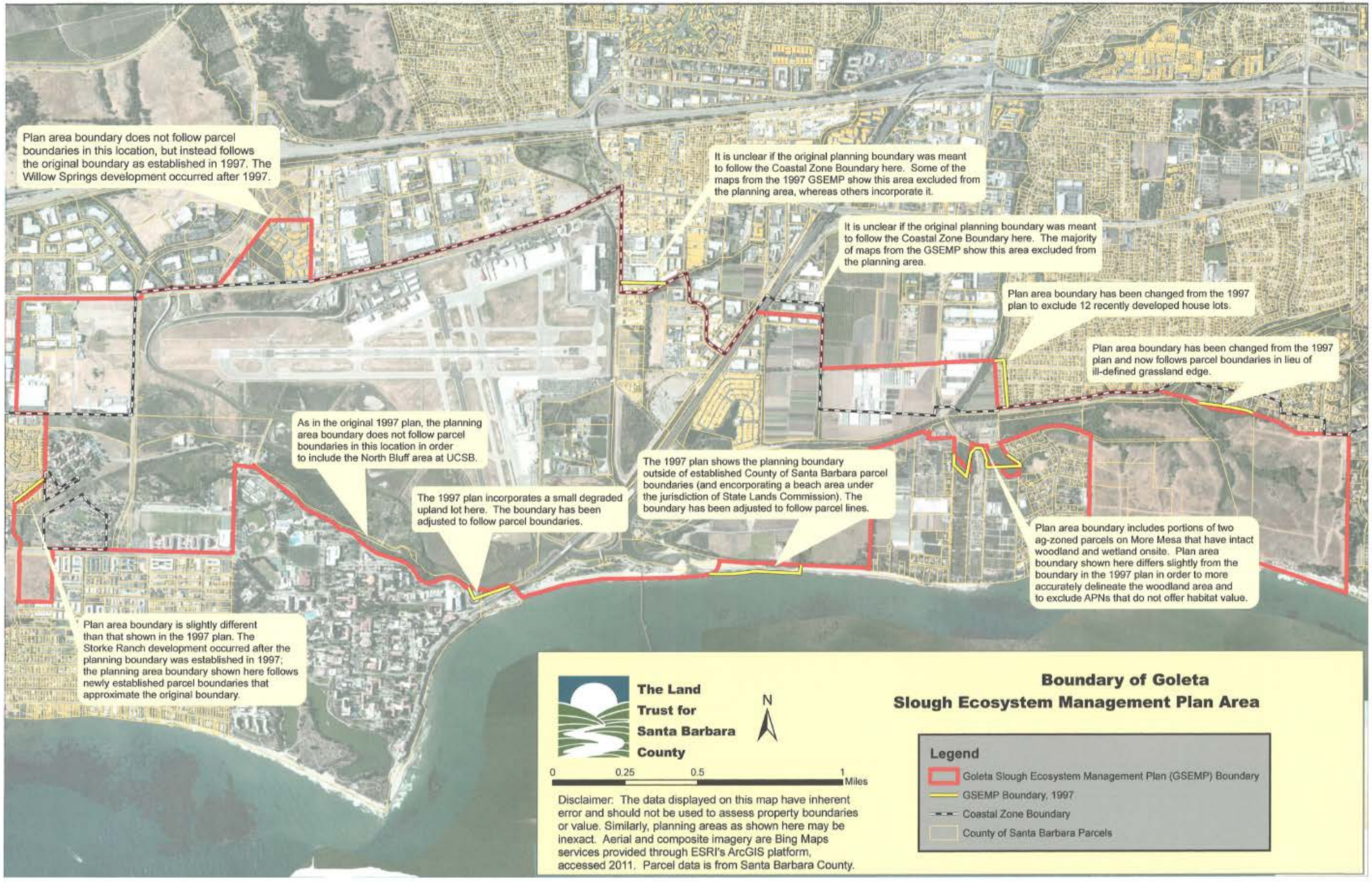
Figure 2-3 Original GSEMP Area Boundary - 1997



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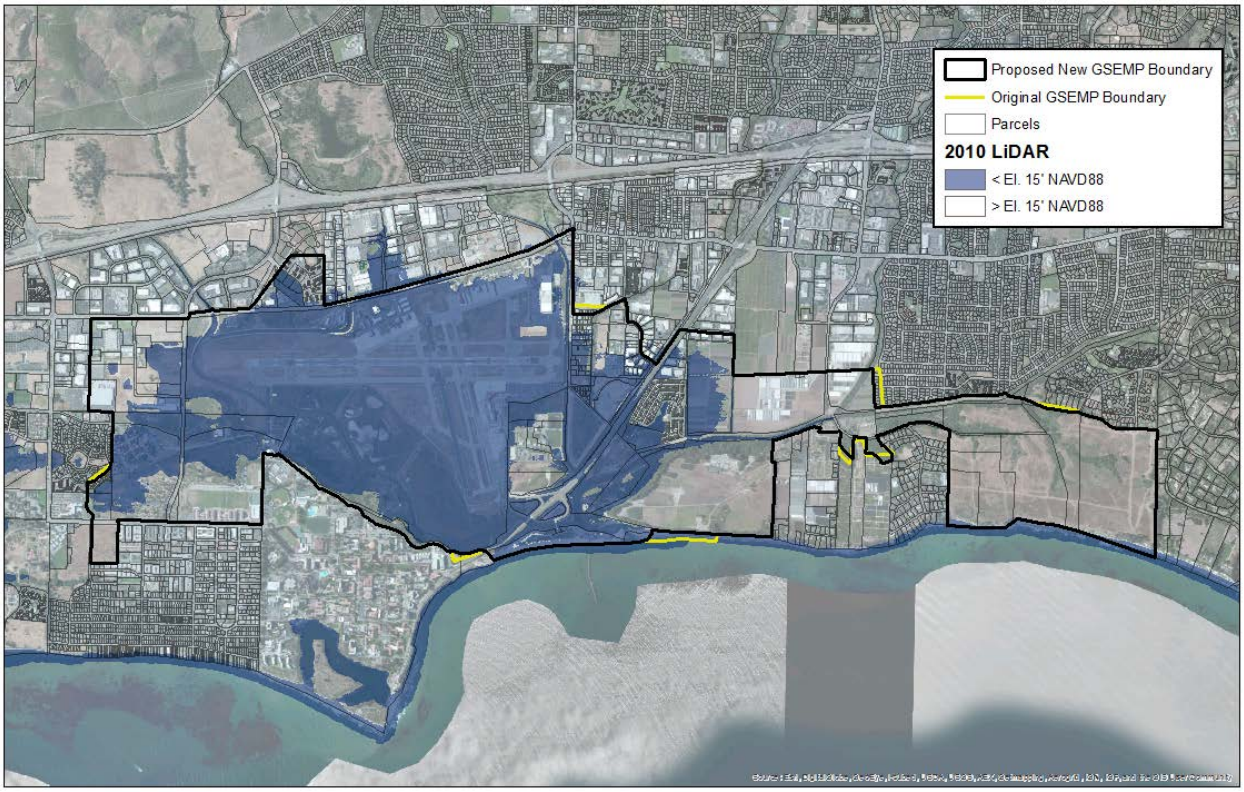
Mapping techniques have improved significantly since the boundary was initially drawn in the early 1990s, revealing several areas where discrepancies exist between the intended boundary and what it now on the ground. Figure 2-4 shows the GSEMP boundary in detail, including areas where there are incongruities, e.g., where the boundary does not follow parcel lines or the Coastal Zone, and where housing tracts and other uses were not intended to be included. The boundary line was revised as part of the 2012 *Existing Conditions and Monitoring Report* and was refined as part of the sea level rise study included in this plan.

Figure 2-4 Revised 2015 GSEMP Area Boundary



2.2 Jurisdictional Boundaries and Ownership

Several jurisdictions are represented within the Ecosystem including two cities (Goleta and Santa Barbara), Santa Barbara County and University of California at Santa Barbara land governed by the U.C. Regents. These jurisdictions are shown in Figure 2-5, Jurisdictional Boundaries of the GSEMP Area.

The relevant policies and other planning considerations relating to these jurisdictions are discussed in Section 2.3, Planning Framework. Local, state and federal agencies that regulate development and restoration projects within the Plan area are also discussed in Section 2.3.

Figures 2-6E and 2-6W, Land Use Designations and Parcels of the GSEMP Area, shows land use designations for parcels within the GSEMP area. Ownership, property address, acreage and land use on each parcel within the GSEMP area is provided in Appendix A, Parcels in the Goleta Slough Ecosystem – 2011.

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Figure 2-5 Jurisdictional Boundaries of the GSEMP Area

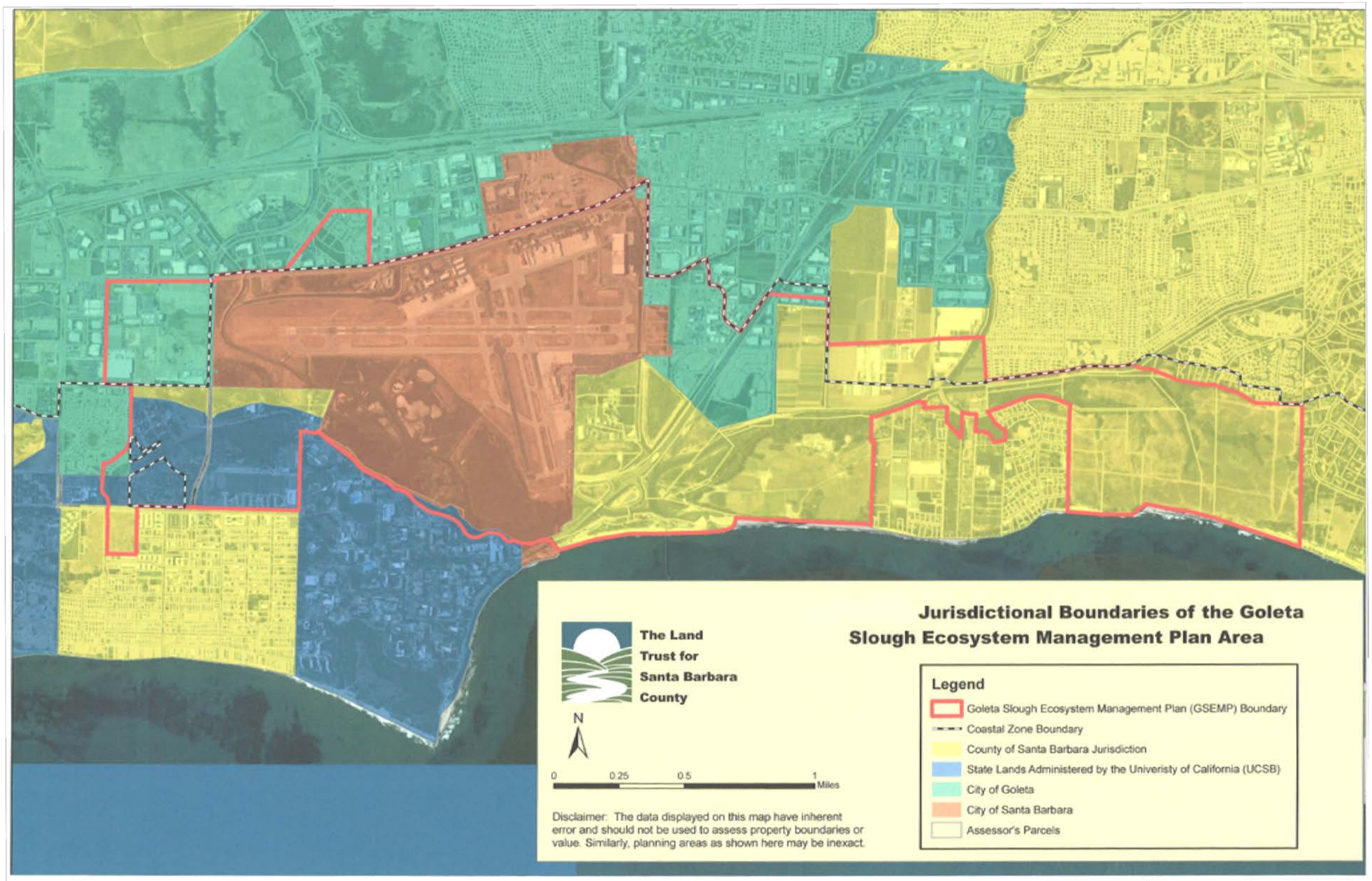

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Figure 2-6W Land Use Designations – West

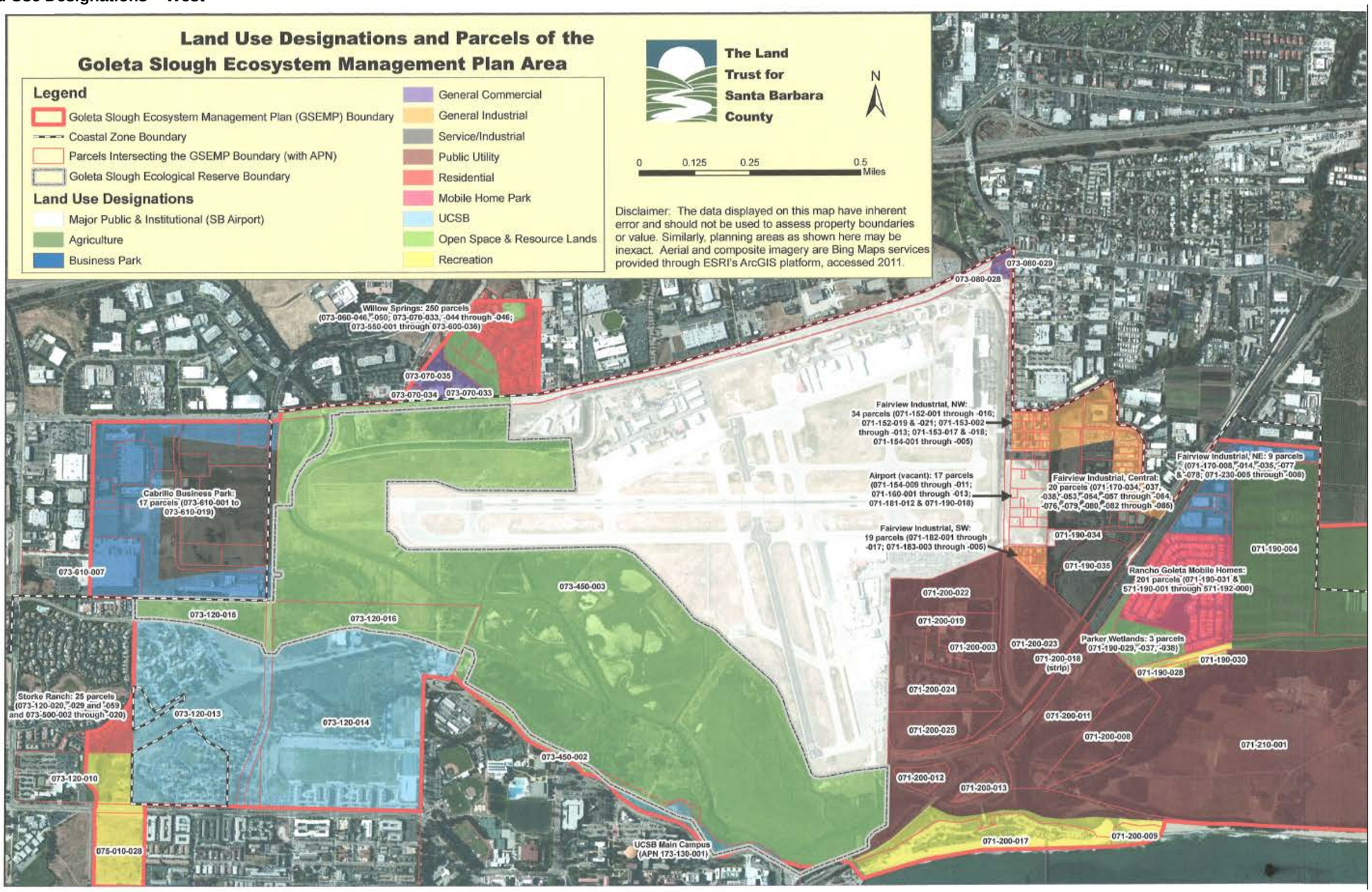

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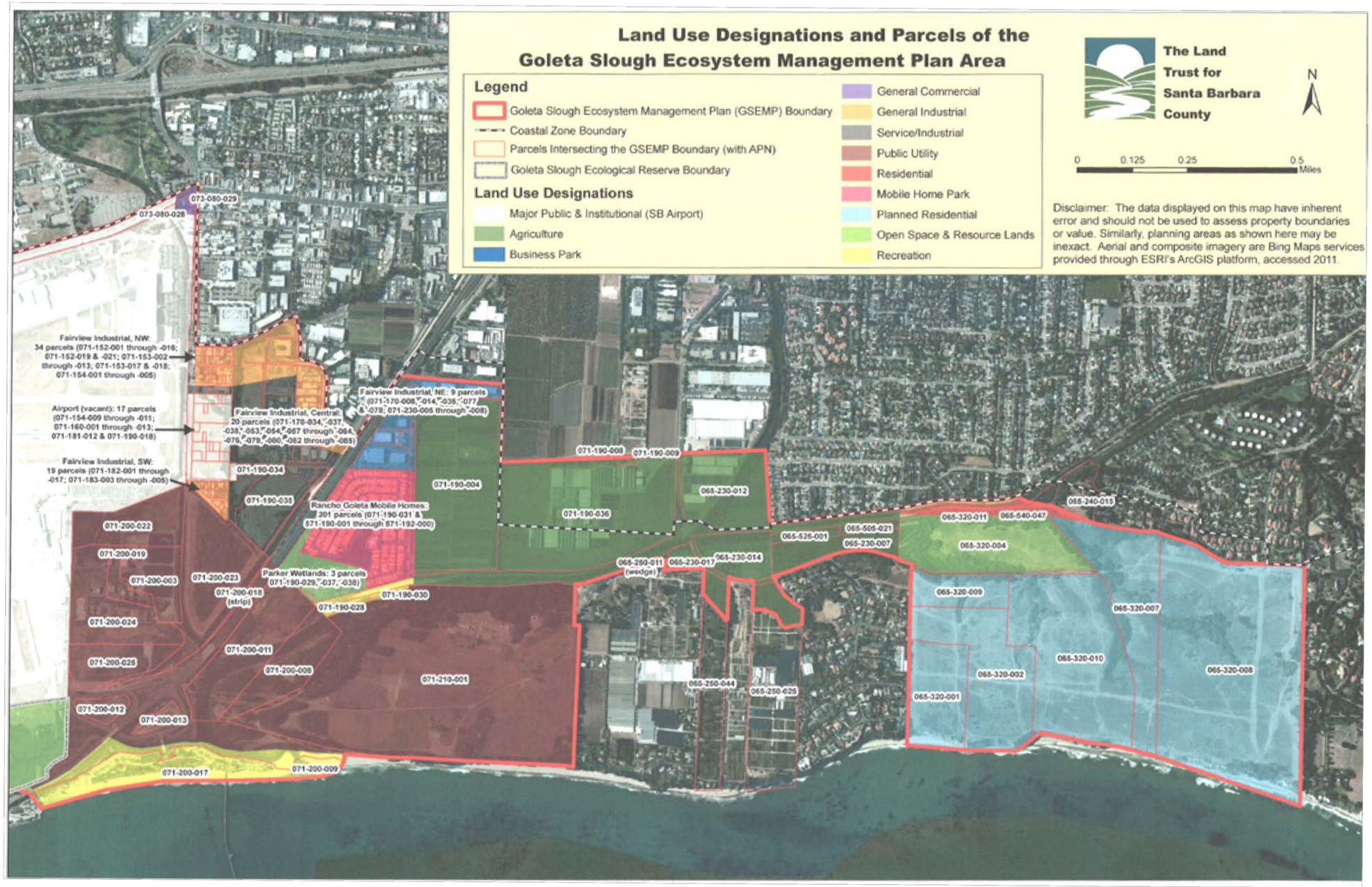
Figure 2-6E Land Use Designations - East



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2.3 Planning Framework

One of the key reasons the Goleta Slough Management Committee was initially formed was to provide a forum for discussion, oversight and management of the Ecosystem irrespective of the jurisdictional boundaries that overlapped with the area. Figure 2-5 shows the jurisdictions in and around the Slough including the Cities of Goleta and Santa Barbara, County of Santa Barbara and the University of California, Santa Barbara (UCSB).

State, federal and local agencies regulate development and restoration projects and conduct or oversee research activities within the Plan area. Regulatory agencies include the Federal Aviation Administration (FAA), Army Corps of Engineers (ACOE), U.S. Fish and Wildlife Service (USFWS), state and regional water quality control boards, the California Department of Fish and Wildlife (CDFW), State Lands Commission (SLC), National Marine Fisheries Service (NMFS), and the California Coastal Commission (CCC). At the County level, special districts such as Flood Control (FCD) and Mosquito and Vector Management District of Santa Barbara County (MVMD) conduct activities in the Slough. Other special districts operating in the Slough are two sanitary districts (Goleta Sanitary District (GSD) and Goleta West Sanitary District (GWSD) and the Goleta Water District (GWD). The authorizing or governing legislation of each relevant agency and a summary of their role and purview are provided at the end of this section in Table 2-1, Major Legislation relating to the Goleta Slough Ecosystem. Key planning issues are discussed further below.

2.3.1 California Coastal Commission

Most of the Goleta Slough Ecosystem is located within the Coastal Zone. The location of the Coastal Zone is shown in detail on Figure 2-7, Coastal Commission Jurisdictional Boundaries within the GSEMP Area. The Coastal Commission retains “original permit jurisdiction” over portions of the Slough itself and along Atascadero Creek as shown in Figure 2-7. They also have two different appeal jurisdictions that, depending on circumstances and the nature of the appeal, could result in a project approved at the local level being appealed to the Coastal Commission. These jurisdictional boundaries may be updated as the City of Goleta and other jurisdictions go through the LCP certification process.

The City of Santa Barbara has a certified Local Coastal Program covering the Airport and Goleta Slough. This plan, originally certified in 1982, was updated in 2003 to incorporate the *Goleta Slough Ecosystem Management Plan.* The County of Santa Barbara also has a certified LCP that will be updated to incorporate climate change and other relevant information. The City of Goleta, incorporated in 2002, has adopted a General Plan/Coastal Land Use Plan but the latter is in the process of consultation with the Coastal Commission. UCSB has a Long Range Development Plan approved by the UC Regents in 2010 and certified by the Coastal Commission in November 2014.

2.3.2 Wetland/Habitat Protection Legislation

State and federal laws that strive to protect wetland and other sensitive habitats were initially passed in the 1970s. Those laws have been amended and augmented since that time. Table 2-1 lists the major environmental legislation that affects the Ecosystem, particularly those laws relating to sensitive and protected species of plants and animals that are discussed in Section 2-10, Natural Resources.

2.3.3 Greenhouse Gas, Climate Change and Sea Level Rise Issues

The related issues of greenhouse gas emissions, climate change and sea level rise have been studied and debated widely in the last two decades. In 2006, AB 32 was passed in California relating to greenhouse gas (GHG) emissions, requiring that by 2020 jurisdictions reduce their communities' GHG emissions to 1990 levels. Since determining 1990 GHG emission levels may be a challenge, some communities are striving to reduce their emissions by a set percentage. In 2008, SB 375 was passed, often called the "anti-sprawl" or "sustainable communities" bill. This bill requires the California Air Resources Board to establish GHG reduction targets. Many communities in the state are preparing climate action plans in response to these laws.

Also in 2008, Governor Schwarzenegger signed Executive Order S-13-2008 that called on state agencies to develop California's first strategy to identify and prepare for expected climate impacts. In March 2011, the State's Ocean Protection Council provided general low, medium and high estimates of sea level rise along the California coast through 2100. In March 2013, the OPC updated its Sea Level Rise Guidance, designed to help state agencies incorporate future sea-level rise impacts into planning decisions, to include the best current science, as summarized in the final report from the National Research Council in 2012, *Sea-Level Rise for the Coasts of California, Oregon, and Washington*. They also recommended that state agencies consider sea level rise in their planning. In October 2013, legislation was adopted in October 2013 (Muratsuchi, AB 691) that would require grantees of public trust tidelands and submerged lands to submit a sea level rise assessments to the State Lands Commission, the agency that has jurisdiction over those lands, by July, 1, 2019. The Coastal Commission adopted guidance to jurisdictions dealing with climate change in August 2015 (http://documents.coastal.ca.gov/assets/slr/guidance/August2015/0_Full_Adopted_Sea_Level_Rise_Policy_Guidance.pdf). It is possible that the coming years will see legislation that would require that coastal cities and counties prepare sea level rise plans.

Table 2-1
Major Legislation Relating to the Goleta Slough Ecosystem

By Issue Area:

Issue/Law	Administered by	Summary
NATURAL RESOURCES		
Endangered Species Act - 1976	• US Fish and Wildlife Service • Nat'l Marine Fisheries Service	• Actions relating to threatened, endangered and candidate species. • Where a species is fully protected, there can be no "take" of the species & no permits to "take" the species.
Fisheries Conservation and Management Act – 1976 [New]	• US Fish and Wildlife Service • Nat'l Marine Fisheries Service	• Mandates the use of annual catch limits and accountability measures to end overfishing • Provides for widespread market-based fishery management through limited access privilege programs • Calls for increased international cooperation.
Calif. Endan-gered Spp Act	• California Dept. of Fish and Wildlife	• Actions related to threatened or endangered species
California Fish & Game Code	• California Dept. of Fish and Game	• Actions that result in alteration of stream bed, bank, channel or riparian vegetation (§1600 et seq)

Issue/Law	Administered by	Summary
California Coastal Act – 1976 and local Coastal Plans	• California Coastal Commission (CCC), Cities and County thru LCPs and UCSB through Long Range Development Plan (LRDP)	• Mission is "To protect, conserve, restore, and enhance the environment of the Calif. coastline"• • "Development" activities are broadly defined to include construction of buildings, divisions of land, and activities that change the intensity of use of land or public access to coastal waters. • Amendments to LCP or LRDP must be found consistent with Coastal Act by CCC.
Draft Eastern Goleta Valley Community Plan – 2011	• Santa Barbara County Planning & Development Long Range Planning Division	• Many policies and actions relating to Community Development and Land Use; General Resources and Constraints; Watershed, Hydrology & Flooding; Biological Resources; ESHA and Riparian Corridor – See Appendix C for text of policies.
City of Goleta General Plan/ Coastal Land Use Plan - 2006	• City of Goleta Advance Planning	• Many policies and actions relating to Community Development and Land Use; General Resources and Constraints; Watershed, Hydrology & Flooding; Biological Resources; ESHA and Riparian Corridor – See Appendix C for text.

City of SB General Plan Update – Env. Resources Element – 2011	• City of Santa Barbara Planning Division & Airport Dept.	• Goals include:
		  • Sustainable resource use including protect and use resources wisely
		  • Reduce Greenhouse Gases including those that contribute to climate change
		  • Climate Change adaptation by, if applicable, incorporating adaptations into new development, redevelopment and public infrastructure.

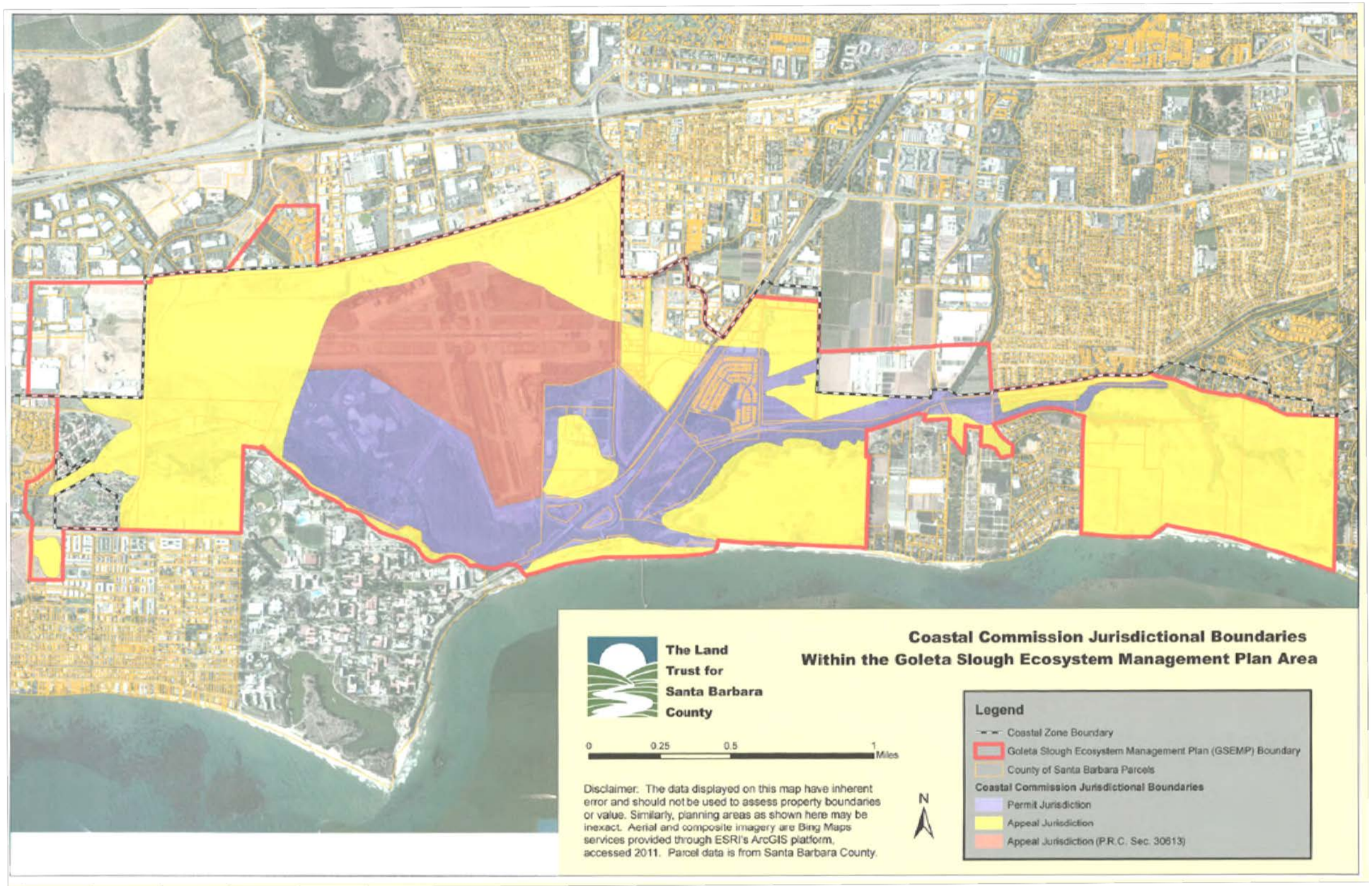
City of SB Coastal Plan – Airport/Goleta Slough – 1982 and 2003	• City of Santa Barbara Planning Division & Airport Dept.	• Many policies and actions relating to Access, Recreation, Mosquito Abatement, Sedimentation, Tidal Action & Wetlands – See Appendix C for text of policies. • GSEMP incorporated as App. G in Airport/GS LCP. Policy C-10 requires that "All development and mitigation of impacts on Goleta Slough shall be consistent with the policies of the Goleta Slough Ecosystem Management Plan."
UCSB Long Range Develop-ment Plan – 2010	• UCSB Office of Campus Planning & Design	• Many policies and actions relating to Land Use; Open Space & Landscaping; ESHAs; Coastal Waters – Water Resources & Erosion; Diking & Filling; Utilities & Infrastructure – See Appendix C for text.
CLIMATE AND SEA LEVEL RISE		
AB 32 (2006)	• Calif. Air Resources Board (CARB)	• Requires CARB develop regulations and market mechanisms to reduce California's GHG emissions back to 1990 levels by 2020.
SB 375 (2007)	• Office of Planning & Research (OPR)	• OPR must develop legal guidelines for analysis and mitigation of GHG emissions, pursuant to the California Environmental Quality Act.
State Exec. Order S-13-2008	• Office of the Governor	• Called on state agencies to develop California's 1st strategy to identify & prepare for expected climate impacts.
Ocean Protection Council Reso 3-11-11	• California Ocean Protection Council	• Provided a range of estimates of sea level rise through 2100 using 2000 as a baseline. • Recommended that state agencies should consider SLR when making funding decisions.
AB 691 (Muratsuchi) - 2013	• State Lands Commission	• Requires lessees of public trust lands to submit to SLC sea level rise assessments by July 1, 2019.
Calif. Coastal Commission Sea Level Rise	• California Coastal Commission	• Provides an overview of best available science on SLR for California and recommended steps for addressing SLR in CCC planning and regulatory decisions.

Issue/Law	Administered by	Summary
Guidance (8/15)		
WATERSHED		
Watershed Protection & Flood Preven-tion Act of 1954	• Natural Resources Conservation Service (NRCS)	• The Act authorizes federal assistance (by the NRCS) to local organizations for planning and carrying out projects in watershed areas for conservation and use of land and water, and flood prevention.
WATER ISSUES – WATER QUALITY, FLOODING, ACCRETION AND EROSION		
Water Quality - Clean Water Act §303	• Regional Water Quality Control Board • Calif. Environmental Protection Agency	• Applied locally through Central Coastal Basin Water Quality Control Plan • Includes Water Quality Standards and Implementation Plans
Clean Water Act – 1964 §401 and 402	• Regional Water Quality Control Board • Army Corps (§404)	• Water quality certif. for §404 (§401); • Regulates discharge into waters of US (§402); NPDES permits (§402)
Clean Water Act – 1964 §404	• Army Corps of Engineers (§404)	• •Water quality certif. for §404 (§401)
Storm Water Management Program	• City of SB	• Under Clean Water Act NPDES Program, Phase II deals with regulations governing discharges for small municipalities that have storm drainage systems.
SBA Storm Water Pollution Prevention Plan	• City of SB	• Under the Airport's Clean Water Act NPDES General Permit for Storm Water Discharges Associated with Industrial Activities
Flood Insurance Reform Act of 2004	• Federal Emergency Management Agency (FEMA)	• This act authorizes the national flood insurance program, which includes provisions for the evaluation and mapping of flood hazard zones.

Regulations Governing Airport, Flood Control and other Special Districts:

Issue/Law	Administered by	Summary
FEDERAL – Santa Barbara Airport		
FAA Regs. Part 77	• Federal Aviation Administration	• This legislation relates to limitations on the height of structures in the vicinity of the runways at the Airport.
Federal Aviation Regs. Part 139 (wildlife hazard mgmt.)	• Federal Aviation Administration	• Provide a safe and efficient airport • Reviews and approves projects proposed on Airport property with respect to wildlife hazards.
LOCAL		
Flood Control Regulations	• SB County Flood Control District	• Provide flood protection (various federal and state laws)
California Health and Safety Code	• Mosquito and Vector Management District of Santa Barbara Co.	• Control existing and future mosquito breeding sources

Figure 2-7 Coastal Commission Jurisdiction



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2.4 Existing Uses, Infrastructure and Development

When the GSEMP was completed in 1997, about one-third of the GSEMP area was in public ownership, just over half was in private hands and about 13 percent was owned by utilities.[1] While the type of ownership in the area has not changed since that time, the land uses within the area have changed. Most notable is the development at the Cabrillo Business Park site immediately west of the main Airport runway as well as the Willow Springs housing development just north of Hollister Avenue near Carneros Creek (see Figure 2-2W, Features and Subareas of GSEMP Area). There has also been a considerable amount of mitigation and restoration work done in the GSEMP area as discussed below. Land use by parcel is provided in Appendix A, Parcels in the Goleta Slough Ecosystem – 2011 with more detailed information available through the County Assessor's Office at http://sbcassessor.com/assessor/AssessorParcelMap.aspx

2.5 Historical Development and Change Since 1860s

For centuries prior to European settlement of California, the Goleta Slough encompassed 18-square miles and was a deep-water harbor. Chumash villages flourished in numerous villages in the area, including on Mescalitan Island and near the confluence of Atascadero, San Jose and San Pedro Creeks. In more recent times, people could sail their boats to just south of what is now Hollister Avenue.

The major changes to the Slough, Airport and to UCSB's Storke Campus area (including wetlands), are summarized in Table 2-2, Major Changes in Goleta Slough Area – 1860s to 2011. Figures 2-8a through 2-8i show the progressive changes in the Goleta Slough area from 1871/73through 2011. The first development at what is now Santa Barbara Airport occurred around 1938 (see Figure 2-8c). Mescalitan Island is visible and intact in this map. By 1943/44 (Figure 2-8d), only a remnant of the island remains and the airfield is considerably more developed. Around this time the nascent Santa Barbara Municipal Airport was conscripted as a Marine Corps Air Station. The air station was deactivated in March 1946 and returned to the City of Santa Barbara.

Table 2-2
Major Changes in Goleta Slough Area – 1860s to 2011

PHOTO DATE	FIGURE # & SOURCE	Area A AIRPORT/GOLETA SLOUGH	Area C UCSB STORKE CAMPUS
1860s and 1870s	**Fig. 2-8a** US Coast Survey	• **GS was altered significantly in 1861-62** when extensive sedimentation occurred as a result of erosion from the watershed during severe storms following fires and overgrazing. • **Goleta Slough (**GS) has extensive salt marsh habitat, sand flats (alluvium) & a small lagoon • **Mescalitan Island** is whole & almost entirely surrounded by marsh habitat & the Slough mouth	• **Storke Campus appears as a grassland** sloping down to the upper portion of the Slough • **Vernal pools** were probably associated with the grasslands near the seeps & were probably associated hydrologically with the seeps

[1] *Draft Goleta Slough Ecosystem Management Plan,* page 1-1 and Figure 3.

PHOTO DATE	FIGURE # & SOURCE	Area A AIRPORT/GOLETA SLOUGH	Area C UCSB STORKE CAMPUS
1903	**Fig. 2-8b** US Geological Survey	• **New development** includes a railroad & new settlement areas (La Patera), fragmentation of the estuary and roads • **Marshlands and lagoon** appear similar to 1871/73 map	• **Western portion** is still intact & not fragmented • **Early roads and berms** are appearing
1938	**Fig. 2-8c** UCSB Map & Imagery Library	• **Extensive salt flats** have developed on the margin of the estuary • **Estuarine wetlands** appear more limited & more fragmentation of habitats has occurred • **GS mouth** appears to be closed • **GS delta** is largest observed in historic record • **Airfield** appears on what is now the Santa Barbara Airport	• **Western GS** has become more fragmented & can see beginnings of West & East Storke Wetlands. • **Additional roads & agricultural development** occur in the upland areas. • **Vernal pools** appear that are large & contiguous (dark soil or wetland vegetation above what is now El Colegio Rd.) • **Storke Ranch** & an early portion of future Los Carneros Rd appear
1943/44	**Fig. 2-8d** UCSB Map & Imagery Library	• **SB Municipal Airport construction began** during fall 1941 by Army Corps of Engineers • **Mescalitan Island** was partially leveled to produce fill for the construction and marsh & salt flat habitats were filled • **Goleta Beach** reaches most eroded state in historic air photo record • **Marine Corps Air Station construction** began in June 1942 & was conscripted for military purposes. MCAS was deactivated in March 1946 & converted back to Santa Barbara Municipal Airport.	• **Major changes** including runoff resulting in the formation of a large pond, called "Storke Lake" • **The current Los Carneros/Mesa Rd. intersection** occurs in the center of this impounded wetland • **Seasonal wetlands** apparently still existed in the vicinity of what is now Storke Field & UCSB housing
1961	**Fig. 2-8e** UCSB Map & Imagery Library	• **Flood control channels** have been excavated within the estuary for the flow of water & sediment from Tecolotito & Carneros Creeks • **Airport** development expanded • **Goleta Sanitary District facilities** expanded including treatment basins • **Construction of US 101** & expansion of residential & commercial development north of the Slough occurred	• **Major changes have occurred** resulting in minimal evidence of seeps, coastal pond & salt marsh vegetation. Storke Wetlands appear more fragmented. • **Extensive western portions** of the GS system appear to be drained, diked, impounded & altered
1967	**Fig. 2-8f**	• **Construction of Ward Memorial Drive** (SR 217) resulted in filling of wetlands,	• **Construction of Harder Stadium** initiated other UCSB development on Storke

PHOTO DATE	FIGURE # & SOURCE	Area A AIRPORT/GOLETA SLOUGH	Area C UCSB STORKE CAMPUS
	UCSB Map & Imagery Library	fragmentation of habitat & perhaps temporary closure of the estuary • **The SW-NE trending runways** appear to have been abandoned	Campus • **Francisco Torres dormitories** appear west of Storke Wetlands & were built on important habitats (including vernal pools?) contiguous to West Storke Wetlands
1975	**Fig. 2-8g** UCSB Map & Imagery Library	• **The main runway is extended 1,000 feet** which necessitated the relocation of Tecolotito Creek (note right angles) • **Sedimentation into the Slough** appears to have accelerated	• **Mesa Road** passes through Storke Campus Wetlands, further altering the natural landscape in the area • **Construction of Married Student Housing** west of Los Carneros Rd. required more filling of wetlands & further isolated habitats of Storke Wetlands
1991	**Fig. 2-8h** UCSB Map & Imagery Library	• **Sediment basins** on Tecolotito & Carneros Creeks are more prominent • **Service roads within the Slough** are more defined	• **Area K** near East Storke Wetlands is visible & provides brackish habitat favored by waterfowl • **Santa Ynez Student Housing** at El Colegio & Los Carneros Road constructed on southern edge of West Storke Wetland.
2011	**Fig. 2-8i** Bing Maps through ESRI's ArcGIS platform	• **The Airport relocated the main runway 800 feet to the west** &Tecolotito & Carneros Creeks were rerouted & have a more curvilinear flow line. Tidewater gobies were discovered in sediment basins in 2006. • **Carneros & Tecolotito sediment basins** expanded • **The Airport restored 80 acres habitat on 12 sites in the Slough** including tidal, creek, wetland and upland habitat restoration	• **UCSB housing has been built on Storke Field** next to El Colegio Rd • **Restoration of West CDFW property** has occurred & work has begun on East CDFW property • **Restoration of 7-acre San Clemente area -** NE corner of Los Carneros/El Colegio intersection treats runoff from new housing on El Colegio.

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Figure 2-8a Historic Map – 1871/1873

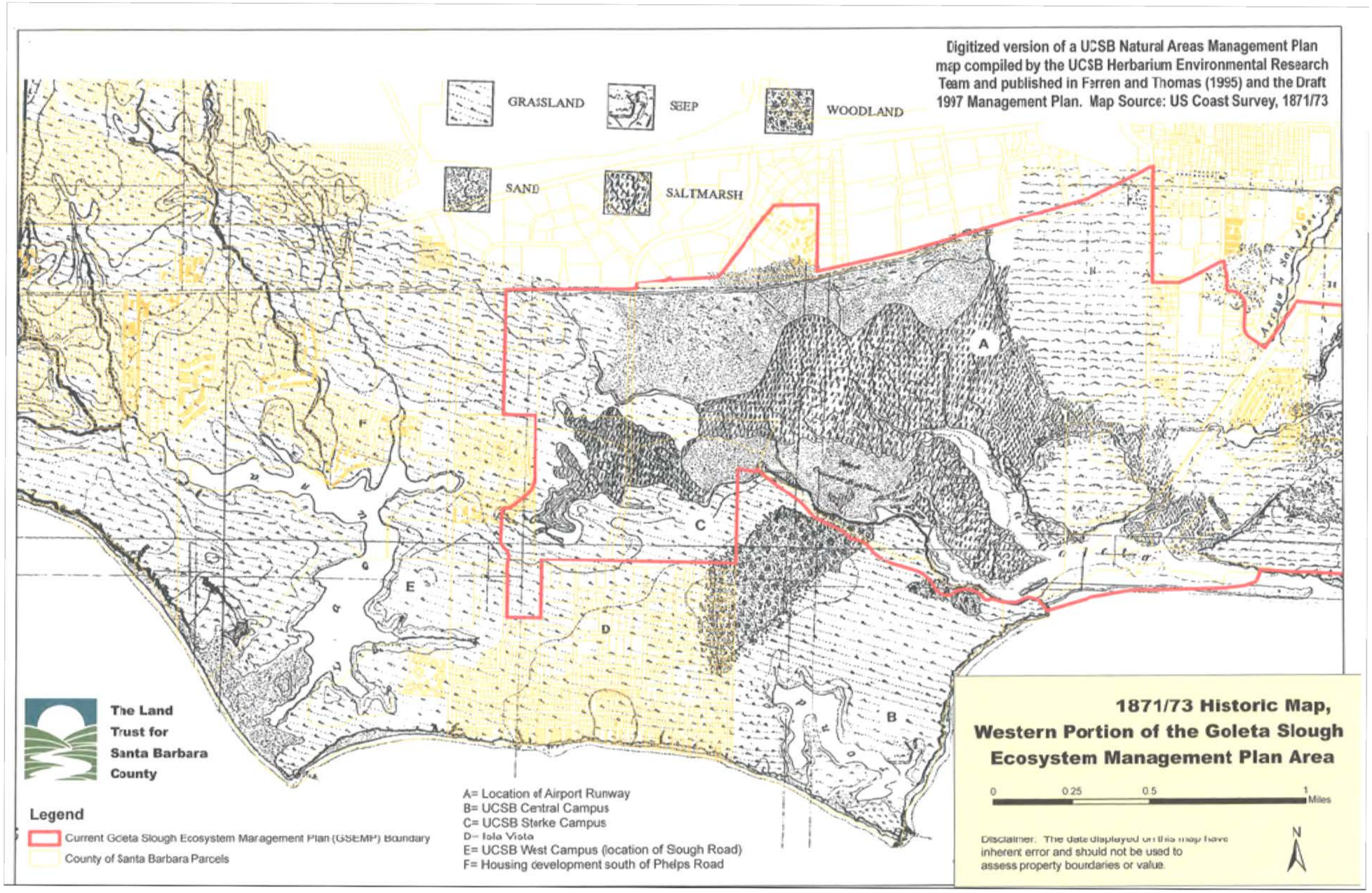

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Figure 2-8b Historic Map – 1903

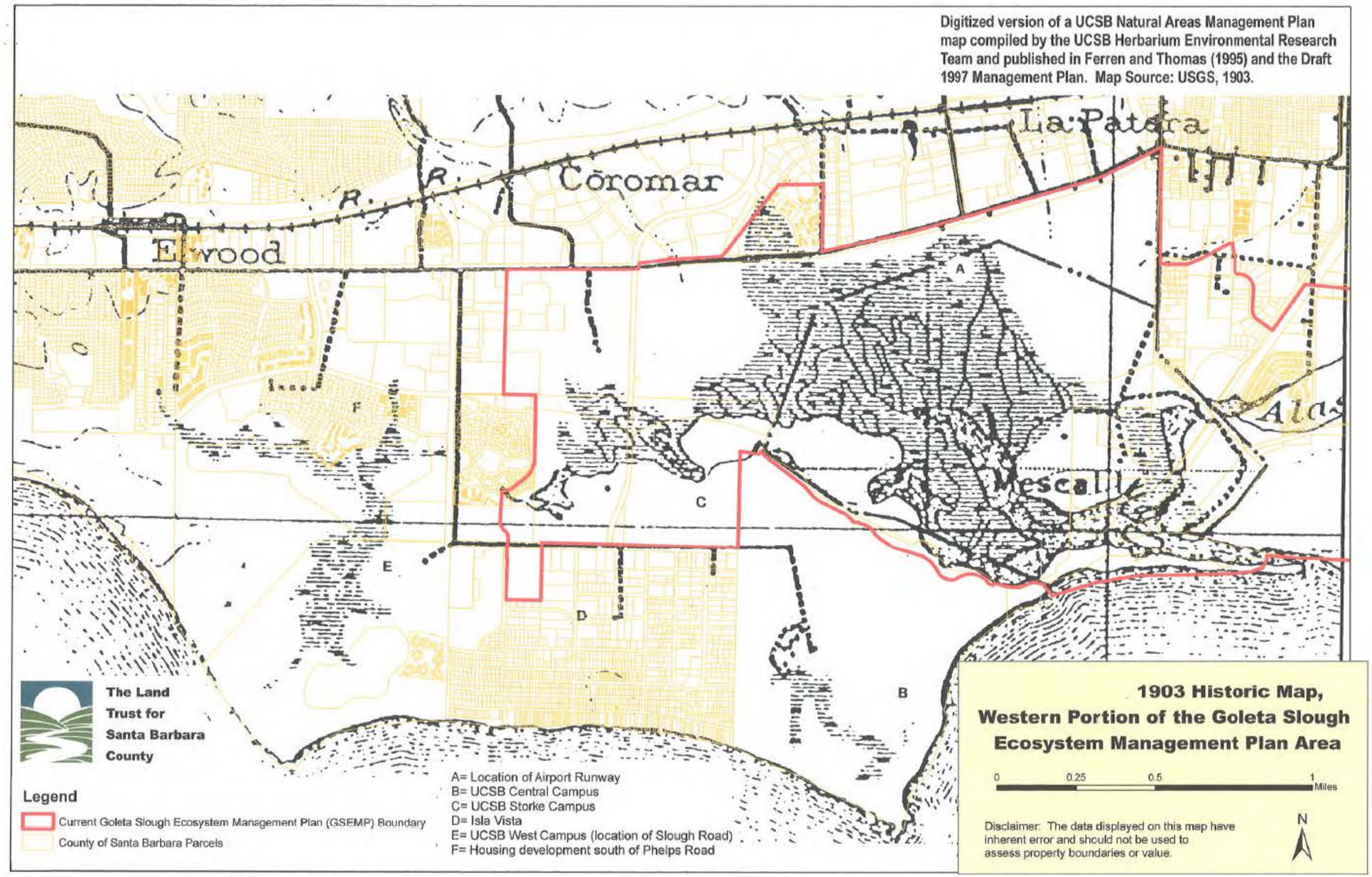

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Figure 2-8c Historic Aerial Photograph - 1938

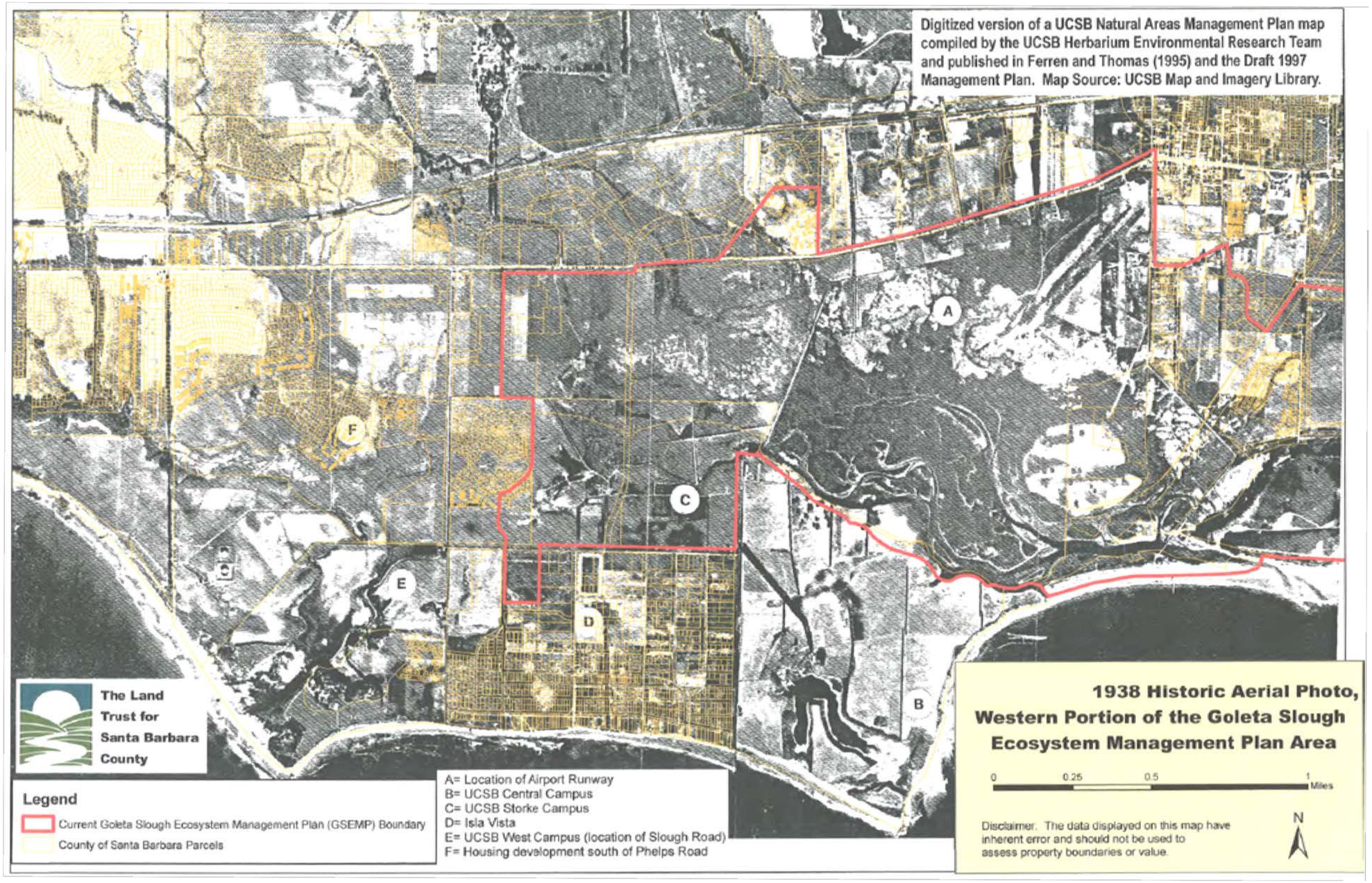

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Figure 2-8d Historic Aerial Photograph – 1943/1944

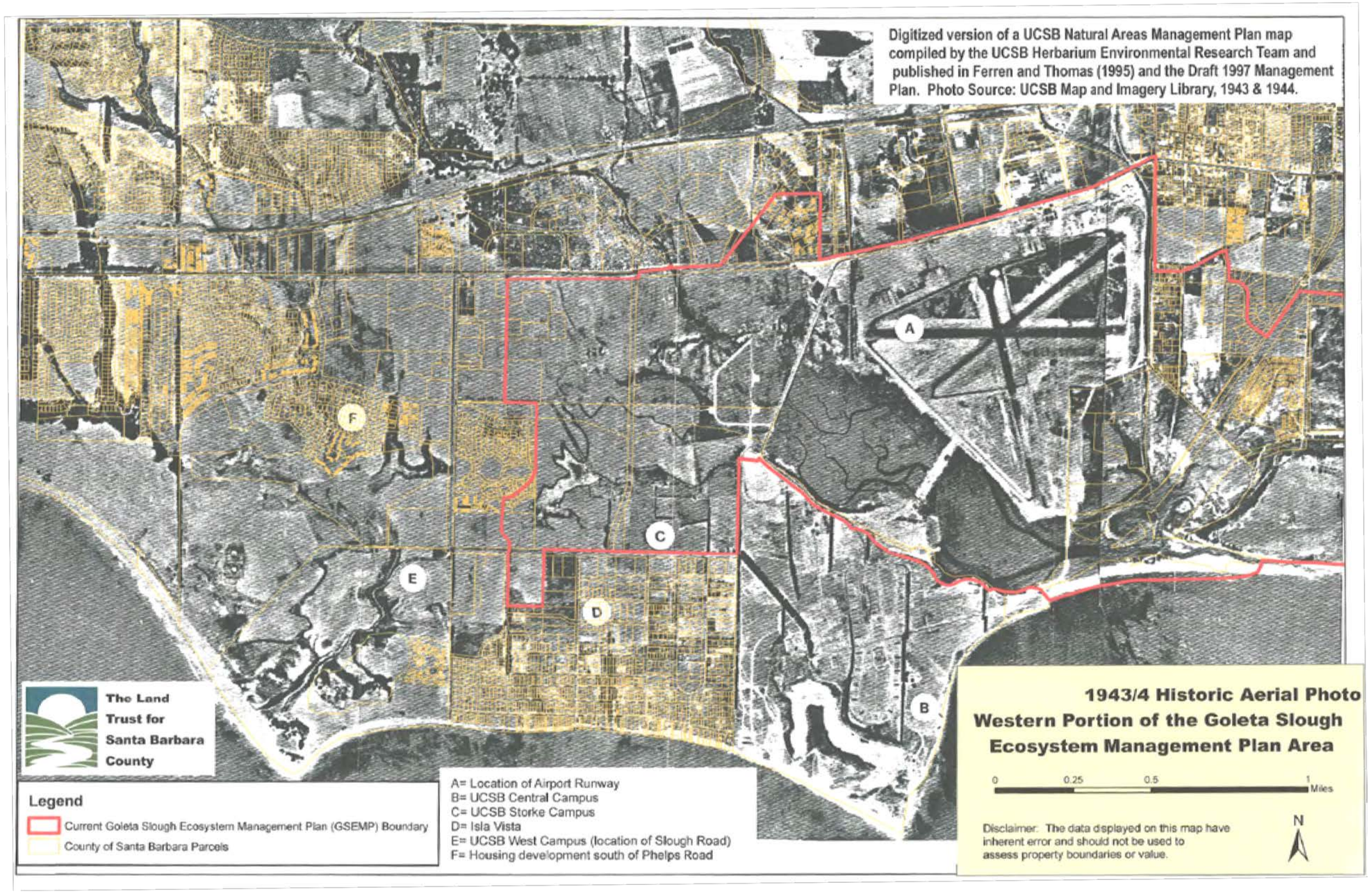

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Figure 2-8e Historic Aerial Photograph – 1961

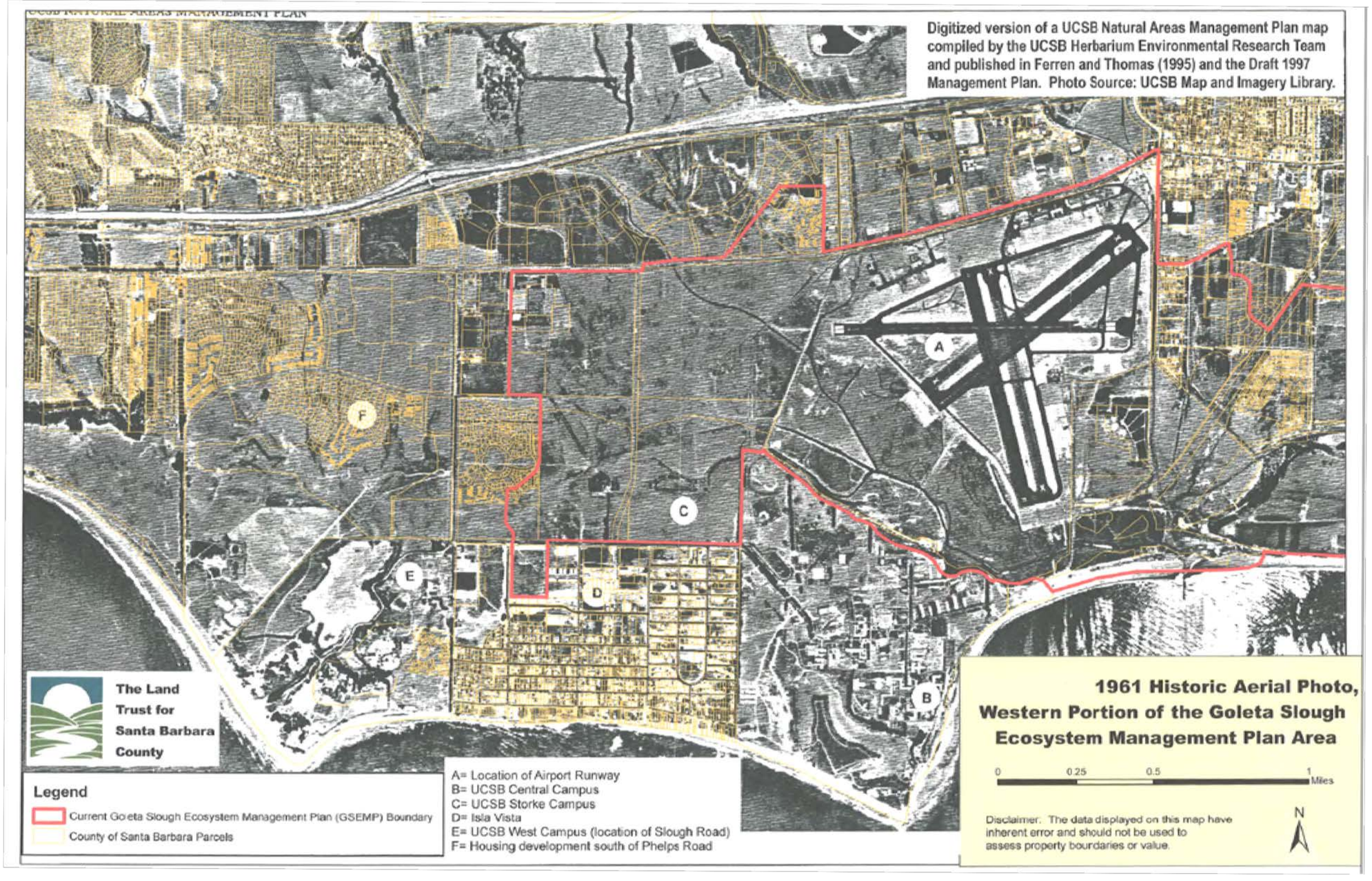

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Figure 2-8f Historic Aerial Photograph – 1967

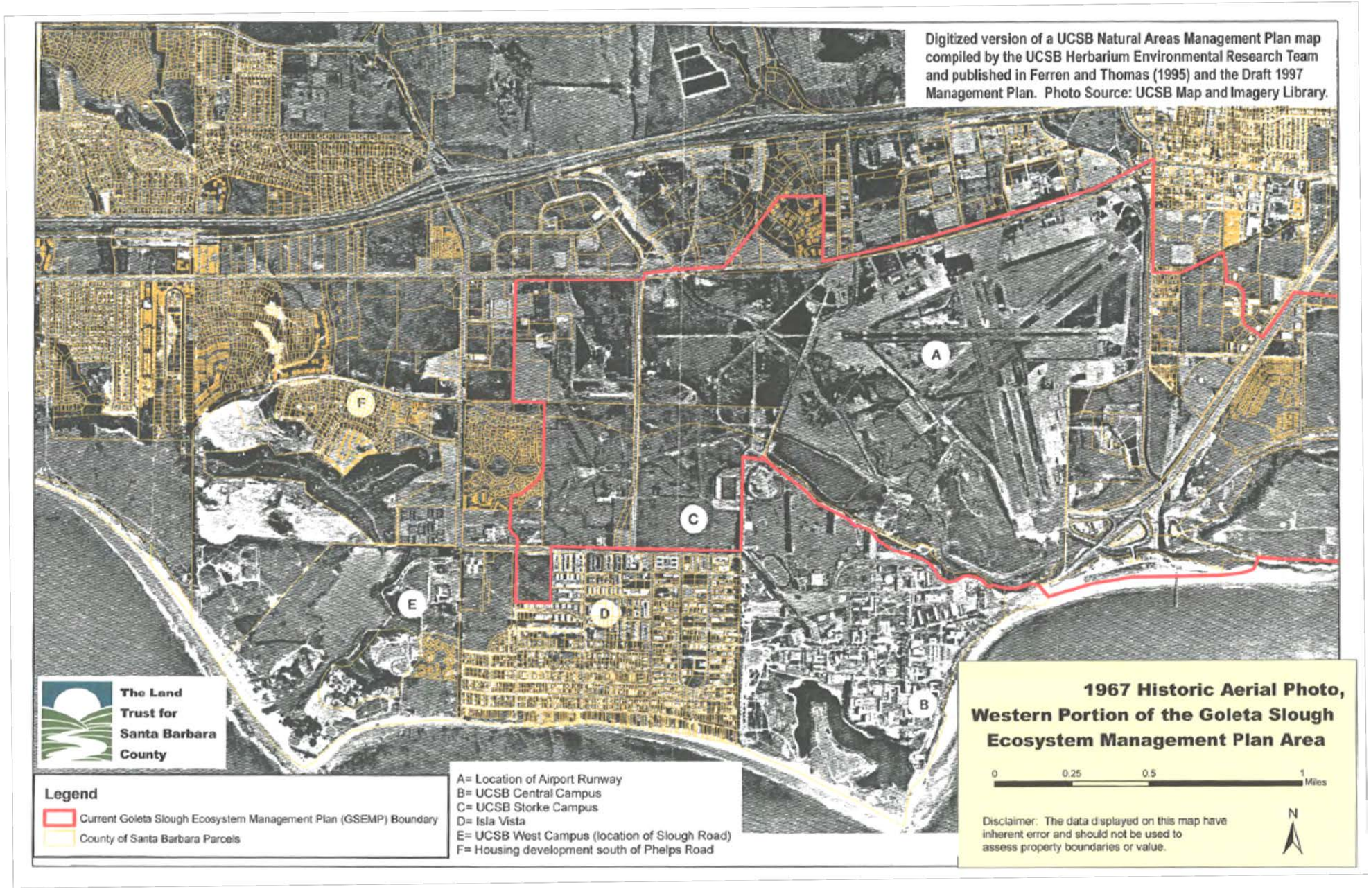

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Figure 2-8g Historic Aerial Photograph – 1975

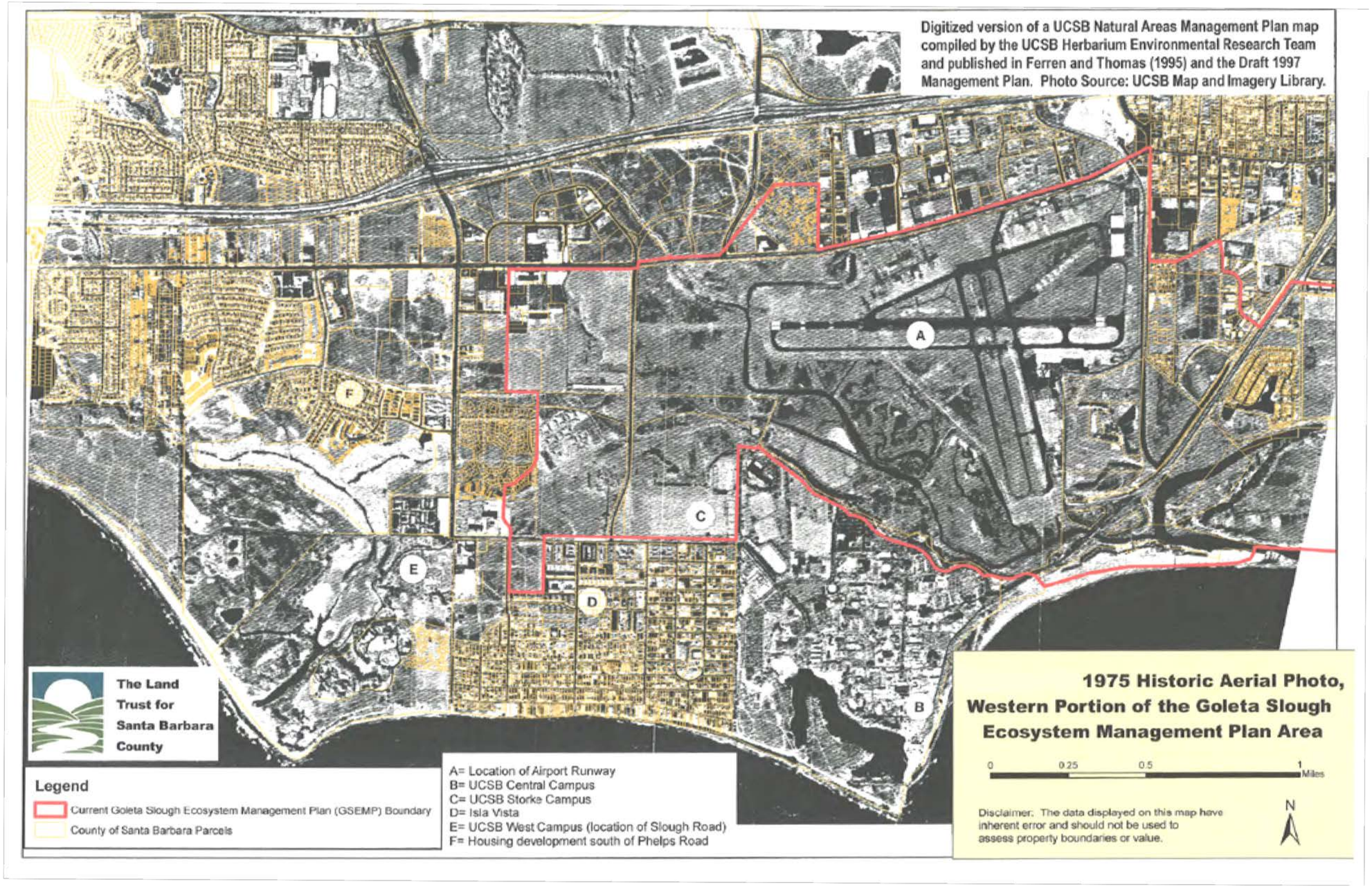

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Figure 2-8h Historic Aerial Photograph – 1991

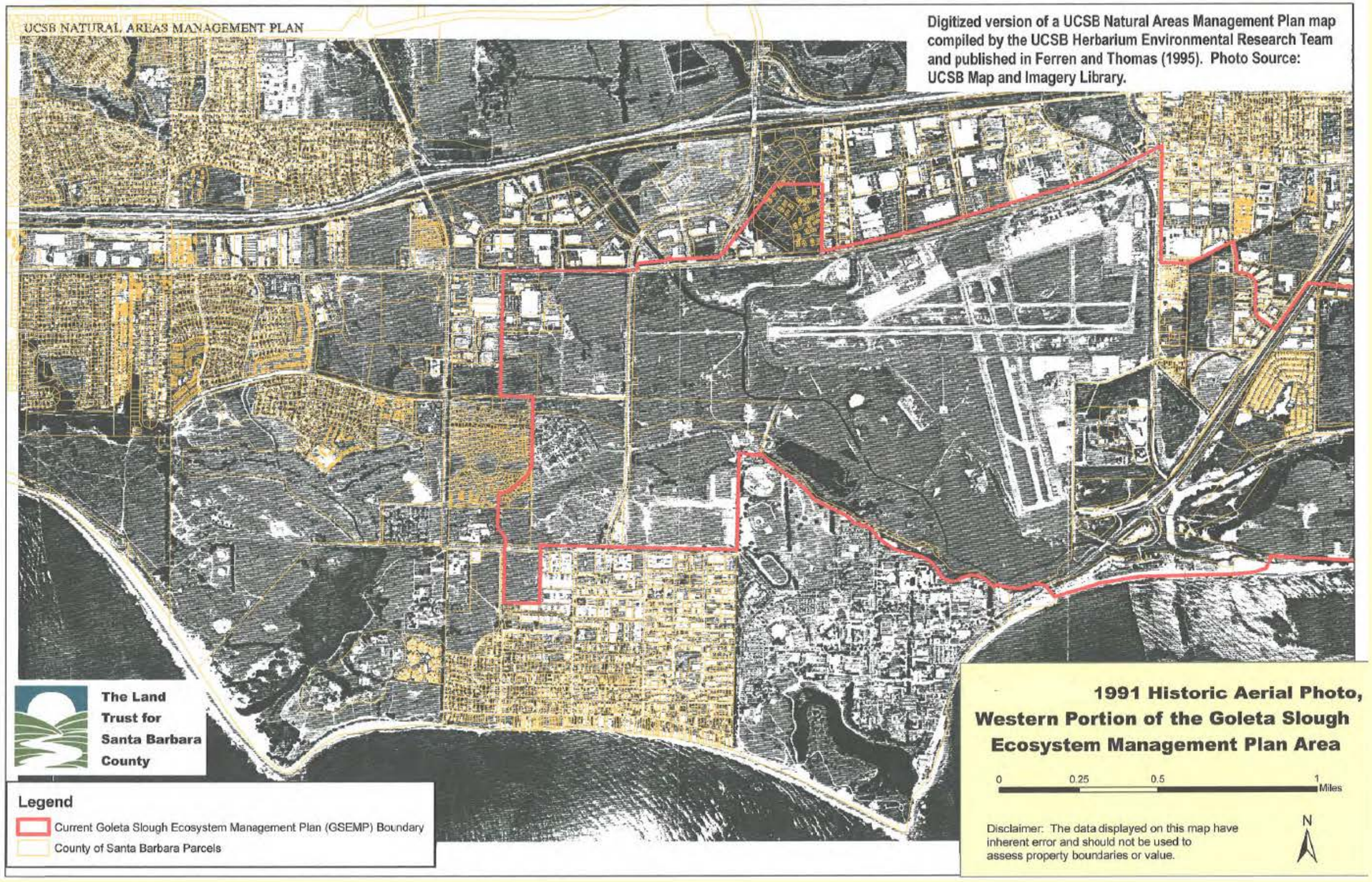

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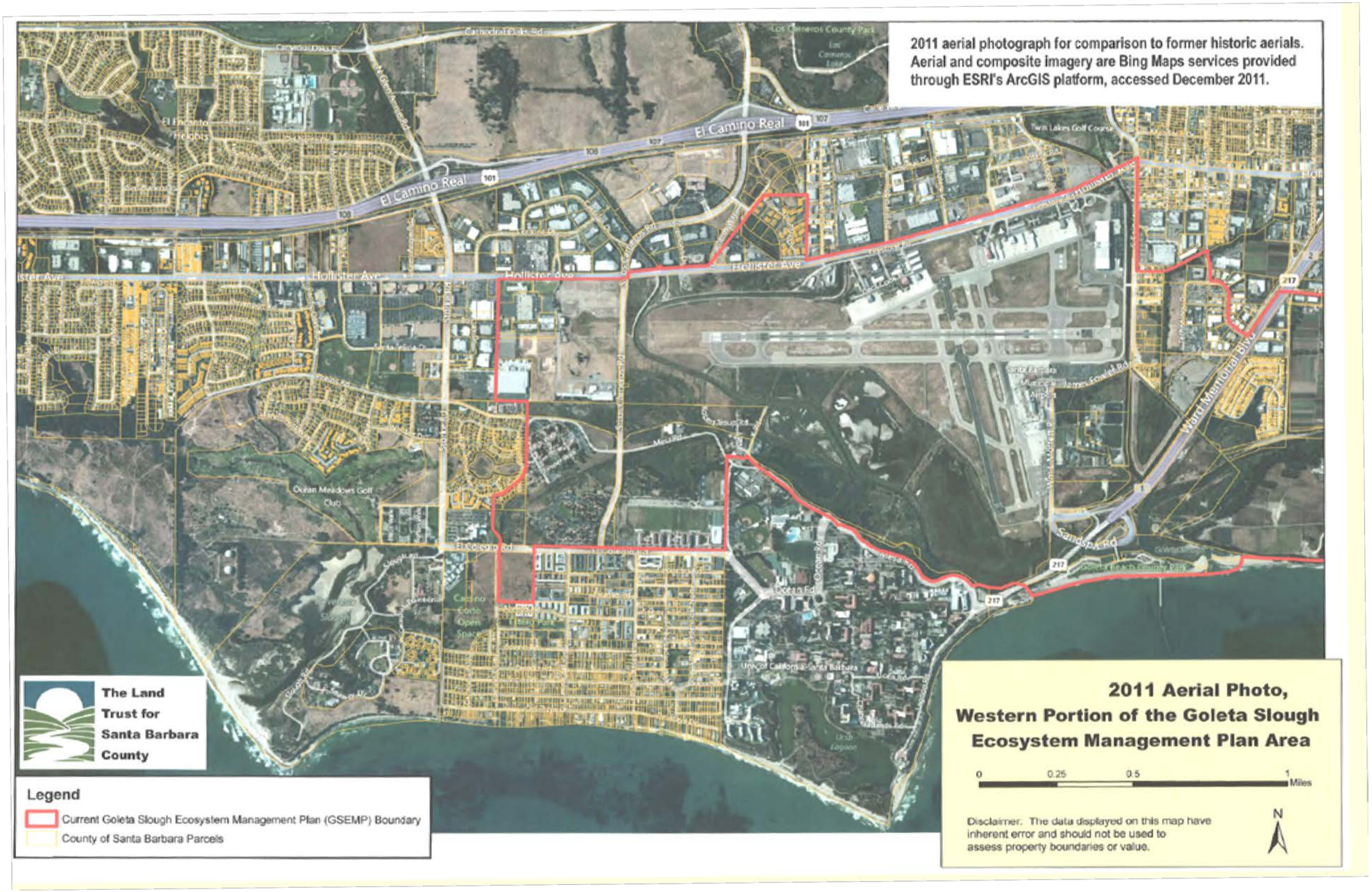
Figure 2-8i Historic Aerial Photograph – 2011



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Approximately 430 acres of the Slough are designated as the Goleta Slough Ecological Reserve. Of this acreage, approximately 400 acres are owned by the City of Santa Barbara and the remaining acreage is owned by CDFW. The entire Ecological Reserve is managed by CDFW under a Memorandum of Understanding between the agency and the City first approved in 1986. The City of Santa Barbara's portion of the Ecological Reserve is also zoned "Goleta Slough Reserve" outlined in Chapter 29.25 of the Santa Barbara Municipal Code. The City-owned portion lies in the Coastal Commission's original permit jurisdiction (see Figure 2-7W and 2-7E, CCC Jurisdiction).

2.6 Resource Stewardship

As discussed earlier in this section, there are many jurisdictions and agencies that manage and regulate assets and resources in the Goleta Slough Ecosystem area. In terms of "stewardship," i.e., responsible use and protection of the environment, many groups contribute to protecting the Slough including the More Mesa Preservation Coalition, Santa Barbara Channelkeeper, Urban Creeks Council, Santa Barbara Audubon Society, and groups concerned with preserving Goleta Beach. The two primary groups that serve as stewards of Ecosystem resources are GSMC and the California Department of Fish and Game as discussed below.

2.6.1 Goleta Slough Management Committee

The Goleta Slough Management Committee (GSMC) was established in 1991 in recognition of the importance of the Slough and the challenge of managing it comprehensively. No single entity has management authority over the entire Slough area, but a number of agencies play a major role in the area including two cities, a county, several special districts, a public university, and several state and federal regulatory agencies. GSMC was formed to work cooperatively with regulatory agencies, property owners and public interest groups to provide for a healthy Goleta Slough Ecosystem irrespective of jurisdictional or other boundaries.

GSMC continues to identify and resolve issues related to management of the Goleta Slough Ecosystem Management Area and serves in an advisory capacity to lead agencies (e.g., City of Goleta, City of Santa Barbara, Santa Barbara County, California and UC Regents). GSMC serves as a forum to review projects that involve property owners, sensitive habitats, interested parties and multiple jurisdictions. GSMC has supported projects that they believe benefit the Ecosystem as a whole. GSMC has written letters of support for restoration and enhancement projects that are seeking funding or discretionary approval and has provided comments on development projects proposed in the Slough area.

2.6.2 California Department of Fish and Wildlife (CDFW)

In 1988, CDFW prepared a draft management plan for the Goleta Slough Ecosystem. This plan initially named the subareas or basins within the Slough (see Figure 2-2W, Features and Subareas of the GSEMP Area). The plan was never finalized but the lettering system for the sub-basins is still used today.

Much of the Slough and area near the Atascadero Creek outfall is designated the Goleta Slough State Marine Conservation Area (MCA) and is managed by CDFW. This 160-acre area is considered a "no take" zone meaning that no marine life may be taken or caught. According to CDFW's Marine Life Protection Act website (https://www.wildlife.ca.gov/Conservation/Marine/MPAs), the Slough's designation as an MCA occurred on September 20, 2007.

2.7 Restoration Efforts since 1997

GSMC provides a broad perspective on restoration practice, opportunities and accomplishments, irrespective of jurisdictions or ownership of the land to be restored. Figures 2-9W and 2-9E, Restoration Project Locations 1997-2011, show the many restoration projects that have occurred in the last fifteen years in the Ecosystem. These 36 projects represent approximately 175 acres of restored habitats. A detailed description of these projects is included in Appendix B, Restoration and Enhancement Projects.

Figure 2-10, Restoration Project Areas by Type 1997-2011, highlights the same restoration projects shown in Figures 2-9W and 2-9E by type of restoration. Much of the work in the Airport's portion of the Slough has been removal of weeds, grading and native plantings. Elsewhere in the Ecosystem, a considerable number of projects have been completed to enhance existing habitats. In other places, single species weed eradication has occurred with a focus on removal of Pampas Grass, especially along and near Atascadero Creek.

2.8 Tidal Restoration Demonstration Project

As discussed above, Goleta Slough was historically a large embayment of approximately 18 square miles that has over time been reduced to about 430 acres. Some of the Slough is still tidally influenced including Tecolotito and Carneros Creeks and Areas A and B (see Figure 2-3 for locations). The remainder of the Slough is brackish or freshwater because most basins have berms that cut off tidal flow. The freshwater and brackish basins tend to fill with rainwater during the winter months and, depending on the amount of annual rainfall, are typically dry by late spring or summer. Ducks and waterfowl are commonly seen in these basins while smaller birds such as Belding's savannah sparrows tend to frequent the tidal basins.

Since its inception, GSMC members have expressed an interest in restoring tidal circulation to portions of the Slough that have been cut off from tidal influence for decades by removal or breaching of berms. One major impediment to restoring tidal circulation is the proximity of the Santa Barbara Airport and concerns about bird strikes. The Federal Aviation Administration (FAA) has expressed concern that restoring tidal circulation to portions of the Goleta Slough could modify bird activity in and near the airfield and possibly increase aviation bird strike hazards.

Biologists and ornithologists familiar with the area have long maintained that changing from freshwater and brackish marsh to estuarine marsh would, in fact, reduce the number of birds that represent hazards to aircraft. To test this assertion, in 2003 a Tidal Restoration Study was prepared by John Gray of URS that was ultimately approved by all permitting agencies in 2006. Two basins were chosen, Basins E and F, with one to be inundated with tidewater and the other served as a non-tidal control. Extensive year-long surveys of bird activity in and near the Airport were conducted with objectives to characterize seasonal bird activity in tidal and non-tidal basins, to document bird overflights over the runways, and to identify bird movement patterns and attractants in the vicinity of the Airport. One condition of approval was that, if the type and number of birds that represent bird strike hazards increases, the experiment would be halted immediately.

The experiment was conducted from 2006 through 2009 and, at its conclusion, was considered a success. The year 3 monitoring report concluded[2]:

[2] *Tidal Restoration Demonstration Project Year 3 Annual Monitoring Report*, URS, March 2009.

> "Data for the tidal basin suggest that the introduction of tidal flow has suppressed bird-strike hazards associated with that basin. Bird numbers for this area over the course of the year continue to be low compared with the control basin, even though the control basin was dry for most of Year 3…. It appears likely that bird strike hazards associated with the tidal area will remain low as the habitat continues to mature."

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Figure 2-9E Restoration Project Locations 1997-2011

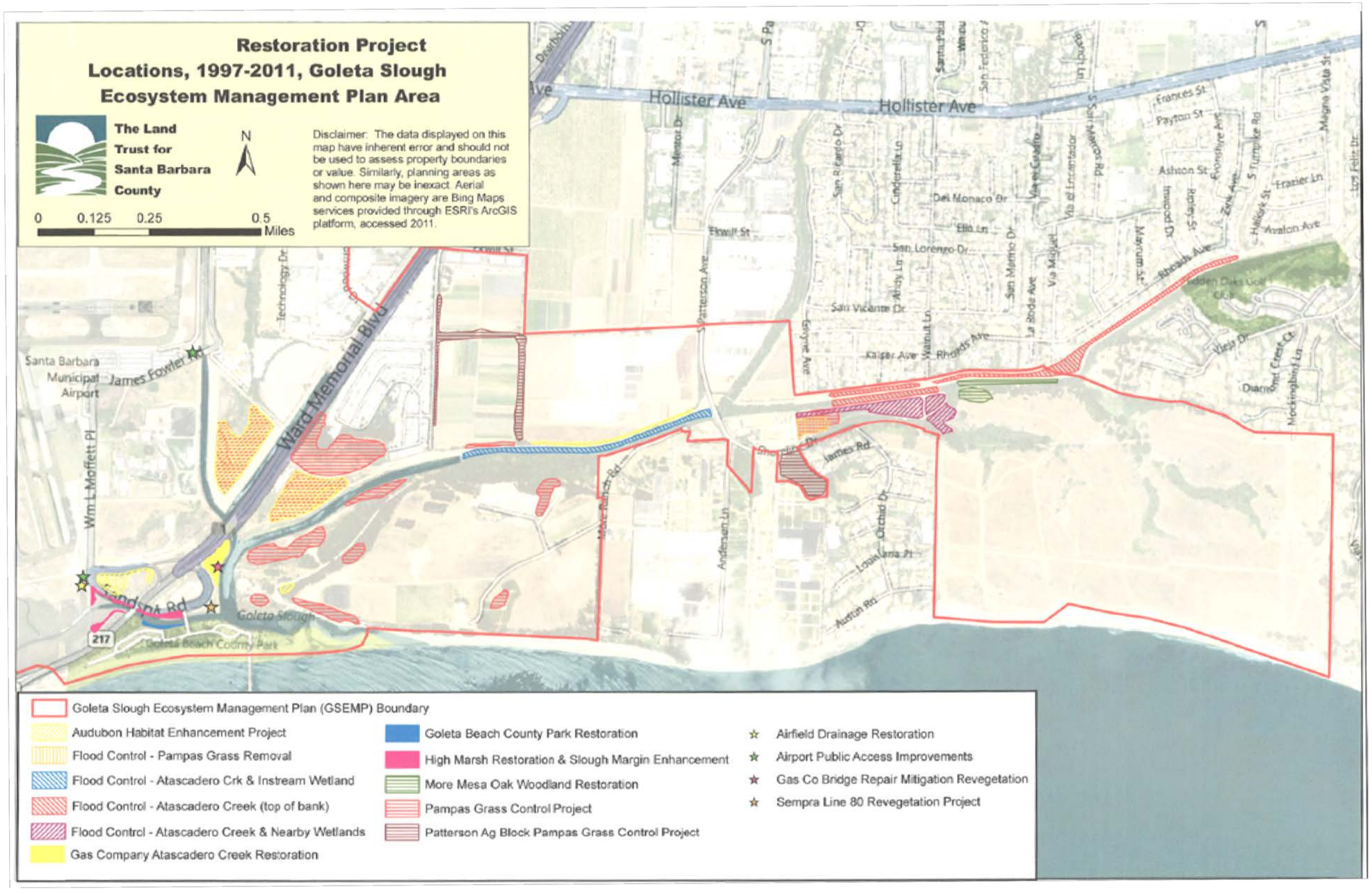

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Figure 2-9W Restoration Project Locations 1997-2011

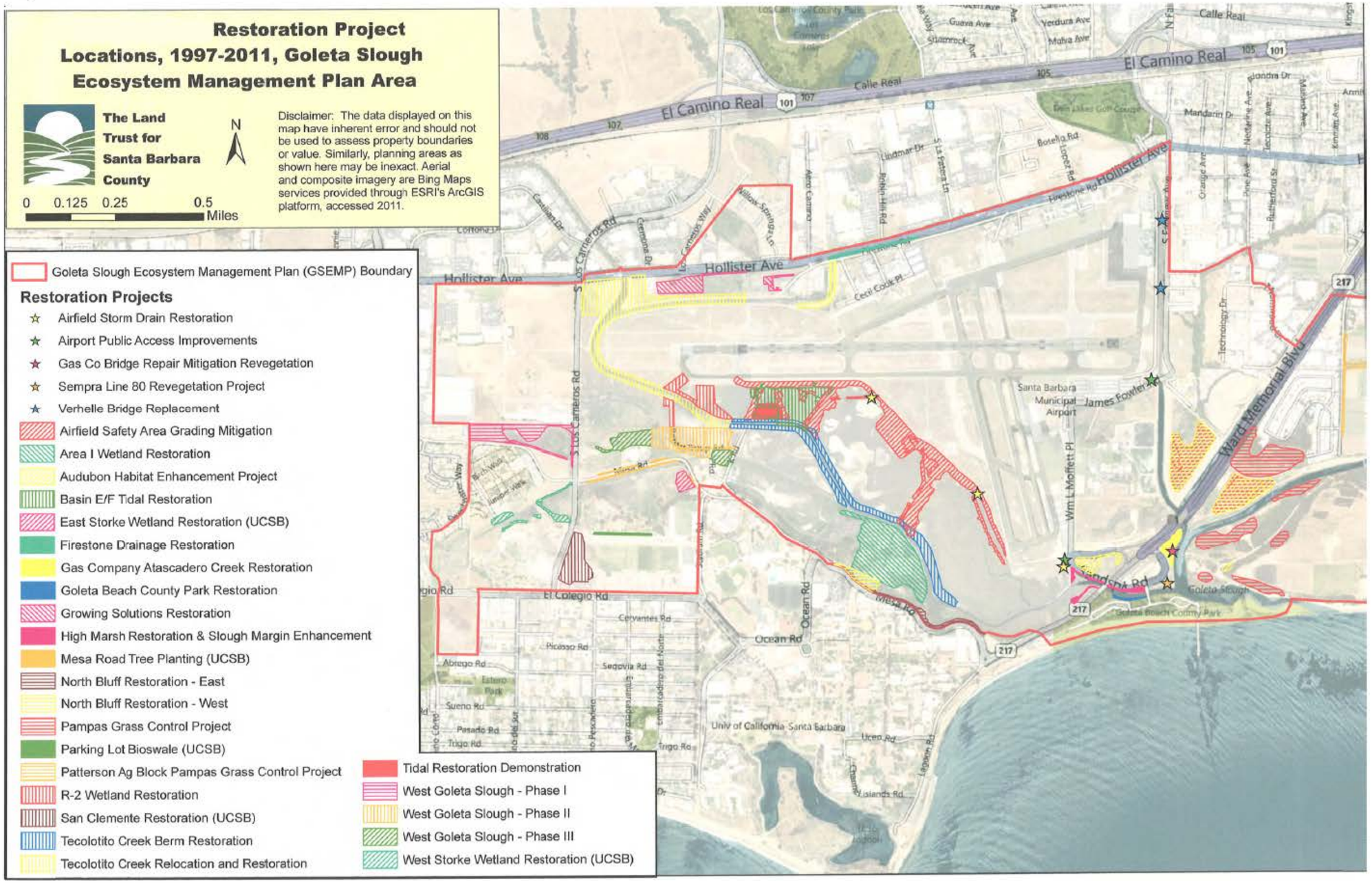

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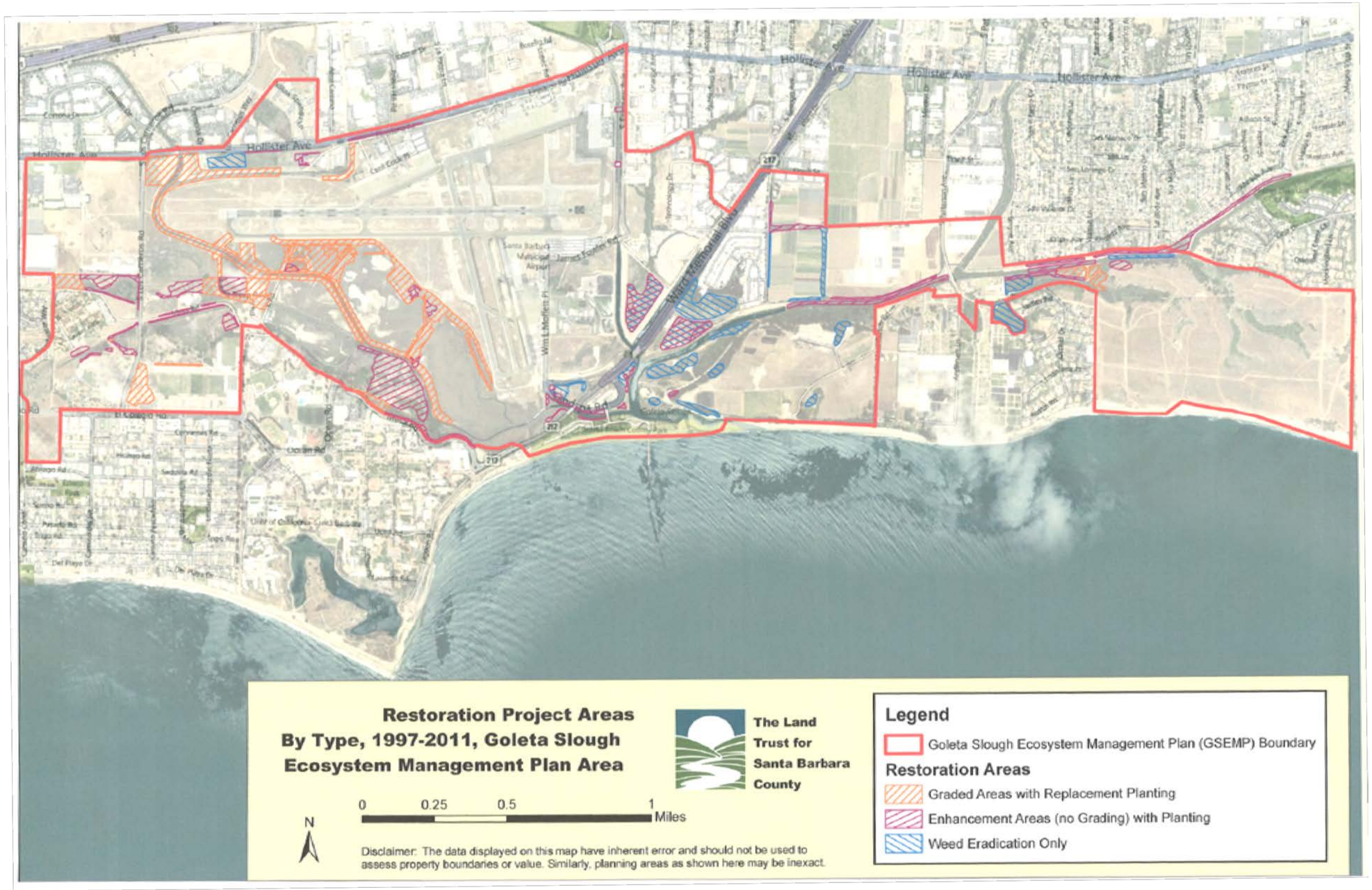
Figure 2-10 Restoration Projects by Type



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2.9 Physical Environment

2.9.1 Geomorphology, Geology and Soils

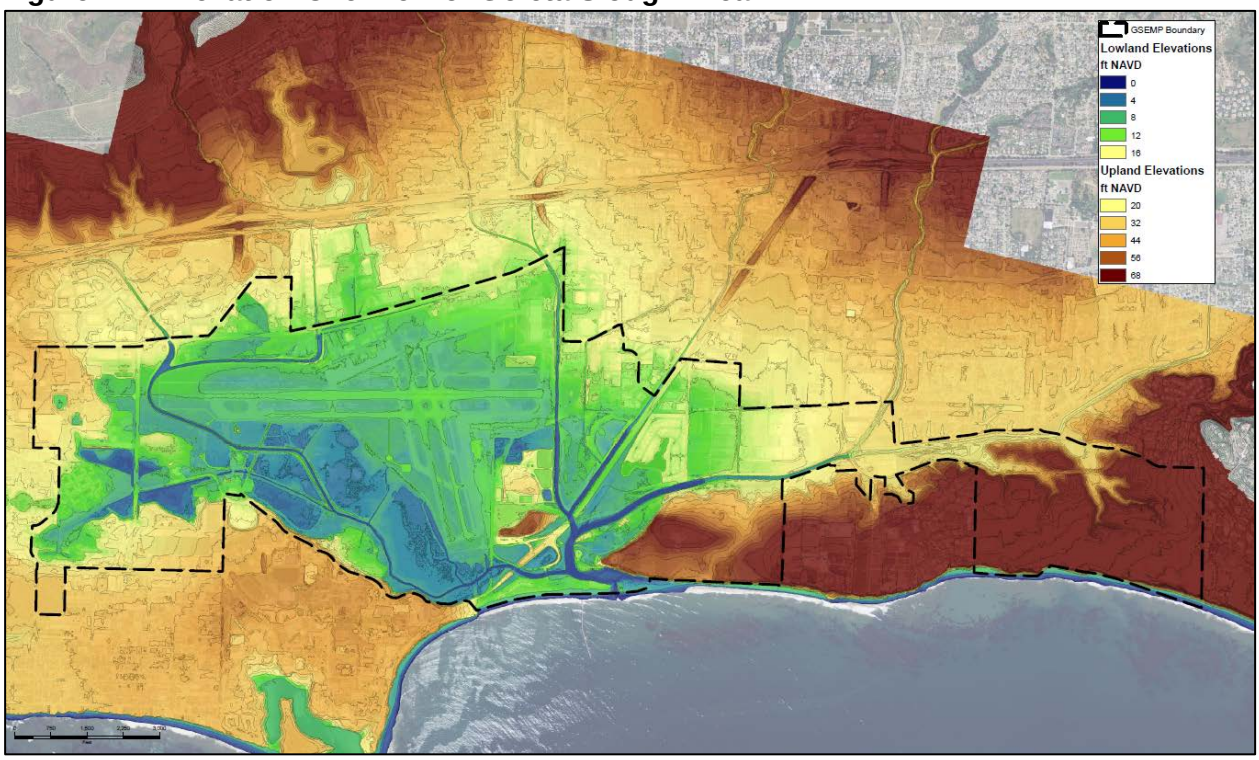
The Goleta Valley lies within a coastal valley created by vertical displacement along a syncline to the north along the Santa Ynez Fault and to the south along the east-west trending More Ranch Fault. The mesas of Isla Vista, UCSB, More Mesa and what remains of Mescalitan Island are related anticlines uplifted along this fault. Structurally, Goleta Slough is a large, shallow basin flooded by the sea. The Slough is not located at a river mouth or coastal canyon, as most other coastal estuaries along the South Coast are located.

The planning area was flooded by high sea levels in the early to mid-Pleistocene, but later drained during low sea levels associated with the glaciation of the middle Pleistocene. During the latter period, drainages were excavated as much as 230 feet below current levels and the mouth of the Slough extended southward beyond its current location at Goleta Beach. During the late Pleistocene and continuing into relatively recent times, gradually rising sea levels drowned the valley, producing a navigable coastal embayment of approximately 18 square miles (Lohmar et al. 1980).

Current elevations within the planning area vary from mean sea level (2.66 feet NAVD) to 140 feet above mean sea level (143 foot NAVD), with the highest points being near the northeastern boundary of the planning area along the eastern edge of More Mesa. See Figure 3-1a, Elevation Overview of GSEMP, for general elevations within the planning area. Within the Slough basin itself, elevation gradients are much more gradual. Elevations here range from sea level to 17 feet NAVD, with the highest point immediately east of Los Carneros Road and north of the eastern CDFG Parcel on Airport property. Not coincidentally, this area includes a Native American archaeological site, as it is known to have been a historical high point within the marsh.

Other points within the Slough that are higher than 17 feet NAVD are anthropogenic in nature, e.g., abandoned military bunkers, levees alongside drainages and creeks, and roads. Figure 2-11and 3-1a-f, Elevation Overview of GSEMP Area, show the elevations within the Slough basin. These maps show the best and most current elevation data available. The figures are a compilation of survey data of Airport property as well as topographic contours digitized from as-built drawings of recent restoration projects that involved grading. In February 2011, Light Detection and Ranging (LIDAR) topographic data was collected by the state. This data was utilized in the sea level rise analysis to refine elevation figures and provide more accurate data in this updated Plan.

Figure 2-11 Elevation Overview of Goleta Slough Area



The low-lying portions of the Ecosystem, like most of the Goleta Valley, are covered with recent, unconsolidated alluvial deposits of silt and sand. Older alluvial deposits cap More Mesa, UCSB and what remains of Mescalitan Island. Along the slopes and ravines of the mesas and Mescalitan Island, older shales, sandstones, and siltstones, primarily the Monterey formation and, more locally, the Santa Barbara formation, are exposed (Dibblee 1987; Ferren and Thomas 1995).

Figures 2-12E and 2-12W, USDA Soils Series, provide complete soil series descriptions of the planning area. The vast majority of soils within the planning area are fine sandy loams, which is to be expected for an alluvial basin at the base of the Santa Ynez range and at the confluence of many creeks and watersheds. A few clay lenses are also found along the tops of the coastal mesas. The majority of the soils near known Native American archaeological sites are characterized as “Xerorthents” (cut and fill areas), perhaps due to the fact that these high points around the Slough margin have been excavated for fill soil, or perhaps due to the large amount of midden material in these areas, or both. The central portion of the Slough itself (on Airport property) is designated as “Aquents – fill areas” or “Aquents – flooded.”

The present character of the Slough also reflects historic and anthropogenic impacts on sediment supply. Actions such as historic overgrazing, altered watershed hydrology due to urbanization and development, channelization of the creek banks, constrained mouth dynamics, and the removal of sediment from the creek channels have all contributed to the disruption of the natural sediment dynamics that shape the Slough landscape and altered patterns of erosion and deposition within the Slough’s waterways and wetlands.

Figure 2-12E Soils within the Goleta Slough Ecosystem Management Plan Area - East

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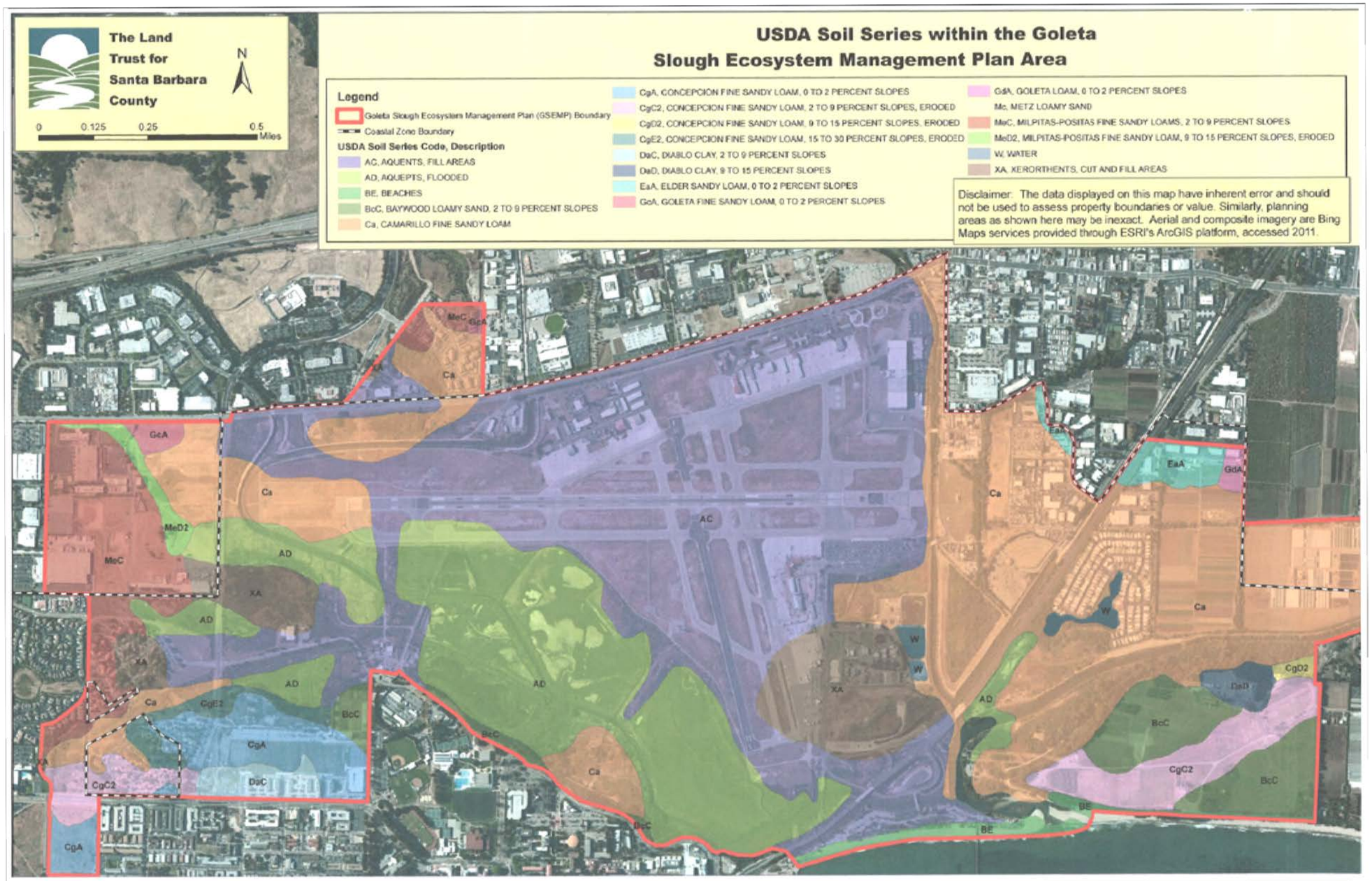
Figure 2-12W Soils within the Golteta Slough Ecosystem Management Plan Area – West



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2.9.2 Climate

The Goleta Slough area has a Mediterranean climate, characterized by a warm, dry "summer" extending from May through October and a mild, moist "winter" lasting from November through April. The climate is similar to the rest of coastal southern California, being significantly warmer and drier than what occurs a relatively short distance to the north beyond Point Conception. As a result, the biological communities of the Ecosystem closely resemble those of coastal southern California and include a number of species that reach their northern distributional limits at Goleta Slough (Ferren and Thomas 1995).

The Pacific Ocean helps to moderate local temperature ranges. Summer maximum temperatures average in the 70s (degrees Fahrenheit) while minimums average in the 50s to low 60s. Maximum air temperatures during the winter months average in the 60s with minimums in the 40s. Temperatures slightly below freezing are not uncommon during the coldest mornings of the year.

The planning area is partially shielded from the prevailing northwesterly winds by the Santa Ynez Mountains to the north. The mountains also help in deflecting the wind, resulting in daytime sea breezes from the southeast to the southwest along the southern Santa Barbara coast. Light northeasterly land breezes usually occur at night within the planning area; these breezes may extend many miles offshore during the colder months of the year until daytime heating reverses the flow back onshore.

Over 90 percent of the total annual precipitation in the project area occurs from November through April. Annual precipitation is approximately 18 inches at the Airport and increases to more than 30 inches in the Santa Ynez Mountains to the north of the planning area (see Figure 2-13). Although the majority of the precipitation in the planning area is produced by winter storm systems from the north Pacific, summer tropical moisture can also produce clouds and occasional rainfall.

Along the Southern California coastline, an inversion layer often forms at altitudes of 500 to 2,000 feet, trapping cool, moist air at lower elevations. Fog and low clouds are formed by condensation below the inversion layer, especially at night and in the morning when air temperature is lower. Fog is most frequent during summer, when the ocean is relatively cool and the marine layer is drawn inland by warm air rising above land.

2.9.3 Watershed

The watershed of the Goleta Slough is approximately 48.2 square miles and is shown in Figure 2-14. Seven creeks—Tecolotito (Glen Annie), Carneros, San Pedro, Las Vegas, San Jose, Atascadero and Maria Ygnacio—drain southward off the Santa Ynez Mountains, discharging into the Slough. Two sub-watersheds of Atascadero Creek, Hospital Creek and Cieneguitas Creek, are also shown in Figure 2-14, as is San Antonio Creek, a sub-watershed of Maria Ygnacio Creek. The Devereux Slough, UCSB Lagoon, and Laguna Blanca watersheds are also shown on that figure as important adjacent watersheds although they do not drain into Goleta Slough. It should be noted that Laguna Blanca is a natural but managed lake, and in wet years excess water is released into the Cieneguitas Creek watershed. Additionally, Goleta Slough also receives runoff from most of More Mesa and the north-facing bluffs of UCSB.

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Figure 2-13 Goleta annual rainfall

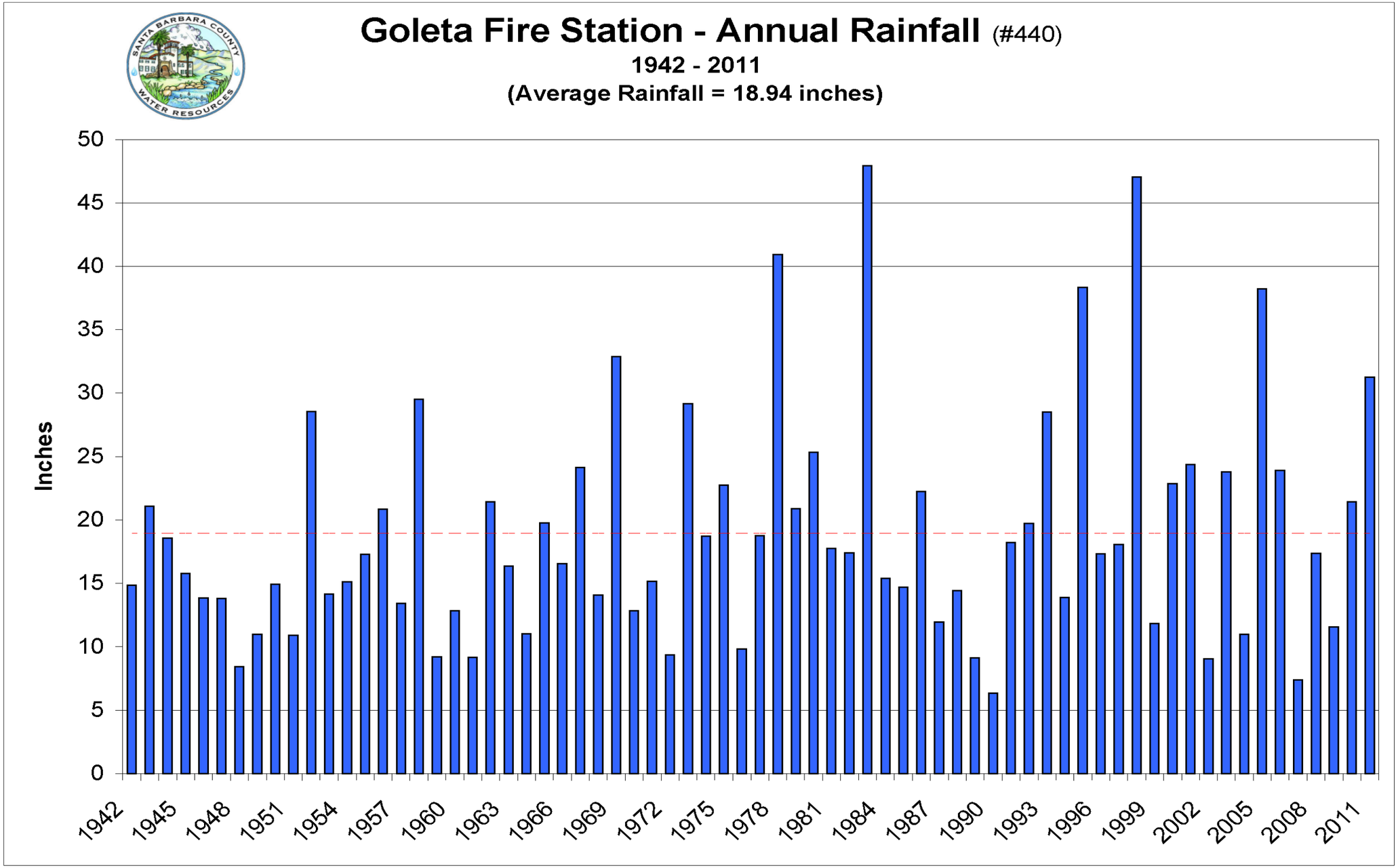

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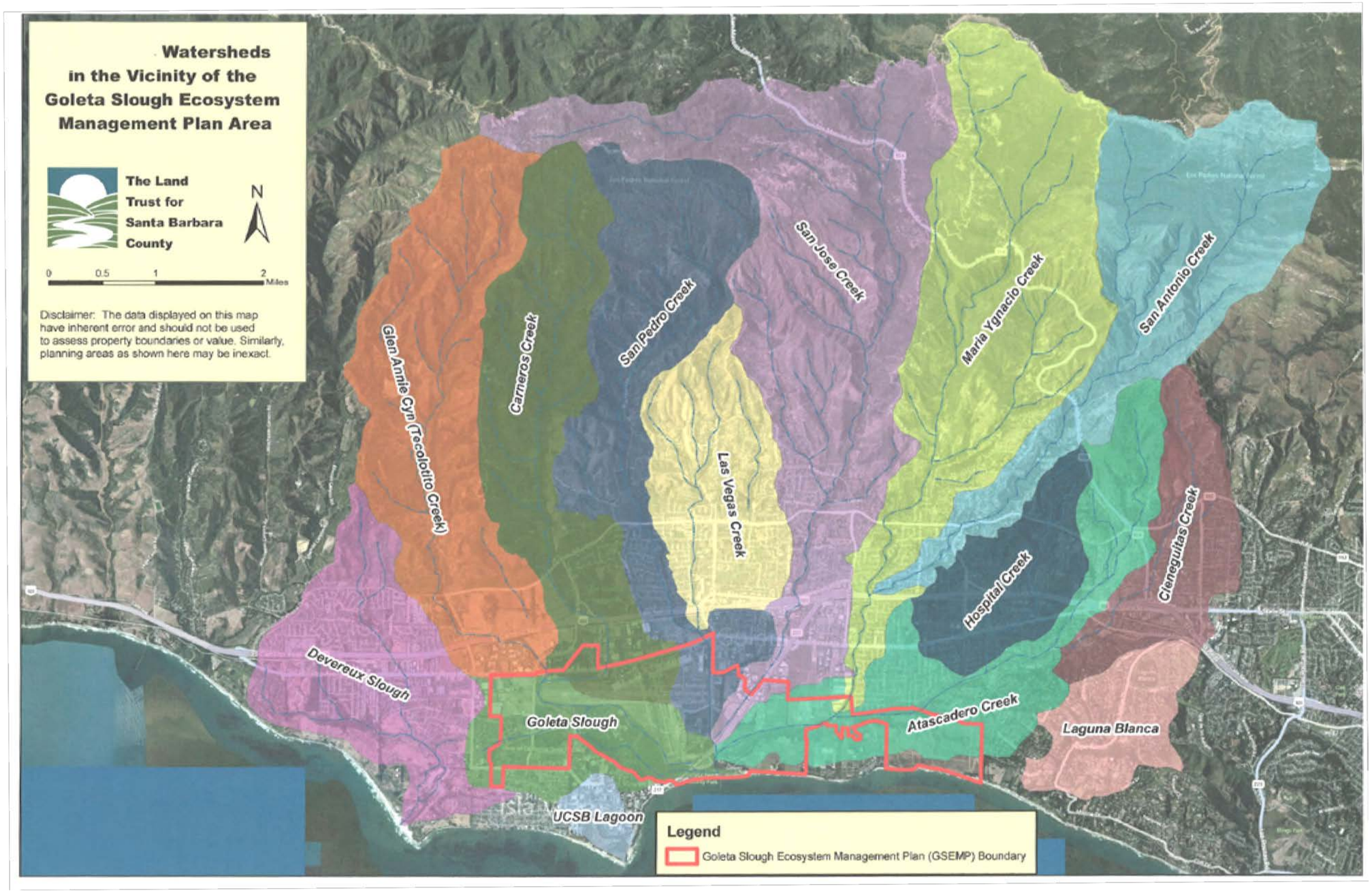
Figure 2-14 Watersheds



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2.9.4 Flood History

Historical accounts state that prior to 1861, the area of the Goleta Slough was comprised of a permanently flooded, shallow estuarine embayment. Some accounts and maps suggest that the embayment was continuous with what is now Devereux Slough (Stone 1982). This navigable bay was substantially filled by sedimentation during catastrophic flooding during the winter of 1861- 62 following extensive hillside grazing and fires in the watershed. About 14 feet of sediment was deposited into the Slough creating a shallow lagoon with extensive bordering intertidal wetlands. Deltaic deposits at the mouths of the creeks produced a much-dissected system of tidal drainages and bordering salt and brackish marshes (Speth et al. 1970; Lohmar et al. 1980; Ferren et al. 1987; Ferren and Thomas 1995) (Figure 2-15). In 1938, just prior to the construction of the Marine Corps Air Station (that became Santa Barbara Airport after WWII), a flood event moved substantial amounts of sediment through the Slough and into the ocean and could be seen as a large ebb shoal off of Goleta Beach. Since the construction of the airport, there has been a significant reduction in tidal prism decreasing the ability of the Slough system to move sediment to the ocean and the ebb shoal has never been as large (Revell and Griggs 2006).

There have been two major flood events at Goleta Slough since the construction of the airport in the late 1930s. The 1969 flood resulted in the highest water levels observed within the Slough in modern times (Figure 2-16). Based on a review of historic photos from the 1969 event, we have estimated that water levels within the Slough exceeded 12' NAVD, covering most of the Airport runway, access roads and parking lots. A second major flood event occurred in 1995, with estimated water levels in the Slough reaching 10' NAVD (Figure 2-17). This flood event caused ponding on low-lying sections of the runways and deposited a considerable amount of sediment on the runways and taxiways. These elevated water levels disrupted operations at the Airport for several days and caused significant damage to the airport facilities and neighboring properties.

Observational data is relatively sparse for these two flood events. No records have been found of the condition of the Slough mouth before either of these events (e.g., berm elevation), nor do we have a complete record of the precipitation or stream flow for either event. The peak stream flow on Atascadero Creek reached 4,000 cubic feet per second (cfs) during the 1969 event and exceeded 10,000 cfs during the 1995 event. Substantial flood channel widening and structural improvements made in the mid-70s after the 1969 event reduced the over flood levels in the Slough. However, the higher water levels within the Slough during the 1969 event, despite the more modest peak stream flow, were also coupled with substantial ocean wave energy suggesting that precipitation and stream flow is not the only driver of flooding within the Slough.

Figure 2-15 1928 Goleta Slough. Spence Collection, UCLA

Figure 2-16 1969 Flooding around Santa Barbara Air Terminal

Figure 2-17 1995 Flooding of airfield

2.9.5 Role of Fluvial Processes in Goleta Slough

Stream flows play an important role in driving the physical and ecological processes that occur in Goleta Slough. Stream flows are a primary component of the Slough water levels and strongly influence the frequency of the breaching of the Slough mouth. Freshwater inflows from the creeks also influence water quality, both by reducing salinity, as well as transporting sediments and potentially contaminants from the watershed. Changes in the salinity can have important implications for habitat and ecosystem function, and contaminants introduced to the Slough from upland areas can compromise habitats and interfere with recreational uses of the Slough and beach. Finally, sediments transported from the upland watershed are a major contributor to the health of local wetlands and are one of the key resources for adapting to rising sea levels.

Stream flow is the primary source of fresh water within the estuary. The distribution of salinity within the estuary is determined by the balance of freshwater streamflows and saline waters entering the lagoon from the ocean. Some estuarine species (e.g. tidewater gobies) are adapted to thrive in the brackish salinities that occur when saline seawater that enters the Slough during high tides and wave overtopping events is mixed with freshwater inflows from the watershed. Consequently watershed discharges are a critical factor in maintaining the habitats and diversity of species present within the estuary.

As water flows into the Slough from the watersheds it carries sand, silt, cobbles and other sediment particles, some of which may deposit in the estuary while a fraction washes out into the ocean. Historically, sedimentation has profoundly affected the Ecosystem through time and continues to affect patterns of flooding and the development of wetland versus upland habitats. This sediment supply can become an important resource for the management of wetland habitat areas under future sea level rise conditions. If allowed to deposit naturally on the marsh surface, sediment can gradually increase the ground elevation, potentially allowing the marsh to keep pace with sea level rise over time.

Sediment and debris, when funneled into relatively narrow areas as a result of creek channelization and development, diminish the capacity of the creek channels to convey

floodwaters through developed areas. The urban encroachment into the Slough and floodplain areas necessitates periodic channel maintenance by Santa Barbara County Flood Control.

Between 1995 and 2011, 1,050,000 cubic yards of sediment were removed from the estuary as part of flood control maintenance (Table 2-3). Some of that has been placed at Goleta Beach, but much of it has been removed from the system. If that volume of sediment were evenly distributed over the existing marshes in Goleta Slough it would increase the ground elevation by ~1.5 ft. In the future as sea levels rise, the fluvial sediment supply should be studied to see if it could prove to be a valuable adaptation resource that can help the wetland habitats in Goleta Slough persist by enhancing natural accretion processes. Without sediment, tidal marshes and wetlands are at risk of drowning or converting to subtidal habitats over time as sea levels rise.

2.9.6 Sediment Supply

A majority of the Goleta Slough watershed is on steeply sloping chaparral covered, undeveloped National Forest or agricultural land on the south-facing slope of the Santa Ynez Mountains. Large volumes of sediment and debris are contained in runoff from the mountains, much of which falls out of suspension as topography flattens and stream flow velocities drop as the creeks enter Goleta Slough.

Table 2-3 below shows the average annual volume of sediment removed from five key creeks that drain into Goleta Slough from 1994 through 2011. The District has been maintaining sediment removal basins in this system for over 40 years to increase the creeks' capacity to convey flood flows. The Santa Barbara County Flood Control District has used some of the removed material for beach nourishment at Goleta Beach. Without ongoing maintenance, Goleta Slough could accumulate sediment that would likely decrease channel capacity and increase the potential for flooding.

While the removal of sediment from the Slough channels reduces the risk of flooding of nearby infrastructure, it also disrupts the natural accretion processes that help maintain the ecological function of the estuary. In an unmanaged estuary, sediments that are deposited in the channels during normal stream flows can be transported onto the marsh plain or flushed out through the mouth during larger flow events. Sediments that deposit on the marsh plain provide nutrients and substrate that allows wetland vegetation to thrive. The process of sediment depositing on the marsh plain may help prevent estuarine wetlands from drowning under rising sea levels, and therefore offers one of the best natural mechanisms for maintaining healthy marshes and improving the resilience of habitats to climate change.

Table 2-3
Summary of Historical Sediment Volumes Removed (cubic yards)
Creeks that enter into Goleta Slough
1994/95 through 2011

Year	Atasca-dero	San Pedro	San Jose	Los Carneros	Tecolotito	Totals
94/95 (Phase I)	130,000	50,000	30,000	18,000	40,000	**268,000**
95/96 (Phase II)	63,853	12,134	18,054			**94,041**
98/99	91,000	34,500	33,000	10,000	30,000	**199,000**
00/01	14,800	6,100	4,100	6,000		**31,000**
01/02	33,450	9,565	17,850	1,400	3,000	**65,355**
2003	8,100	6,600	7,200			**21,900**
Jan/Feb 2005	20,000	50,000	35,000			**105,000**
2005	46,520	10,790	13,190	30,000	60,000	**160,500**
2006		6,500	3,000	2,500	7,000	**19,000**
Gap Fire (July 2008) affected Los Carneros, Tecolotito, San Pedro, and San Jose Creek Watersheds (among others outside of the Goleta Slough Watershed).						
2008		6,500	3,000	2,500	7,000	**19,000**
Jesusita Fire (May 2009) affected Atascadero Creek Watershed within the Goleta Slough (among others outside of the Goleta Slough Watershed).						
2009	13,000					**13,000**
2/2010		3,900		3,300		**7,200**
12/2010	10,300	11,650	6,900			**28,850**
3/2011		8,100	7,600	5,400	8,700	**29,800**
Totals	***431,613***	***214,839***	***175,894***	***81,600***	***148,700***	***1,052,646***

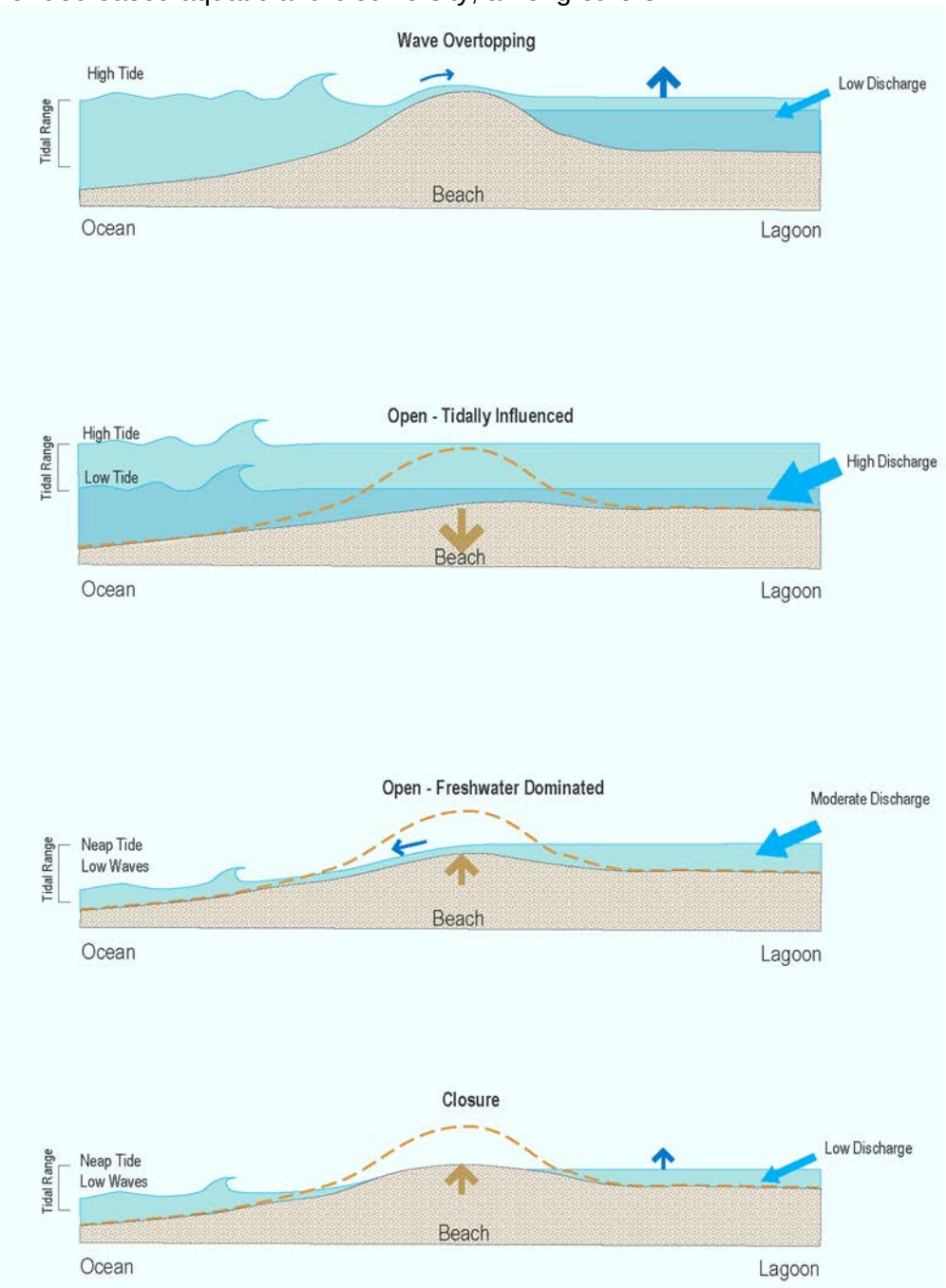
Source: Santa Barbara County Flood Control

2.9.7 Natural Functioning of Goleta Slough

Point Conception in the northwest and the Channel Islands to the south create a narrow swell window that shelters much of the south-facing coast of Santa Barbara County from extreme wave events during the winter months. During the summer months the wave energy is significantly reduced allowing the beach to build up and naturally close the Slough inlet.

Under existing conditions, water levels in Goleta Slough are controlled by the presence and elevation of the beach berm at the inlet mouth at Goleta Beach (Figure 2-18). Seasonally, the Slough cycles between closed and open inlet conditions. Depending on the elevation of the beach berm crest, wave overtopping and freshwater flows fill the Slough like a bathtub (Figure 2-18a). At some point, as the water level elevations of the Slough reach the berm crest elevation, the inlet breaches. This breaching is typically associated with a rainfall/runoff event but in some cases a significant overtopping event can also initiate the breach. Regardless of the actual cause, the breach scours a channel through the beach reintroducing tidal exchange (salt water) to the Slough (Figure 2-18b). Eventually, as the streamflow diminishes and sand begins to accumulate in the inlet mouth, the beach forms a sill that limits the amount of tidal influence. During this phase (Figure 2-18c), the system is predominantly freshwater flow controlled. At Goleta Slough this often is the phase when the inlet has migrated east down the beach. Eventually, the beach builds up and closes off the inlet mouth causing a bathtub-like filling of the Slough, and a slow increase in the Slough water elevations (Figure 2-18d). Problems that can arise when the Slough mouth remains

closed indefinitely include localized flooding, increased mosquito breeding, fish kills, and potential for decreased aquatic and biodiversity, among others.



Figures 2-18 a, b, c & d – Bar Built Estuary Function

2.9.8 Tidal Influences

Tides along the California coast are of the mixed, semidiurnal type, meaning that there are two daily high tides of unequal height separated by low tides that are also of unequal height or amplitude. The Goleta area experiences an average daily tide range of 5.2ft. Extreme high water, the highest tide experienced during an average year, is approximately +6.9 ft NAVD, although

storm surges and other meteorological phenomena can cause higher coastal water levels during rare events. Table 2-4 shows the elevation of the key tidal datums at the Santa Barbara tide gauge.

Table 2-4
Goleta tides

Datum	ft NAVD88
Extreme High Water	6.90
Mean Higher High Water	5.27
Mean High Water	4.52
Mean Sea Level	2.66
Mean Low Water	0.85
Mean Lower Low Water	-0.13

Source: NOAA Tides and Currents, Santa Barbara Tide Gauge, STA # 9411340

Tidal patterns in Goleta Slough have not been systematically measured. Observations made during the tide gate experiment in 1994-1995 suggest that, similar to the Carpinteria Salt Marsh (Hubbard 1995), tides extending up the Goleta Slough are of diminished amplitude and exhibit a time lag relative to predicted tides along the open coast. For example, at the tide gate at Adams Road (near the Goleta West Sanitary District plant), spring tide ranges of 2-3 feet were observed, rather than the 6-8 feet predicted by local tide tables, and appeared to lag several hours behind tides at the mouth of the Slough (Dugan and Saley, personal communication). Similar observations have been made for Los Carneros Creek that also show diminished amplitude (Stratton, pers. comm.).

Tidal circulation within the Slough is driven by tidal flows passing through lagoon mouth. Wave and watershed processes cause the lagoon mouth to periodically open and close, consequently Goleta Slough experiences intermittent periods of tidal action separated by periods where the lagoon is closed to the tides. Factors affecting the breaching and closure of the lagoon mouth are discussed further in Part 3 of this document.

A gauge located on the access bridge to Goleta Beach shows that, during periods when the lagoon mouth is open, at high tide water levels within the Slough tend to match those on the open ocean, however the Slough often does not fully drain during low tides. The lowest low tides measured at the access bridge between 2011 and 2014 were approximately 1 foot higher than the lowest low tide levels on the open ocean.

Tidal circulation extends from the mouth of the Slough at Goleta Beach up each of the tributary streams of the Slough, with the exception of Las Vegas and Maria Ygnacio Creeks. These two creeks enter San Pedro and Atascadero Creeks, respectively, above the tidal limit. Tidal influence extends up Tecolotito and Carneros Creek channels to Hollister Avenue. Extensive areas of historic salt marsh below the high tide line are currently isolated from tidal exchange by berms and levees. Tidal inundation is generally limited to the stream channels and to the south-central portion of the Slough.

2.10 Natural Resources

The 1997 GSEMP included an extensive discussion of ecosystem resources in the GSEMP area. Historic conditions were described, based in part on 1995 information from the UCSB Natural Areas plan and Airport Master Plan EIR/EIS that was completed in the early 1990s. Other sources included the 1993 Goleta Community Plan and various EIRs, studies and plans that had been

done in the area. Existing 1997 conditions were also described as well as anticipated future habitats.

Due to budget limitations, most of the natural resource information in the 1997 GSEMP has not been updated in this report. However, considerable information about natural resources in the eastern part of the Goleta Slough Ecosystem is available in the *Draft Goleta Valley Community Plan* at:

http://longrange.sbcountyplanning.org/planareas/goleta/documents/Planning%20Commission%20Hearing%206.17.2015/Draft%20Final%20EGVCP%20PC%206-17-2015.pdf

The community plan's Draft Final Environmental Impact Report can be found at:
http://longrange.sbcountyplanning.org/planareas/goleta/documents/EIR/FEIR/Volume_I_FEIR_052215.pdf

UCSB's *Long Range Development Plan,* certified by the Coastal Commission in November 2014, also has information about the western part of the Ecosystem at:
http://lrdp.id.ucsb.edu/sites/default/files/sites/client057/www/streaming/USCB%202010%20LRDP.pdf.

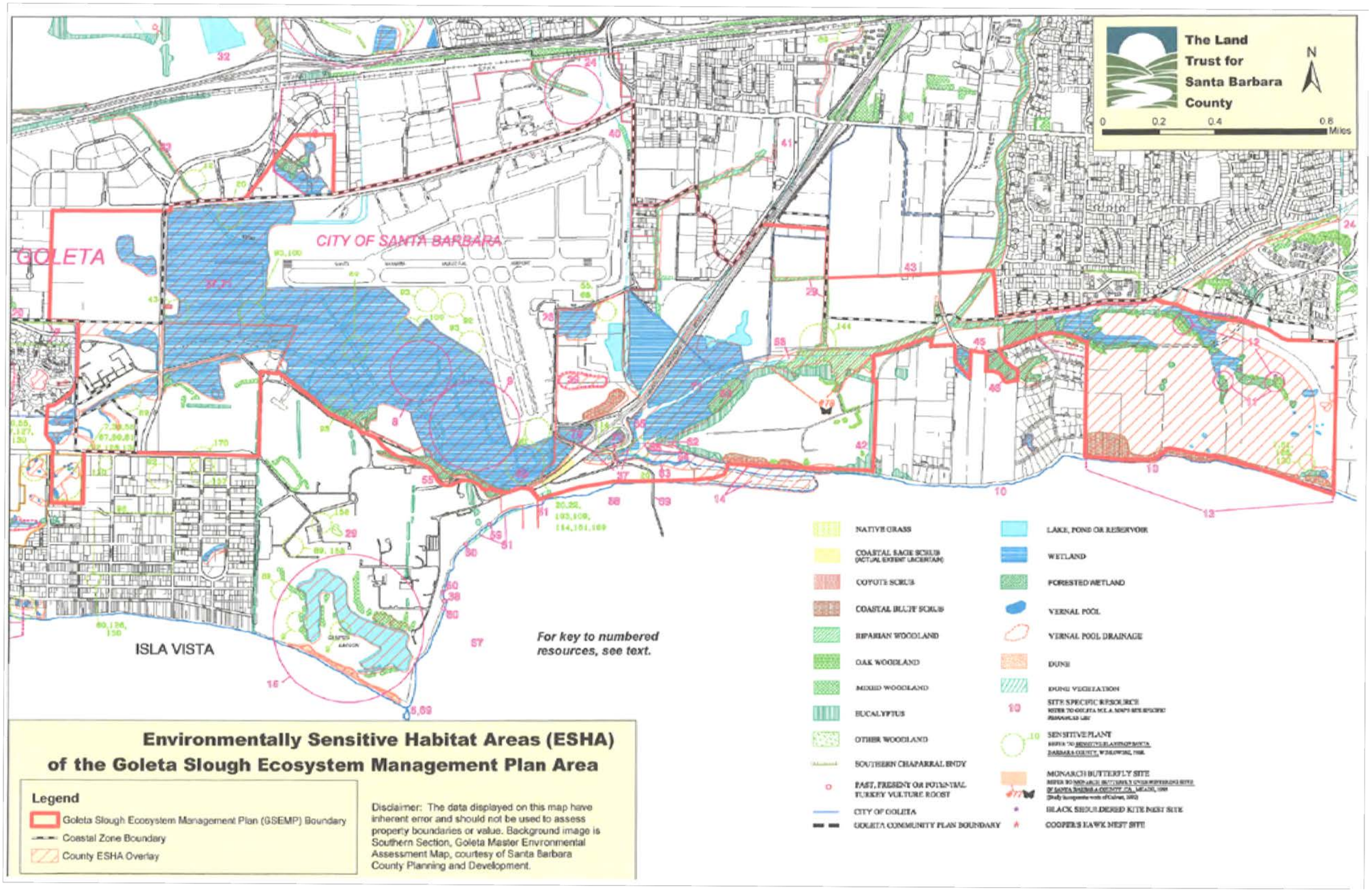
The LRDP EIR is available at:
http://lrdp.id.ucsb.edu/sites/default/files/sites/client057/www/streaming/LrdpFnlEIR.pdf

The updated natural resources information in this report is limited to Environmentally Sensitive Habitat Areas as shown in Figure 2-19. These habitats update Figures 19A and 19B from the Draft GSEMP (P. I-55 and I-57), including using more up-to-date nomenclature for various habitats.

Site-specific resources are numbered in pink on that figure and refer to information included in the Goleta Master Environmental Assessment that was originally prepared by Santa Barbara County Planning and Development. The light green numbers refer to specific plants as listed in the *Sensitive Plants of Santa Barbara County* prepared in 1988 by Tara Wiskowski for the Santa Barbara County Division of Environmental Review. Some information was also taken from the February 2011 *Draft Goleta Valley Community Plan* initiation draft document.

Note that while the Figure 2-25 legend refers to "Black-shouldered kite nest site," the correct name for this bird is now "White-tailed kite". More Mesa and the North Bluff area of UCSB are the only known White-tailed kite nesting sites in the study area.

Environmentally Sensitive Habitat Areas – Figure 2-19



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Tidewater Goby

One notable species that was not known to exist in the Ecosystem when the 1997 plan was written is the Tidewater goby (*Eucyclogobius newberry*). Tidewater goby is a Federally-listed endangered species. Tidewater goby was thought to have been extirpated from the Goleta Slough, however in August 2006 Tidewater gobies were found in the two sediment basins near Hollister Avenue in during the Creek Relocation Project. Following the observation of Tidewater goby within the project area, work on the creek project was halted and the Airport contacted the US Fish and Wildlife Service pursuant to the Endangered Species Act.

The US Fish and Wildlife Service conducted a site visit with Airport staff and agreed that, given the work already completed, the tidewater goby could not leave the site on its own and must be relocated. In September 2006, the US Fish and Wildlife Service issued a Biological Opinion on the Airfield Safety Projects with respect to the tidewater goby allowing "incidental take" during the fish relocation project. A total of 1,502 tidewater gobies were relocated in this effort. Additionally, the creek bottom soil was stored separately and was laid out in the new creek alignment to maintain similar feeding/breeding conditions in the new creek alignment.

An unintended benefit of the Airfield Safety Projects is that the new creek alignment increased the extent of suitable Tidewater goby habitat. The Airport conducted tidewater goby surveys in 2007 and in 2008. These surveys found a stable population of breeding Tidewater gobies.

The following excerpt from Appendix C, page C-79 of the Santa Barbara Airport Master Plan DEIR (August 2015) provides additional information on the observations of Tidewater goby within the Slough:

> Tidewater goby (*Eucyclogobius newberryi*) […] is found in brackish or freshwater in bays, sounds, and lagoons and creeks along the coast from Del Norte County south to San Diego County. Half-grown and adult tidewater gobies move upstream in summer and fall, usually up to 1 kilometer (0.62 miles) from the estuary, but in some areas from 5 to 8 kilometers (3.1 to 5.0 miles). Reproduction occurs at all times of year, but peak spawning occurs during spring and late summer (USFWS 2005). Although this species inhabits creeks along the entire coast of Santa Barbara County and was present in Goleta Slough in the 1960s, collecting efforts in the 1990s failed to find tidewater gobies there, and the species was considered extirpated in the area in 2005 (USFWS 2005). However, surveys conducted in 2006 in relation to the Creek Relocation Project recorded tidewater gobies in both Tecolotito and Carneros Creeks (URS 2008c, County 2010).
>
> Since tidewater gobies were rediscovered in Goleta Slough in 2006, most surveys have involved sampling of limited areas of the slough and have resulted in small numbers of tidewater gobies detected. However, prior to construction activities for the Creek Relocation Project, capture and relocation efforts in August and September 2006 covered all areas within Tecolotito and Carneros Creeks to be impacted by construction. These efforts resulted in the capture and relocation of 1,502 tidewater gobies, with most fish captured in upstream portions of Tecolotito Creek (URS 2007, 2008c). Post-construction surveys found the species in both of these creeks in 2007 and 2008 (URS 2007, 2008c). However, no tidewater gobies were found in sampled areas of Tecolotito and Carneros Creeks in August 2008. These surveys occurred two weeks after anoxic conditions resulting from an algal bloom caused the death of large numbers of topsmelt (Antherinops affinis) within Goleta Slough; these conditions may have the potential to reduce the habitat area for tidewater gobies (URS 2008c, USFWS 2005). However, tidewater gobies were detected in this area

> in subsequent years. Surveys within limited areas of Basin E/F and adjacent portions of Tecolotito Creek resulted in observations of one tidewater goby in September/October 2010, five in May 2011, and none in August 2011 (URS 2012).

This species was also found in Atascadero Creek subsequent to its discovery in Tecolotito and Carneros Creeks in 2006 (County 2010). The County's Final Subsequent Environmental Impact Report (FSEIR) on Flood Control's maintenance activities in the Slough noted the species had not been detected in San Pedro and San Jose Creeks. However, the FSEIR assumed tidewater gobies were present in all five creeks, and conditions for on-going Flood Control activities in all of these creeks required exclusion of tidewater gobies for work conducted in these areas (County 2010). Although USFWS did not include any portion of the Santa Barbara Airport in its final designation of tidewater goby critical habitat in 2008 (73 FR 5920-6006), all five creeks converging in Goleta Slough were included within a proposed revision of critical habitat for the species in 2011 (FR 76 64996-65060). No focused surveys for this species were conducted in early 2012.

In 2014 and 2015, the Airport Department and its consultants have worked with state and federal agencies to address the potential for "takings" of Tidewater goby, Southern steelhead (see next section), and other protected species which could result from management actions at the Slough mouth intended to reduce flooding of the Airport and surrounding areas.

Steelhead

The *Draft Goleta Slough Mouth Management Biological Assessment*, Rincon et. al., 2015 describes the southern steelhead population in the Goleta Slough Area, as follows:

> "The steelhead population that potentially occurs in Goleta Slough is part of the southern California steelhead Distinct Population Segment (DPS) which extends from the Santa Maria River in San Luis Obispo County to the U.S-Mexico border (NMFS 2006). This DPS is listed as endangered under the federal Endangered Species Act, and designated critical habitat includes Goleta Slough (NMFS 2006).

Both anadromous and resident O. mykiss occur within tributaries to Goleta Slough (Stoecker 2002, National Marine Fisheries Service 2013, as cited in U.S. Army Corps of Engineers 2014), although detailed information on the relative proportion of each type is not available. Little data on steelhead spawning timing exists for Goleta Slough, although both spawning timing and distribution within the basin is related to timing, frequency, and duration of sandbar opening and winter flow conditions. Adult steelhead occurrence in Goleta Slough is necessarily limited to periods when the estuary is open, at which point adults are expected to use it as a migration corridor to the upper watershed as soon as water depth in the river allows. Timing of smolt outmigration also depends on when adequate flow conditions are present to connect the estuary to the ocean.

Juvenile steelhead may rear for extended periods within upstream freshwater habitats of the Goleta Slough depending upon seasonal variations in rainfall that control the extent of wetted channel and connectivity from the Slough to upstream locations. Juvenile O. mykiss have been reported in upstream habitats of Atascadero, San Jose, San Pedro, and Tecolotito creeks as well as in some of their tributaries including West Fork San Jose Creek, and Maria Ygnacio and San Antonio creeks which flow into Atascadero Creek (Stoecker 2002). Adult steelhead have been reported in the lower sections (south of Highway 101) of San Pedro, Atascadero, and Maria Ygnacio creeks (Stoecker 2002). In 2013, two adult steelhead and numerous juveniles were

observed by NMFS staff in Atascadero Creek below the drop structure (i.e., grade control) at the Patterson Avenue Bridge (National Marine Fisheries Service 2013, as cited in U.S. Army Corps of Engineers 2014).

Although closed-mouth conditions may force periods of lagoon rearing, little is known regarding habitat use within the Goleta Slough. Numerous tidewater goby protocol surveys conducted throughout the Slough between 2006 and 2008 reported no capture of steelhead (URS Corporation 2008a,b,c,d, URS Corporation 2009c), although the survey methods are unlikely to be effective for capture of steelhead. Under open-mouth conditions in the Goleta Slough, steelhead are assumed to use the lagoon habitat primarily as a migratory corridor, although there is potential for rearing within the freshwater/brackish ecotone."

Belding Savannah Sparrow

The *Draft Goleta Slough Mouth Management Biological Assessment*, Rincon et. al., 2015 describes the Belding Savannah Sparrow population in the Goleta Slough Area, as follows:

> [Goleta Slough's pickleweed marsh habitat supports] "a nesting population of Belding Savannah Sparrow, (*Passerculus sandwichensis beldingi*), a state endangered species. Other than one or two territories present irregularly at Devereux Slough, approximately 1.25 miles west of Goleta Slough, the population at Goleta Slough is the furthest northwestern occurrence for the subspecies. Periodic surveys (approximately every five years) have yielded counts of between 52 and 68 territories since 2001, although more extensive surveys in 1992 and 1994 recorded 117 and 140 pairs, respectively (Zembal and Hoffman 2010, Compton 2015, Holmgren and Burnell 1992, Holmgren and Kisner 1994).

See the full report for a more detailed analysis of this species' presence in the Slough.