MODIFYING SUCCESSION: A HISTORY OF VEGETATION ALLIANCES ON SWANTON PACIFIC RANCH

A Thesis

presented to

the Faculty of California Polytechnic State University,

San Luis Obispo

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts in History

by

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June 2019

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ABSTRACT

Modifying Succession: A History of Vegetation Alliances on Swanton Pacific Ranch

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This thesis conducts historical research into Swanton Pacific Ranch in the County of Santa Cruz, an interdisciplinary facility for education and research managed by Cal Poly's College of Agriculture, Food and Environmental Sciences. The study seeks to determine whether there have been discernable changes in vegetation alliances (communities), spatially or in type, within a 110-acre Study Area from the early twentieth century to the present day and how the changes compare with other similar historical analyses in California. Historical farming and ranching uses of the area are researched, and two family case studies are presented as paradigms of potential changes to vegetation as well as the connectivity with the larger socioeconomic context of Italian immigration into California. Examination of the vegetation alliances over the course of the historical study period utilizes several types of historical imagery, including twentieth-century aerial photography, ground level photography and nineteenth-century maps. This thesis diverges from scholarship that posits substantial alteration of ecological systems by anthropogenic activities by arguing that the primary alliances and geospatial borders of the vegetation in the Study area have remained essentially stable, i.e., unchanged at a macro level, since at least the early twentieth century, and that this stability has persisted despite long-term agricultural activities. This thesis contributes to the historiography of Swanton Pacific Ranch by providing a preliminary exploration of the botanic resources and the attendant anthropogenic agricultural activities on the land that may have affected those resources. It provides a framework for further study of Ranch resources as well as the cultural context of the agricultural history of the North Coast-Santa Cruz region.

Keywords: Swanton Pacific Ranch, Vegetation Change, Cal Poly, Rancho Agua Puerca y Las Trancas, Western Terrace, Santa Cruz Agricultural Production, Italian immigration.

ACKNOWLEDGMENTS

There are numerous people who have supported me during the preparation of this thesis and in the process of earning my M.A. degree and I would like to mention herein those individuals who have been especially helpful in various respects. I would like to thank my advisor, Dr. Andrew Morris for his guidance throughout the development of this thesis and its historical analysis, and his encouragement and patience. I would also like to express my sincere appreciation to my other committee members, Dr. Anne Reid and Dr. Joel Orth for their input at my request for topical suggestions in the field of ecological history, as well as their comments on the draft manuscript of this thesis. My sincere thanks to all of my professors from whom I have benefitted immensely from their courses during this M.A. program, and to Dr. Kathleen Murphy, for her leadership as Chair of the Department of History.

This thesis was made possible by the scholarship of Cal Poly Librarian Jeanine Scaramozzino who laid the foundation for documenting the history of Swanton Pacific Ranch (SPR) and environs in her 2015 thesis "Una Legua Cuadrada: Exploring the History of Swanton Pacific Ranch and Environs." Her knowledge of the property and local residents with personal histories of SPR as well as other research contacts have been instrumental in contributing to the development of this study, and her generous time in discussion of strategies, research results and input on my draft chapters have been invaluable. I am also indebted to Russell White, Cal Poly Data and Geographic Information Systems (GIS) Specialist, who was instrumental in preparation of key graphics for this thesis and who spent considerable time assisting me in making my imagery goals a reality. His preparation of a GIS-based web-application tool greatly facilitated my historical analysis of vegetation conditions over time. I also thank Russ for his unending patience with my underdeveloped graphics skill set, and I have learned much from his tutelage.

This thesis benefited greatly from the contributions of SPR staff. My thanks especially to Grey Hayes who provided assistance throughout the project, from contacts with key scholars who provided valuable input into the resource focus, to botanical expertise and field investigation. I also thank Gordon Claassen and Steve Auten for their help and sharing of knowledge about the Ranch resources and historical features, and the overall support of this study by Ranch Director Brian Dietterick. Further, I wholeheartedly recognize the significant input and support given by Swanton resident and botanist Jim West, who provided not only his extensive botanical expertise pertaining to my Study Area and the Swanton area overall, but equally meaningful, his genuine and indefatigable enthusiasm in mentoring student scholars such as myself, encouraging exploration of all of the epistemological potential that SPR has to offer. My thanks go also to Reed Kenny, M.S. Botany candidate, for sharing plant species information pertinent to my Study Area.

The study of vegetation alliances herein is interstitially tied to the anthropogenic influences on the land, in particular, the immigrant farming and ranching communities of the Swanton area in the early to mid-twentieth century. My deep gratitude to several

former Swanton residents and relatives who have shared their families' histories with me to personalize this study by shaping local land use case studies, including Marie (Pini) Stoner who provided details about her family's crop-growing activities and ranch life within my Study Area, her son, Kim Stoner, who coordinated information exchange and introduced me to his mother as well as provided historical land ownership and lease information, and Marvin Del Chiaro, who generously gave of his time to provide me information about his family's ranching experiences in the Swanton area.

I am also appreciative of the input provided by scholars which clarified what historical scientific evidence was available for the SPR area, specifically pertaining to faunal and floral resources. In this regard, my thanks go to Rob Cuthrell, Postdoc fellow in anthropology at UC Berkeley, Diane Gifford-Gonzalez, Zooarchaeologist at UC Santa Cruz (UCSC), Rick Flores, UCSC Director of Horticulture, and Steward of the Amah Mutsun Relearning Program Arboretum and Botanic Garden, and Chris Wilmers, Professor, Environmental Studies Department at UCSC. My thanks also go to Andrea Woolfolk, Stewardship Coordinator, and Charlie Endris, GIS specialist, both with the Elkhorn Slough National Estuarine Research Reserve for their assistance with interpretation of historical "T-Sheet" mapping.

This thesis and the work behind it would not have been possible without the support of family and close friends to whom I am forever grateful, most especially, my husband Mike who sustained me with his unwavering patience and love during my pursuit of further education in place of easing into retirement; my sister Barbara Bochner and brother Alex Wilson and their families for their love and support; my friends and former colleagues Carollyn Lobell and Mona Kuczenski who will always be inspirational paradigms of good humanity, and my friend Cindy Reed, Mustang alum and standard-bearer for post-graduate education long after undergraduate life, for her continuous enthusiasm and encouragement throughout this educational voyage.

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1. INTRODUCTION

> The material history of environmental change is simultaneously a spiritual history of human consciousness and a political economy history of human society. They can never finally be separated from each other and it would be foolish to even try.
>
> -- William Cronon, "The Uses of Environmental History"

Early twentieth-century farming and ranching in the North Coast region of California's Central Coast represents a paradigm of a landscape which has undergone anthropogenic modification in various ways for millennia, beginning with the earliest indigenous residents. Swanton Pacific Ranch (SPR or the Ranch) provides a setting for which historical changes in physical resources can be examined through the lens of larger cultural and socioeconomic contexts. SPR is a 3,200-acre working ranch and interdisciplinary educational property owned by the Cal Poly Corporation and managed by Cal Poly's College of Agriculture, Food, and Environmental Sciences (CAFES). The Ranch is located fifteen miles northwest of the City of Santa Cruz, California, within the Santa Cruz coastal mountain range (Figure 1-1). The SPR property was donated to Cal Poly in 1993 by alumnus Albert B. (Al) Smith, whose vision was to foster Cal Poly's "Learn by Doing" philosophy by providing a space for "collaborative, interdisciplinary, and technology-mediated learning experiences on a working ranch with diversified agricultural and natural resources in California's coastal region."[1]

[1] California Polytechnic State University (Cal Poly), San Luis Obispo, College of Agriculture, Food and Environmental Sciences, *Swanton Pacific Ranch Management Plan* (San Luis Obispo, CA: California Polytechnic State University, 2015), 8.

Figure 1-1. Regional and Location Maps of Swanton Pacific Ranch

Despite an amalgam of hands and hooves in the soil particularly since European immigrants settled in this environment, the Ranch property contains a rich and diverse variety of habitat and vegetation types from marine/shoreline, riverine, grassland/ rangeland and forest, to managed areas of agricultural cropland and forest production. Recent botanical studies of the area confirm that native plant species are remarkably resilient in certain portions of the Ranch despite a fairly consistent history of anthropogenic uses and disturbances. In addition, the primary watershed that traverses through the Ranch, Scott Creek watershed, contains a high percentage (10-12%) of all

floral taxa in the state of California, a significant and ecologically valuable representation of the State's botanical resources.[2] As an important ecological resource area, it additionally provides a valuable platform for cultural and socioeconomic historiography of the region, particularly of immigrant histories of California in the early twentieth century addressed herein.

1.1 Study Objectives and Historiographical Framework

This thesis investigates what, if any discernable changes in the types and geospatial coverage of the vegetation alliances (traditionally referred to as vegetation communities) have occurred over time on a selected portion of the Western Terrace area of the Ranch and associated anthropogenic land uses. This study specifically seeks to answer: 1) What types of vegetation and other natural features on the SPR property were predominant during the twentieth century, and possibly much earlier given observations of the region by eighteenth-century Spanish missionary explorers? 2) How much did vegetation patterns and spatial coverage change over time on the ranch property and have there been changes in the types of vegetation? 3) What were the likely causes, either anthropogenic or natural, of any shifts or changes to these biotic resources? 4) Do the results of this vegetation change analysis of the coastal SPR area bear some degree of consistency with other relatively comparable areas in California which would serve as historic models?

This study examines anthropogenic land use activities in the Swanton region and to what extent they may have influenced vegetation change from the early twentieth century to the present day corresponding with the primary source evidence utilized

[2] James A. West, "Traversing Swanton Road," University of California Santa Cruz Arboretum, 2015, accessed May 2, 2018, https://arboretum.ucsc.edu/pdfs/traversing-swanton.pdf, 2.

herein, specifically, available historical aerial photography, historical mapping and case studies of family farming and ranching activities. By uncovering more of the human interactions with the land we can further our understanding of the cultural and socio-economic contexts of those activities with a larger geographic lens. This research is also important at a local level to contribute to Swanton's cultural history that is infused with immigrant farming and ranching uses of the land. Further, this work recognizes the educational and management goals of the Ranch as specified in the *Swanton Pacific Ranch Management Plan* (2015), including "protection and enhancement of the natural functions and diversity of the varied ranch ecosystems" and "to improve the grassland and the water supply resulting in a sustainable rangeland that supports biodiversity and protects the natural habitat for animals and plants."[3]

The literature addressing anthropogenic influence and outright modifications to ecological systems has developed into a robust and varied array of topics and themes since the emergence of the subfield of environmental history in the late twentieth century. The research and my thesis assessment herein both connects with, and diverges from this body of scholarship with respect to the conclusions pertaining to changes in botanic resources on my Swanton Study Area. Inherently, environmental histories link anthropogenic changes to local and regional environments with social, economic and/or political transformations at larger regional and sometimes global scales. In this regard, this study of Swanton's botanical systems over time aligns with this type of larger relationship, connecting particularly with Italian immigration into California in the late nineteenth and early twentieth centuries. Scholarship on environmental histories

[3] Cal Poly, *Swanton Pacific Ranch Management Plan*, 8-9.

intrinsically interconnects with other disciplines of history, such as the overarching anthropological quests for survival and agency through pivotal movements such as migrations to new lands, establishing familiar cultures, and perhaps changes to present societies and their structures and practices. As historian J. R. McNeill succinctly characterizes the field, "environmental history is about as interdisciplinary as intellectual pursuits can get."[4]

Themes within the subfield of environmental or ecological histories are frequently drawn on changes in the landscape and ecological resources between pre-and post-European contact, i.e., anthropogenic uses and practices on the land changing after European expansion and conquest of the indigenous peoples in the Americas and Australasia. Among the many notable scholars who ply the post-contact theme are William Cronon, Alfred W. Crosby, Elinor G. K. Melville, J. R. McNeill and Donald Worster.[5] William Cronon also posits that ecosystems, or biotic communities, have

[4] J. R. McNeill, "Observations on the Nature and Culture of Environmental History," *History and Theory* 42, no. 4 (December 2003): 9, accessed April 22, 2018, http://www.jstor.org/stable/3590677.

[5] On the theme of significant alterations to the land and its resources by European colonists as well as to behaviors and adaptations with which indigenous peoples responded within colonial New England see William Cronon, *Changes in the Land: Indians, Colonists, and the Ecology of New England* (New York: Hill and Wang, 1983 and 2003). On significant impacts on ecological systems with overarching economic, social and political contexts from introduction of European livestock and plant materials and farming practices upending indigenous lifeways and populations see Alfred W. Crosby, *Ecological Imperialism: The Biological Expansion of Europe, 900*-1900 (Westport: Praeger Publishers, 2003). Pertaining to histories of extreme ecological and social changes from colonial expansion into Mexico, see Elinor G. K. Melville, *A Plague of Sheep: Environmental Consequences of the Conquest of Mexico* (Cambridge: Cambridge University Press, 1994). For Eastern Pacific colonial history focusing on exchanges of livestock, plants and diseases between California and Hawaii that caused social and ecological upheavals see John Ryan Fischer, *Cattle Colonialism: An Environmental History of the Conquest of California and Hawaii* (Chapel Hill: University of North Carolina Press, 2015). On connectivity of global agroecological change driven by capitalistic monoculture with socio-economic and political contexts see Donald Worster, "Transformations of the Earth: Toward an Agroecological Perspective in History," *Journal of American History*, 76, no. 4 (March, 1990): 1087-1106. Regarding use of grasslands as a platform for political and economic hegemony, alteration and adaption of indigenous lifeways post-European contact in the Great Plains and northern Mexican territory, see Pekka Hämäläinen, "The Politics of Grass: European Expansion, Ecological Change, and Indigenous Power in the Southwest Borderlands," *William and Mary Quarterly*, 67, no. 2 (April, 2010): 173-208 and *The Comanche Empire* (New Haven: Yale University Press, 2008).

always undergone some form of change, both with and without human activities as causes.[6] This concept counters some works which presume that an ecosystem originally had a "natural state", that is, an untouched condition before humans interfered. My thesis herein disagrees with the dated teleological assumption of a natural state as discussed in my assessment of several model studies of vegetation change in Chapter 5.

Cronon also addresses the binary-botanical impact from high-density grazing of European livestock in the New World post-contact which both reduced native herbaceous plant populations and transmitted foreign species that supplanted the native vegetation.[7] These and other forms of anthropogenic causes of vegetation change from immigration of Europeans into North America bringing cattle and other livestock continues into the twentieth century as discussed herein for the subject study. This impact is also a strong theme of historian Alfred Crosby's seminal works in which he historicizes the significant ecological alterations and adaptions of what he refers to as "portmanteau biota" brought by Europeans as they migrated to the Americas and Australasia.[8] Crosby convincingly depicts the vulnerability of California's flora to European botanical foreigners, which began to arrive in the late eighteenth century with the Spanish missionary exploration parties, and again in the nineteenth century as Anglo-Americans and other European immigrants moving west to claim gold brought plants with them from the eastern seaboard.[9] Ecological historiographies have also been valuable in showing paradigm cases of extreme ecological and social changes, such as in Elinor G. K. Melville's

[6] William Cronon, *Changes in the Land*, 10, 11.
[7] Ibid., 142-143.
[8] Alfred W. Crosby, *Ecological Imperialism: The Biological Expansion of Europe, 900*-1900 (Westport: Praeger Publishers, 2003), 146.
[9] Ibid., 153-154.

analysis of the drastic transition in ecosystem types from grassland to relatively denuded desert along with the decline of the indigenous inhabitants in the Valle del Mezquital, Mexico as a result of Spanish conquest.[10] These changes were prevalent in the Central Coast region of California as well, and yet my study shows a different perspective by focusing on a period well after Spanish livestock first trailed up the coast in Alta California.

Relevant to the history of indigenous occupants in the Central Coast of California, a substantial array of scholarship is available on the subject of landscape and vegetation change specific to the use of fire by indigenous peoples as a way of exercising some control over their food supply and hunting efficacy. On this subject, this thesis references the works of Omer C. Stewart, M. Kat Anderson, Mary Null Boulé, and Robert O. Cuthrell, in particular, as discussed in Chapters 2 and 5 for their formative research pertaining to cultural practices and lifeways of Native American tribal bands, demonstrating the long-term changes of the land in the North Coast-Santa Cruz region.

This thesis also draws upon several similar studies of anthropogenic land uses and their attendant impacts on vegetation in California for purposes of comparative assessment of the findings of this study of vegetation on SPR with closely relevant historiography. In the most recent of these studies, Charles Thomas Carlson analyzes the changes in land uses and land tenure and the intendant effects on vegetation in the Point Reyes Peninsula in the San Francisco Bay Area of California.[11] Carlson finds that after the Peninsula was transitioned from private ranching and other agricultural properties to

[10] Elinor G. K. Melville, *A Plague of Sheep*.
[11] Charles Thomas Carlson, "Land Use History and Vegetation Change on the Point Reyes Peninsula, California" (Ph.D. dissertation, University of California, Davis, 2003).

designation as a National Seashore under the jurisdiction and management of the National Park Service that cessation of both livestock grazing and regular burning episodes led to increased diversity of vegetation types and succession stages, e.g., grasslands to shrublands, or shrublands to forest types. Randall Steven Rossi's study of historical vegetation change in northern San Luis Obispo County examines changes in native oak woodland and savanna and anthropogenic activities over the past two centuries since Spanish exploration of California.[12] Similarly, John Lyman Vankat studies vegetation in Sequoia National Park and the ways in which forests, grassland and shrubland were altered after the arrival of European and early California settlers in the area in the mid-nineteenth century.[13] Both Rossi and Vankat share similar conclusions pertaining to significant disruption and reduction of vegetation post-European settlement, attributing substantial changes in anthropogenic land practices, for examples, cessation of regular vegetation burning which was practiced by the indigenous tribes, implementation of fire prevention policies by the U.S. government, introduction of livestock grazing, and in the case of Northern San Luis Obispo County, encroachment of orchards and suburban subdivision development. The complete analysis of these studies as they compare with the findings of this thesis for Swanton vegetation is contained in Chapter 5. These three studies were also considered for their evaluation methods and tools as discussed below.

1.2 Evaluation Methods, Sources and Tools

Research inquiries pertaining to vegetation change on SPR were investigated through a large range of source material including primary and secondary source

[12] Randall Steven Rossi, "Land Use and Vegetation Change in the Oak Woodland-Savanna of Northern San Luis Obispo County" (Ph.D. dissertation, University of California, Berkeley, 1979).
[13] John Lyman Vankat, "Vegetation Change in Sequoia National Park, California" (Ph.D. dissertation, University of California, Davis, 1970).

documentation of histories of the Santa Cruz region, communications with members of immigrant settler families who grew crops and raised dairy or beef cattle on or in the vicinity of the Study Area, historical aerial photography, topographic and vegetation mapping, and communications with scientists and other Cal Poly SPR staff with botanical and natural resource expertise in the Swanton area. Additional secondary sources include government documents, studies, and industry databases for agricultural production and environmental conditions, botanical classification systems, and websites of government agencies and organizations. A varied selection of scholarship addressing Italian immigration into California and early entrepreneurial ventures in the North Coast region of Santa Cruz County are mined for the larger cultural and socio-economic contexts as discussed in Chapter 4. The historical aerial photographs of the SPR Study Area and environs are used as primary source evidence for assessment of potential changes in vegetation types and other landscape features detectable on a macro, or gross level. A web-based application was developed as a tool to compare and contrast each of the years of aerial imagery and other digital vegetative and topographic mapping information in the SPR area which enabled comparison of each of the historical period images to assess the relative amount, location and type of vegetative changes.[14]

The methods used in the studies by Carlson, Rossi and Vankat were reviewed for applicability to this thesis. As dissertations in scientific fields, those models are intrinsically technical, applying scientific procedures for quantification of vegetation types and geospatial areas. Investigating vegetation changes at a macro-level in the Study

[14] Web Application tool was prepared by Russ White, Data and GIS Specialist, California Polytechnic State University, https://calpoly.maps.arcgis.com/apps/webappviewer/index.html?id=107735f5730e4a5a9fce4c4e6068e287.

Area to contribute to the historical framework of SPR does not necessitate on-the-ground vegetative quantification measurements or other botanical data sampling. However, the model studies utilized methods and tools appropriate for this study of SPR as well, including historical aerial photographs and maps, historical sketches, ground photographs and land survey mapping and records, historical diaries and field observations in order to explore specific anthropogenic land uses and the attendant effects of those activities on vegetation.

As a result of the research conducted herein, I argue that the primary vegetation alliances in the Study Area have remained relatively stable since at least the early twentieth century, and that their geospatial cover areas and habitat boundaries appear not to have changed substantially during that time period. This stasis has persisted despite long-term agricultural activities that have modified the majority of the vegetation to varying degrees through grazing and crop cultivation, plowing and disking and construction of ranch infrastructure. Keeping in mind William Cronon's well-justified takeaway from environmental historiography that "neither nature nor culture are static," he nonetheless clarifies the point by positing that "the rate and scale of such change can vary enormously."[15] Landscape conditions, in particular, the affiliated natural resources systems, and land use histories vary and do not always reflect substantial alteration over time, as I argue herein for my Swanton Study Area. As such, this thesis diverges from recurrent scholarship conclusions pertaining to the devastation wrought upon natural communities by changes in the manner in which agricultural practices changed post-European contact in the Americas. However, this research is framed with a historically

[15] William Cronon, "The Uses of Environmental History," *Environmental History Review* 17, no. 3 (Autumn, 1993):14.

more recent time period than most environmental histories which often consider ecological changes since indigenous occupation. The SPR Study Area appears to have undergone agricultural uses that although relatively continuous with likely periods of rest, were also of a low to moderate intensity based on the evidence considered, including the presence of native vegetation in portions of the Study Area and environs.

This study of vegetation change and anthropogenic land uses at SPR was inspired by Cal Poly librarian Jeanine Scaramozzino's 2015 master's thesis "Una Legua Cuadrada: Exploring the History of Swanton Pacific Ranch and Environs." Her work assimilates historical information about the inhabitants and resources of the Ranch property and adjacent environs from numerous types of sources so as to provide a cohesive chronology of the historical narrative of the Ranch, from early history of the original Indigenous Peoples to present-day Cal Poly ownership and operation.[16] As Scaramozzino notes, a comprehensive history of Swanton and its environs did not exist prior to her study, but rather was in pieces from a multitude of various sources, such as family photographs, memories, storage boxes, historical newspaper articles and obituaries, and site knowledge of the Ranch by SPR faculty and staff.[17] Scaramozzino's historiographical contribution to Swanton history is instrumental in understanding and documenting the collective reciprocal relationship between the land ecology and its people over time, and serves as a benchmark for further studies in multiple disciplines.

[16] Jeanine Marie Scaramozzino, "Una Legua Cuadrada: Exploring the History of Swanton Pacific Ranch and Environs" (M.A. thesis, California Polytechnic State University, San Luis Obispo, 2015), accessed February 21, 2018, https://digitalcommons.calpoly.edu/theses/1522.
[17] Ibid., 91.

This thesis springboards from Scaramozzino's study to examine the subtopic of vegetative change within the overarching construct of the rich ecological history of the Ranch. Even with Scaramozzino's foundational historiography of Swanton, there is much more to be uncovered regarding the specific details of land use activities by various occupants over time. As such, this thesis intends to provide a framework of the historical context of a portion the Ranch from which further studies may fill in additional pieces of the land use chronology.

The process of the investigation into the thesis queries evolved during the course of the research. At the outset of the study it was intended to examine the vegetation alliances within the entire 3,200-acre ranch to assess how, where and why changes had occurred over the historical study period beginning in the early twentieth century.[18] It became apparent, however, that focusing on a smaller, sample portion of the Ranch would enable a more specific investigation of anthropogenic land use activities associated with vegetation modification rather than a broad investigation of the entire Ranch. Therefore, a 110-acre section of the Western Terrace area of SPR was selected to focus this research. This approach also facilitates consideration of the portions of the Study Area which have more predominance of endemic (native) plant species and which areas are dominated by invasive/introduced non-native species and what types of (and verifiable) actions could have triggered their presence.

[18] Correlating the historical study period to available primary source information rather than attempting to evaluate anthropogenic land uses since the earliest Native Peoples inhabited the area is also valid because there is limited, if any, substantive evidence available to date pertaining to Native American activities that could have affected vegetation types or plant stage succession specific to the SPR property.

The Study Area was selected in part because it contains several representative vegetation alliances characteristic of the coastal prairie ecological system and it also includes a major natural drainage gulch which contains a preponderance of native vegetation species, some of which are designated as rare. The area was also selected because it includes an historical area of cultivation of artichokes and Brussels sprouts, two crops that were introduced to the North Coast of Santa Cruz County during the early twentieth century and became important cultural components of the region having been taken up by immigrant Italian farmers whose descendants continue to live in the County. As such, the cultural history behind the agricultural uses of the land on and around Swanton Pacific Ranch becomes equally important to the metamorphic history of the botanic environment and potential changes thereto that farming and ranching activities may have engendered.

Chapter 2 of this study begins with a chronological overview of historical anthropogenic involvement in the region, beginning with the early stewards, occupants and visiting observers of the property and surrounding coastal and interior Santa Cruz region. These people included the coastal indigenous Amah Mutsun band of Native Americans (referenced in some earlier scholarship as Ohlone or Costanoan tribal peoples), followed by Spanish explorers, missionaries and Mexican land grantees. Chapter 2 further explores the periods of European immigrants and American settlers to the region, Cal Poly alumnus Al Smith's ownership of the land that he transitioned into Swanton Pacific Ranch, and finally, the Ranch's current ownership and operation by Cal Poly for natural resource and agricultural educational purposes. Chapter 3 sets the stage for the evaluation of vegetation change by describing the location and resource features

of the selected Study Area, and early vegetation and landform information provided on historical maps of the Swanton and North Coast-Santa Cruz region. The ecological setting of SPR and environs is described, including geological and climatic history affecting vegetation in California, the geological components of the Ranch area, regional climate and the types and locations of the various vegetation associations (alliances) on the Ranch and within the Study Area. Notable natural events including fires, floods and landslides are also described in order to investigate whether botanical resources may have been altered by non-anthropogenic factors.

Chapter 4 investigates selected land use history in and around Swanton and concludes with analysis of vegetation change within the Study Area. The land use history begins with the nineteenth-century Mexican rancho, Rancho Agua Puerca y Las Trancas, which, through subsequent incremental parcel purchases by multiple parties over time, eventually transitioned into the majority of SPR through Al Smith's property accumulation. Early agricultural and industrial development in the Santa Cruz region is examined through the history of a major dairy and land company, and historical agricultural production data is provided with particular emphasis on artichokes and Brussels sprouts in Santa Cruz County. An overview of Italian immigration into California provides a link with the formation of a strong Italian and Swiss-immigrant community in Santa Cruz and the North Coast region, an outgrowth of the larger socio-economic context of San Francisco. Two case studies of Italian farming and ranching families that settled on or near the property that became SPR illuminate activities on the land that may have affected vegetation. Chapter 4 concludes with observations pertaining to the vegetation alliances and agricultural land uses within the Study Area utilizing

historical aerial photography, and draws conclusions pertaining to whether or not there have been any discernable changes in the types of vegetation and/or their coverage areas over the period of time beginning in the early 1920s through the present day.

Chapter 5 concludes this historical examination with a comparative analysis of the Carlson, Rossi and Vankat dissertations that address historical vegetation change and attendant anthropogenic shifts and land use modifications in other areas of California. This evaluation ascertains how the results of those studies compare to the findings of this study and addresses the inquiry of whether the results of this vegetation change analysis of the coastal SPR area bear some degree of consistency with other relatively similar areas in California that that would serve as historic models. Chapter 5 also encapsulates the conclusions and argument of this thesis stated above pertaining to vegetation change on the Study Area. This thesis contributes to the historiography of Swanton Pacific Ranch by providing a preliminary exploration of the botanic resources of a portion of the Western Terrace area and the attendant anthropogenic agricultural activities on the land that may have affected those resources. In doing so, it provides a framework for the educational objectives of Cal Poly for Swanton Pacific Ranch and context for further study of the resources thereon as paradigmatic of early farming and ranching in California.

2. ETHNOHISTORY

There has been human activity on the land and uses of the natural resources thereon for millennia in the North Coast-Santa Cruz region beginning with the earliest indigenous inhabitants. This chapter provides an overview of the anthropogenic history of this region encompassing Swanton Pacific Ranch to establish the context for research inquiries herein into historic vegetation changes and their potential causes since the early twentieth century.[19] The ethnography is presented chronologically, beginning with the original indigenous human inhabitants of the land and concluding with the most recent and current use of Swanton Pacific Ranch for ongoing education through resource management, research, and forestry and agricultural production.

2.1 Indigenous Inhabitants: Ohlone Period

This section provides a synopsis of early anthropogenic history of the North Coast-Santa Cruz region during which the Ohlone (Amah Mutsun) tribal bands inhabited and modified the landscape and its resources long before European and other immigrants moved to the area. The information provided herein is gleaned from various anthropological sources and Scaramozzino.[20] Although this thesis focuses on historical changes in landscape and vegetation beginning in the late twentieth century, it is important to recognize that "changes in the land" have been occurring over time, whether they are caused by human activities or events of nature. Indigenous Native American

[19] The North Coast region of California is generally considered the coastal area between San Francisco Bay and the Oregon border, including the counties of Marin, Sonoma, Mendocino, Lake, Humboldt and Del Norte. Some reference documents pertaining to Santa Cruz County, however, also use the regional term North Coast, perhaps creating some confusion as to the nomenclature. This thesis addresses the latter area.
[20] Scaramozzino, "Una Legua Cuadrada." It is noted, as indicated by Scaramozzino, that the sources cited herein often referred to the Indigenous Peoples of the Swanton region by names not recognized by the Tribal Band and their descendants, i.e., "Costanoan" and "Ohlone." The author recognizes that the Band identifies as Amah Mutsun, a distinct Tribal Band from the Ohlone/Costanoan Esselen Nation.

practices of modifying vegetation, such as regular periodic burning of scrub and grasslands show that people were modifying their landscape long before the study period examined herein.

Anthropological scholars estimate that the Ohlone Tribal Band of Native Americans came into the San Francisco Bay region approximately 1,500 years ago, migrating south from the present-day Sacramento area. According to scholar Mary Boulé, the Ohlone were peaceful people that utilized and occupied lands that extended from the northern portion of San Francisco Bay, east to the mountains (assuming these to be the Coast Range) and to the south of Monterey Bay.[21] Among the earliest written records about the Native American peoples that lived in the Monterey/Santa Cruz region are diaries from Spanish explorers in the region in the early seventeenth century. The Indigenous Peoples that met Sebastián Vizcaíno's expedition in Monterey Bay in 1602 were members of the Rumsun "Tribelet" of the Ohlone Tribal Band, according to Mary Boulé; tribelets were small populations of up to 250 members within up to thirty or so associated villages and campsites used for food gathering. By the late 1770s, approximately fifty separate Ohlone Band Tribelets, or language groups, are estimated to have lived in the San Francisco Bay Area with a total indigenous population of about 10,000.[22]

Subsequent documentation of the Ohlone people may be found in the diaries of the Spanish missionaries during their exploratory travels through Alta California,

[21] Mary Null Boulé, *California Native American Tribes: Ohlone Tribe* (Vashon, WA: Merryant Publishers, 1992), 4, 26, 27.
[22] Ibid., 26, 47.

beginning with Portolá's expedition in 1769.[23] Fray (Father) Juan Crespí's diary provides his impressions of the missionary party's interactions with Indigenous Peoples of the area (whom he refers to as "heathen"). Crespí's observations from the party's travels on October 23, 1769 through the coastal area about two miles north of present-day Swanton Pacific Ranch near Waddell Creek provides several descriptive references to landscape features and botanical resources of the area, including the "Sierra Blanca" (white hills), acorns (oak trees), structures made of pine wood, and redwood groves, all consistent with resources present today in the Swanton area:

> About half past eight we set out from this valley of La Salud, following the beach, where there is pasture, but after half a league passage is cut off by the precipitous Sierra Blanca. We traveled two leagues in three hours, and halted in a little valley between hills near a village of heathen, which for some days we had been wishing to find. They had already learned of our coming from the explorers. They welcomed us with demonstrations of pleasure, and immediately gave us some tamales with seeds, some of acorns and some of other kinds of seeds, as well as a certain kind of honeycomb which some of our party said was bee honey. They brought it very neatly wrapped in leaves of the reed grass. Their gift was repaid with beads, which pleased them greatly. In the middle of the village there is an immense house of a spherical form, large enough to hold all the people of the town, and around it there were some little houses of a pyramidal form, very small, constructed of stakes of pine. There is a good arroyo of water here, much pasture, and an abundance of firewood, and not far from the village there is a grove of redwoods.[24]

The Spanish missionaries dubbed the Indigenous Peoples of this region as "Costanoan," translating as "people of the coast." However, in 1971 the remaining descendants of the Costanoan peoples jointly took the name Ohlone; this group received ownership of the

[23] Boulé, *California Native American Tribes: Ohlone Tribe*, 47.
[24] Herbert E. Bolton, *Fray Juan Crespí* (New York: AMS Publishing, 1927), 219-220. The league land measurement used by the Spanish in their early surveys of part of the American Southwest is approximately equivalent to 2.63 miles, or generally accepted as three statute miles. Its origins are Roman, with a league equal to 1,500 paces (passus). A pace in Roman measure is nearly five feet. "League," Encyclopedia Britannica, accessed October 7, 2018, https://www.britannica.com/Science/league/measurement.

Ohlone cemetery at Mission San Jose where their ancestors are buried.[25] The descendants of the Indigenous People that inhabited present-day Swanton and SPR identify as Amah Mutsun, a distinct Tribal Band from the Ohlone/Costanoan Esselen Nation. The Amah Mutsun remain a thriving group of approximately 600 people today even though they are not recognized by the federal government and their ancestral lands are in the ownership of the State of California or the County of Santa Cruz.[26] Scaramozzino states "there is evidence of shell piles and grinding stones that show Ohlone activity took place in the canyon or the valley to the north, Waddell Creek, which runs east and west and has a greater beach area including areas next to Scott Creek."[27] Ohlone villages were generally located near food and water sources according to archaeological research on Central Coast Native American ethnic groups; therefore, on SPR it is likely that the Ohlone villages were on ridgelines, open grassland prairies and coastline areas near intertidal mussel beds. While there are several known archaeological sites on the Swanton Pacific Ranch property, there are numerous other likely sites that have not been thoroughly investigated and formally recorded, particularly in the rangeland.[28]

[25] Boulé, *California Native American Tribes: Ohlone Tribe*, 26.
[26] Scaramozzino, "Una Legua Cuadrada," 8.
[27] There have been multiple variations used for the name of the primary creek, Scott's, Scott or Scotts, that flows through Rancho Agua Puerca y Las Trancas and the Swanton Pacific Ranch and vicinity. Scaramozzino conducted a detailed investigation in her thesis into the use of the different versions of the name over time on numerous references found in the literature, mapping, studies and other publications pertaining to the Swanton area. Scaramozzino, "Una Legua Cuadrada," 42-53. For purposes of referencing the creek in this thesis, the author has chosen to use the name Scott Creek primarily to be consistent with Scaramozzino, former Ranch owner Al Smith, and the federal and state government departments in their nomenclature for the creek. Scaramozzino, "Una Legua Cuadrada," 4.
[28] Scaramozzino, "Una Legua Cuadrada," 10, 11. Scaramozzino also cites the Northwest Information Center of the California Historical Resources Information System, one of nine centers affiliated with the California State Office of Historic Preservation in Sacramento, California.

The Ohlone subsistence practices were based on seasonal hunting, fishing and gathering of plant foods; particularly key were grasses, seeds and acorns.[29] The California Central Coast offered a rich variety of food sources for the tribal peoples year round prior to the arrival and settlement of Europeans and Euro-Americans in the eighteenth century.[30] There is substantive scholarship on ecological modification by Native American peoples, in particular, their use of fire to purposefully manage vegetation growth. According to ecological historian M. Kat Anderson, "the wielding of fire as a horticultural tool enabled Native Americans systematically to alter the natural environment on a long-term basis and at varying scales from individual shrubs to whole bioregions. Fire not only warmed hearths and kept predators at bay; it increased forage for wildlife, curtailed insects that plagued food crops and promoted long, straight shoots for basketry."[31] Scholars are continuing to examine historical anthropogenic burning practices by Indigenous Peoples in Central California as a regular method to have created and maintained grassland vegetation, in contrast with vegetation alliances (traditionally referenced as vegetation communities) supported by natural fire regimes, i.e., shrublands and conifer forests.[32] Ecological restoration scholars have concluded that the coastal prairie habitat in California, such as that on the Western Terrace in the coastal Swanton region, has co-evolved with anthropogenic management practices. Specifically, scientists are finding that vegetation alliances such as oak woodlands and coastal prairie grassland/herbaceous alliances will transition into successive stages of shrublands and

[29] Boulé, *California Native American Tribes: Ohlone Tribe*, 11.
[30] Scaramozzino, "Una Legua Cuadrada," 22.
[31] Omer C. Stewart, *Forgotten Fires: Native Americans and the Transient Wilderness*, eds. Henry T. Lewis and M. Kat Anderson (Norman: University of Oklahoma Press, 2002), 63. The diary of missionary Fray Juan Crespí also mentions burned vegetation; see Stewart, *Forgotten Fires*, 260-261.
[32] Rob Cuthrell, Chuck Striplen, Mark Hylkema, and Kent G. Lightfoot, "A Land of Fire: Anthropogenic Burning on the Central California Coast," in *Contemporary Issues in California Archaeology*, eds. Terry L. Jones and Jennifer E. Perry (Walnut Creek: Left Coast Press, 2012), 169.

coniferous forests when left undisturbed, e.g., after burning practices by Native Americans ceased. An example of this shift in vegetation succession has occurred in the Quiroste Valley Cultural Preserve area, located near Año Nuevo Point about 4.8 miles north of Swanton, where Douglas fir forest has encroached into grasslands.[33] Although there no known studies to date according to the research conducted herein that specifically pertain to burning and other vegetation modification by indigenous peoples on the Western Terrace of the Swanton area, evidence from the studies of locations further north, i.e., Año Nuevo, and eighteenth-century observations of Spanish missionaries support likely burning as land management by the early inhabitants on the Study Area and environs. Further, subsequent grazing of livestock beginning in the early rancho era supports the theory proposed herein of an overall stasis condition, or lack of substantial change in vegetation conditions of the Study Area after the early twentieth century, as addressed in Chapters 4 and 5.

2.2 Spanish Exploration

The North Coast region of California was visited and/or passed by along the Pacific by a series of Spanish explorers, beginning in the mid-sixteenth century with Juan Rodriguez Cabrillo, who was sent by the Spanish Crown in 1542-1543 as part of its general expansion policy and mission to find a northern sea-passage from the Pacific Ocean to China.[34] According to early twentieth-century scholar Narcissa Parrish, although Cabrillo famously missed his objective of locating and claiming a suitable bay for a port along the coast on this initial exploratory voyage, two of his maritime

[33] Rick Flores, University of California, Santa Cruz, e-mail communication with author, January 16, 2019. The referenced anthropogenic studies of the Quiroste Valley Cultural Preserve are led by Robert Q. Cuthrell, University of California, Berkeley.
[34] Narcissa Parrish, "The Early History of the Santa Cruz Region" (M.A. thesis, University of California, Berkeley, 1924), 1.

successors, explorer Sebastián Rodriguez Cermeño in 1595 and Sebastián Vizcaino in 1602, were successful in finding and visiting the bay that was later named Monterey Bay in honor of the Conde de Monte Rey, Viceroy of New Spain.[35]

A gap of exploration by the Spanish ensued for 167 years, due in part by the relative failure to discover riches along the coast of northern Mexico and the Baja peninsula, activities pertaining to settlement in New Mexico, development of silver mines in northern Mexico and trade with the Philippine Islands. Exploration resumed in 1769 when simultaneous land and sea expeditions were undertaken along the coast of northern New Spain (present-day California) as ordered by the Spanish Junta at San Blas for the purpose of taking possession of the port of Monterey and to build a presidio in that location. Gaspar de Portolá led the land-based exploration, proceeding north from San Diego to San Francisco. Portolá's party provides the earliest known written observations of the Santa Cruz region, including the vicinity of what is now Swanton Pacific Ranch. In addition to the previous excerpt from Fray Juan Crespí's diary regarding the party's encounter with the local indigenous peoples, the following are additional observations from Crespí and the expedition engineer, Miguel Costansó. These diary entries include the observers' descriptions of the terrain, vegetation, waterways and other resources during their days travelling through the Santa Cruz region in mid-October, 1769.[36]

Crespí's diary entry on Wednesday, October 18, 1769 (to Majors Creek, Santa Cruz County) is particularly notable with regard to observations of the vegetation in the

[35] Parrish, "The Early History of the Santa Cruz Region," 2.
[36] Ibid., 3.

area, including burned grassland now associated with indigenous vegetation management practices. It reads in part:

> About eight in the morning we started, taking our way along the coast, which runs to the west-northwest, over high hills, precipitous on the side towards the sea. Five hundred steps after we started we crossed a good arroyo of running water which descends from some high hills where it rises. It was named Santa Cruz. Afterwards we crossed some large mesas of good land which could easily be irrigated with the water of this stream. The mesas, which end in cliffs at the sea, must be about one league wide, extending to some hills at the foot of the mountains. We traveled three hours and a half but only made two leagues, during which we descended and ascended four deep watercourses carrying running water which empties into the sea. Only in the watercourses are any trees to be seen; elsewhere we saw nothing but grass, and that was burned. About halfway on the march we left the redwoods behind us. We stopped at the fourth arroyo, which ends in an estuary; it was named Arroyo de San Lucas, but the soldiers called it Las Puentes, because it was necessary to bridge it with poles and earth before it could be crossed. [37]

The engineer, Miguel Costansó, notes the following from their travels the next day, Thursday, October 19, 1769, to Molino Creek and Scott Creek, the main watershed drainage in the present-day Swanton Pacific Ranch:

> The march we made this day was toilsome on account of the many ravines we came upon – there were seven or eight of them – all of which gave the pioneers much work, one especially because of its depth and the ruggedness of its sides. Into this fell the mule that carried the kettle, and for this reason the place was named the Barranco de la Olla. The coast turns more to the northwest, and is everywhere precipitous, excepting at the outlet of these ravines where there is a short stretch of beach. To our right, there were some whitish, barren hills that filled us with sadness, and there were days on which we missed the comfort of seeing natives. We halted on a very high hill and in sight of the white mountain range, which the scouts had discovered, where some clumps of pines could be seen. At the foot of the low hill, to the right and left, ran some streams containing plenty of water. Today we travelled for two leagues and a half. This place was given the name Alto Jamón.

[37] Pacifica Historical Society, "Portola Expedition Diaries, July 14, 1769 to January 14, 1770," https://web.archive.org/web/20160616204636/http://pacificahistory.wikispaces.com/Portola+Expedition+1769+Diaries; Bolton, *Fray Juan Crespí*, 215-216.

According to Parrish, the reference by Costansó translated as "whitish barren hills" pertains to the present-day Ben Lomond mountains and "Alto Jamón" was near Scott Creek.[38] This excerpt from the engineer's diary notably mentions several ravines, or drainage gulches as well as a high hill with pines, consistent with present-day terrain and vegetation conditions as discussed in Chapter 3.

The next day, Friday, October 20, 1769, Costansó describes the party's journey into the most northern portion of present-day Santa Cruz County:

> We afterwards traveled a long distance along the backbone of a chain of broken hills, which sloped down to the sea. We halted on the same beach at the mouth of a very deep stream that flowed out from between very high hills of the mountain chain. This place, which was named Arroyo or Cañada de la Salud, is one league or a little more from Alto del Jamón. The coast in this locality runs northwest by north. The canyon was open toward the north-northeast, and extended inland for about a league in that direction. From the beach a tongue of land could be seen at a short distance, west by north. It was low and had rocks which were only a little above the surface of the water.

Parrish notes that Costansó's reference in this entry from October 20th to "mouth of a very deep stream" refers to present-day Waddell Creek two miles north of Swanton Pacific Ranch, and that his reference to "a tongue of land" is Punta del Año Nuevo.[39] These accounts indicate that the Swanton/Santa Cruz region had qualities desirable to the Spanish for settlement, including arroyos (drainages) with running water and mesas of "good land" that could be irrigated by the water from the stream. Importantly, in addition to the identification of pines and redwoods in the Swanton Area, the observations provide

[38] Parrish, "The Early History of the Santa Cruz Region," 18.
[39] Ibid., 19, 20.

evidence of burned grasslands and few trees, indicating early, if not the first written evidence of what was likely the modification of vegetation by the native Ohlone (Amah Mutsun) people. Further, scientists studying ecological restoration and historical land management practices of the indigenous peoples of the Central California coast consider it to be most likely that the Ohlone/Amah Mutsun and their ancestors utilized fire to manage the grasslands of the coastal prairie habitat in the Swanton environs.[40] These observations of the Spanish explorer-missionaries are also important in that they provide some valuable primary source descriptions of the plants and topographic terrain in a period with few other written descriptions of the area.

2.3 Mission Period

Five years after the Portolá expedition traveled up the coast of Alta California to San Francisco, a follow-up expedition to ascertain possible sites for missions was conducted using an inland route going north and the Portolá coastal route on the return south. In a diary entry from Father Palou on December 11, 1774 of that expedition, he observes the San Lorenzo River in the Santa Cruz region and various species of trees found in riverine habitats:

> We reached the San Lorenzo River which is quite large and has a deep bed; its water reached the stirrups. The entire bed is lined with poplars, willows, alders, small poplars and other trees and near the crossing, close to the mountains, there is much red-wood timber.[41]

The Spanish established missions in San Carlos (about six miles south of SPR) in 1770, in San Francisco in 1776, in Santa Clara in 1777 and in Santa Cruz in 1791 which

[40] Rick Flores, University of California, Santa Cruz, e-mail communication with author, January 16, 2019.
[41] Parrish, "The Early History of the Santa Cruz Region," 25. Parrish's source is Fr. F. Palou, "Noticías de la Nueva California, Tomo III," 315.

became the first settlement in Santa Cruz.[42] Mission operations included cattle herds grazing on area rangeland and crop cultivation to sustain their communities, thus beginning the historical ranching and farming activities that continue today in the coastal terrace and valley areas. The incorporation of the indigenous Ohlone (Amah Mutsun) people into the missions for conversion to Catholicism, baptism and the concomitant modifications to their indigenous lifeways, and even more so, the exposure to foreign disease pathogens brought by the Spanish missionaries combined to significantly reduce the Native populations.[43] According to Mary Null Boulé, the toll of foreign disease-caused mortality among Mission Indians (referred to as neophytes by the missionaries) reduced the Mission Ohlone population by 8,000 individuals over 65 years, leaving only 2,000 by 1835. Mission records indicate that by 1810, the last of the Ohlone tribelets had disappeared.[44] The vegetative management practices of the Indigenous Peoples such as seasonal grassland burns then dissipated from the combination of the significant reduction of the indigenous population and the instituting of livestock grazing on mission lands.

2.4 Mexican Land Grant Period

After Mexico obtained independence from Spain in 1821, the missions were secularized and the mission land holdings in Santa Cruz County and elsewhere in California came under the several Mexican colonization laws for transformation into ranchos for individuals and families.[45] All Ranchos in Santa Cruz County granted after

[42] Parrish, "The Early History of the Santa Cruz Region," 26; "California Missions," History, last updated August 21, 2018, accessed October 9, 2018, https://www.history.com/topics/religion/california-missions.
[43] Scaramozzino, "Una Legua Cuadrada," 24.
[44] Boulé, *California Native American Tribes: Ohlone Tribe*, 47. Boulé uses the term "triblets" for sub-divisions of the overall Tribal Band.
[45] Parrish, "The Early History of the Santa Cruz Region," 67, 68.

1832 were under the jurisdiction of the Mexican Colonization Law of August 18, 1824 as well as the Government Regulation of November 21, 1828. In the thirteen years between 1833 and 1846, over half of Santa Cruz County was given as Mexican land grants, according to Parrish.[46] Under Mexican rule, over 150,000 acres of land were incorporated into grants in the county, and grantees typically grew limited crops and raised long-horned cattle.[47]

After the Mexican-American War of 1846-48 and establishment of California statehood in 1850, land grants were then required to be validated by the United States government.[48] Twenty land grants were validated in Santa Cruz County.[49] Among these was the grant for the northernmost rancho, Agua Puerca y Las Trancas, which contained over half of the 3,200 acres of present-day SPR. Translating as "hog water and the bars," the Rancho was named for the two creeks that bounded the property, Agua Puerca Creek near Davenport Landing south of the Ranch and Las Trancas Creek to the north.[50] According to Scaramozzino, the original grantee was Hilario Buelna in 1839 whose claim, as well as those of subsequent claimants Thomas W. Russell and Jose de la Cruz Rodriguez, was ultimately not recognized by the government.[51] The claims of Ramon Rodriguez and Francisco Alviso, were recognized, and they received the grant on

[46] Parrish, "The Early History of the Santa Cruz Region," 67, 68, 71.
[47] Cal Poly, *Swanton Pacific Ranch Management Plan*, 19. There have been several editions of the *Management Plan* prepared by Cal Poly. This thesis references content from the most recent edition published in 2015.
[48] Scaramozzino, "Una Legua Cuadrada," 27.
[49] Parrish, "The Early History of the Santa Cruz Region," 73.
[50] Cal Poly, *Swanton Pacific Ranch Management Plan*, 19, 21. Scaramozzino, "Una Legua Cuadrada," 32, notes that the original boundaries of the Rancho are not coterminous with the current property boundaries of the Swanton Pacific Ranch.
[51] Scaramozzino, "Una Legua Cuadrada," 27.

November 2, 1843 and the land patent on March 1, 1867; that same year they sold the property to Scottish farmer James Archibald.[52]

2.5 American Immigrant Settler Period

The discovery of gold in late January of 1848 at Sutter's Mill in the American River near present-day Coloma and Sacramento triggered a new surge of migration to, and settlement of northern California. This migration caused major shifts in economies and cultures at local, regional and global scales; the quest for gold in California was a key impetus for émigrés from European, Asian and Latin American locales, among others, to come to California, and for many to settle. This aspect is integral to the nineteenth-century cultural expansion in Santa Cruz County and the Central Coast region, including the Italian and Swiss-origin residents of Swanton discussed further in Chapter 4. Some Santa Cruz residents were among many across the continent and beyond that were affected by the lure of gold. Parrish notes, for example, that mining picks were made at the first foundry in Santa Cruz and sold for work at the mines, one of the few places that could supply picks at the time.[53] During this period of influx of settlers into California, various industries began developing in Santa Cruz County in farming/agriculture, ranching, livestock, dairies, railroads, cement, roads, dams, bridges and other transportation infrastructure, county buildings, and electric power plants.[54]

[52] Parrish, "The Early History of the Santa Cruz Region," 75; Scaramozzino, "Una Legua Cuadrada," 27, 29.
[53] Parrish, "The Early History of the Santa Cruz Region," 125.
[54] Edward Martin, *History of Santa Cruz County, California with Biographical Sketches* (Los Angeles: Historic Record Company, 1911), 100-102.

As a result of developing business enterprises and settlement, Parrish describes the year 1850 as something of a pivotal turning point in Santa Cruz, being "the only settlement in the region that could be called a town."[55] The twenty ranchos in the region generated their own centers of activity, and logging in the forested mountains generated increased trade for Santa Cruz, per Parrish. In addition to the foundry, the earliest tannery, school and Protestant worship among other industries and facilities emerged in Santa Cruz in the late 1840s.[56] Days after the gold discovery, the Treaty of Guadalupe Hidalgo was signed, ending the Mexican-American War and paving the way for California statehood. By the end of 1849, California's immigrant population (coming in from other U.S. states, territories and other countries) mushroomed to approximately 100,000 from about 800 in early 1848.[57] County historian Edward Martin indicates that from approximately 1860 through 1910, the population of Santa Cruz County grew from 350 to 25,000 residents.[58]

Benefitting from its mild climate and beautiful scenery, Santa Cruz in the nineteenth century had a strong market economy supported by multiple trading commodities, including forest logging, lime and cement processing, dairy production, crop cultivation, livestock production, whaling and other commercial fishing and tourism, according to Scaramozzino. The early livestock and crop production activities are particularly relevant as forerunning uses on the SPR Study Area investigated in this study, setting a foundation for a continuum of modifying vegetation succession in the

[55] Parrish, "The Early History of the Santa Cruz Region," 125.
[56] Ibid., 126.
[57] "California Gold Rush," History, last updated August 21, 2018, accessed October 3, 2018, https://www.history.com/topics/westward-expansion/gold-rush-of-1849.
[58] Martin, *History of Santa Cruz County*, 102.

twentieth century as posited herein. In 1866, the town of Santa Cruz was established, and subsequently in 1876 it was formally incorporated as a city.[59]

Beginning in the mid-nineteenth century a handful of early ranchers and homesteaders lived and produced on the land of the Agua Puerca y Las Trancas Rancho and/or in the Swanton area. Scottish farmer James Archibald, who purchased the Rancho from Rodriguez and Alviso in 1867, owned and operated a dairy on the property with 120 cows at one time, and he arranged for Ambrogio Gianone, a Swiss dairyman to manage it. Remnants of the stone "cheese house," which Gianone built for cheese production in 1867 remain on the Ranch property today on the east side of Swanton Road near the Ranch administrative offices.[60] Mr. Gianone ultimately purchased the northern third of the Rancho upon which two fourth-generation Gianone families currently live.[61] Current Swanton resident and botanist Jim A. West is the great-grandson of Ambrogio Gianone. Other pioneer homesteaders and ranchers included Fred Swanton, Harold Gianone (Jim West's uncle and grandson of Ambrogio Gianone), H.H. and Charles West, Alfred and Lucy Miller, J. Shaw, W. H. Purdy and the Staub family. Bud and Lud McCreary, residents in the Scott Creek watershed and owners of Big Creek Lumber adjacent to the northerly boundary of SPR are the great grandchildren of the Staubs.[62]

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[59] Scaramozzino, "Una Legua Cuadrada," 35, 36; Martin, *History of Santa Cruz County*, 65. In her thesis, Scaramozzino incorporates some of the 1990 oral interview given by original Swanton Pacific Ranch owner and Cal Poly donor Al Smith in which he briefly describes some of the history of the ranch; she also qualifies the information in part due to a lack of source citations of his account and indicates that there may be some inconsistencies with other sources.

[60] Tanner O. Hartman and Clinton J. Isbell, "Structures of the Swanton Pacific Ranch" (Natural Resources Management Department, Cal Poly, 2004), Cheese House sheet (no page number).

[61] Cal Poly, *Swanton Pacific Ranch Management Plan*, 21.

[62] Scaramozzino, "Una Legua Cuadrada," 36; Cal Poly, *Swanton Pacific Ranch Management Plan*, 19.

As a paradigm of these American pioneers instrumental in developing the early socioeconomic framework of the Santa Cruz region, businessman Fred Swanton came to Santa Cruz in 1867.[63] Graduating from Heald Business College in 1881, he went into business with his father, Albion Paris Swanton, constructing a three-story hotel and adjoining stable on Pacific Avenue, which later burned down. Later on his own he engaged in pharmaceutical and electric lighting businesses. The latter was a successful venture such that the business supplied the City of Santa Cruz with over 4,000 lights; its capital worth magnified over twelve times its original stock value within a few years.[64] Fred Swanton was also an early mayor of Santa Cruz and developed the Santa Cruz Boardwalk, and a hydro-electric plant on Big Creek and dams on Mill Creek and Berry Creek and several miles of flumes. The hydro-electric plant, which was later acquired by Pacific Gas & Electric, produced electricity for nearly fifty years, from 1899 to 1948.[65]

2.6 Recent Period: Al Smith and His Legacy of Educational Land Management

Cal Poly's ownership and management of SPR is due to its donation to the university by alumnus Al Smith upon his passing in December 1993.[66] Smith obtained his Bachelor of Science degree at Cal Poly in Crop Science in 1944, and a Master of Arts in Education in 1956. He taught high school agriculture for seventeen years near San Jose and also served a term as Mayor of the town of Aptos, located approximately seven miles

[63] Cal Poly, *Swanton Pacific Ranch Management Plan*, 20. As noted therein, the settlement of Swanton was previously called Laurel Grove, which had been a station stop on the Santa Cruz-Pescadero Stagecoach line and the northern terminus of the Ocean Shore Railroad.
[64] Edward S. Harrison, *History of Santa Cruz County California* (San Francisco: Pacific Press Publishing Company, 1892), 318.
[65] Cal Poly, *Swanton Pacific Ranch Management Plan*, 20.
[66] Scaramozzino, "Una Legua Cuadrada," 65.

south of Santa Cruz.[67] His father, Stanley Smith, helped establish and managed a farmer's cooperative called Orchard Supply in 1931 which two decades later became Orchard Supply Hardware to serve developing residential communities in greater San Jose region. Al Smith directed a business expansion strategy for the company and became President in 1962.[68]

Smith's connection with Swanton began during early childhood when his father brought him and his brothers to the Little Creek area to camp, and as part of his participation in the Boy Scouts of America (Troop No. 39) activities at Camp Totocano, also known as Camp Swanton.[69] At different stages of his life from early adulthood up until retirement in 1979 he purchased portions of what would become SPR as well as the separate Valencia Creek property, 600 acres of forestland thirty miles east near Aptos.[70] Smith settled in Swanton in 1978 and retired after Orchard Supply Hardware was sold in 1979 to the W. R. Grace Company.[71] Smith ran stocker cattle on the rangelands (grasslands) on the Ranch, including the Study Area addressed in this study. He also leased portions of the land primarily along the Swanton Road/Scott Creek corridor to others to farm prior to implementing a nominal lease agreement with Cal Poly in 1986.[72]

SPR remains as open space with agricultural operations, a working educational ranch to foster and continue Al Smith's vision for the property to implement Cal Poly's 'Learn by Doing' maxim in perpetuity. As such, Cal Poly's College of Agriculture, Food and Environmental Sciences prepared the *Swanton Pacific Ranch Management Plan*

[67] Cal Poly, *Swanton Pacific Ranch Management Plan*, 24, 25. Scaramozzino, "Una Legua Cuadrada," 73, indicates that Smith was Mayor of Los Gatos.
[68] Scaramozzino, "Una Legua Cuadrada," 70-72.
[69] Ibid., 66.
[70] Cal Poly, *Swanton Pacific Ranch Management Plan*, 6, 25.
[71] Scaramozzino, "Una Legua Cuadrada," 73.
[72] Cal Poly, *Swanton Pacific Ranch Management Plan*, 6, 25.

consistent with Smith's wishes and instructions for the property's educational service. Among the overall *Management Plan* goals are projects that offer expanded "learn by living" educational experiences, foster healthy crop production with minimal artificial inputs and costs, improve the grassland ecosystem and water supply for sustainable rangeland, produce uneven-age forest resources while protecting the forest ecosystem, strive for a bio-diverse natural habitat for forest wildlife and vegetation; and protect and enhance the natural functions and diversity of all ranch ecosystems.[73]

The ethnohistory of the Ranch and environs provided in this chapter shows the shifting uses of the land from the early human occupants to other cultures and lifeways as they settled the area, affecting the landscape in various ways. The ecological setting, history and analysis of vegetation are described in the following chapters. Chapter 3 describes the historical and present-day vegetation, soils, geology and climate within the Swanton region and within the Study Area on the Ranch as a foundation for the assessment of historical vegetation change during the study period which is addressed in Chapter 4.

[73] Cal Poly, *Swanton Pacific Ranch Management Plan*, 9. Since its inception as an educational working ranch, a number of agricultural and natural resources management study projects have been undertaken, for example, studies of crop irrigation methods, methodology of deterrents to feral pig damage, the effects of cattle grazing on grasslands and the effects of selective harvesting on redwood understory flora. More recent studies include livestock health management, water quality monitoring in Little Creek, streambed erosion and other geomorphic analyses, measurements of stream channels using the Light-Detection and Ranging (LiDAR) method for data collection using aircraft, and regeneration of Monterey Pine forests in the presence of pitch-cancer disease; *Management Plan*, 39.

3. STUDY AREA AND ECOLOGICAL SETTING

In order to become familiar with the subject matter under historical investigation herein, i.e., the ecological system, habitat types and/or specific natural resources comprising the landscape of SPR, this chapter describes the ecological setting and historical framework, including the geologic and soils resources of the Swanton region, a brief history of vegetation alliance development in California, and general descriptions and mapping of the vegetation alliances (also referred to herein as vegetation types) of SPR. Natural events such as significant fires, floods and landslides are also investigated so as to identify any possible non-human causations of vegetation change in the SPR area as well as anthropogenically-derived modifications. As environmental historian William Cronon elucidates, changes to the land happens with and without human influence.[74] Yet Cronon also posits that human history is deeply influenced by cultural systems, and cultural systems are interconnected with environmental systems. The changes which different cultures have routinely been bringing to natural spaces over the course of anthropological time makes clear the importance of understanding the elements of both systems.[75] To begin this chapter, an overview of the Study Area selected within the main Ranch property boundary is described.[76]

[74] Cronon, *Changes in the Land*, 11.
[75] For elaboration on the theme of the reciprocal relationship between cultural and environmental systems overtime, see Cronon, "The Uses of Environmental History," 1-22.
[76] A separate property referred to as the Valencia Creek property is also part of Swanton Pacific Ranch. The Valencia Creek property is approximately 600 acres near the town of Aptos, California, about 30 miles east of Swanton. Cal Poly, *Swanton Pacific Ranch Management Plan*, 6. That portion of the Ranch is not included in the historical vegetation queries of this thesis as the author elected to focus on examination of historical changes in vegetation on the primary portion of the Ranch.

3.1 Study Area

Given the large size of SPR at nearly 3,200 acres, a specific area that has undergone various agricultural land uses was selected upon which to study potential changes to vegetation types from the early twentieth century to the present. A 110-acre portion within the area of SPR referred to as the Western Terrace was selected as the Study Area. The Western Terrace comprises the sand and mudstone rangeland adjacent to the coastal bluffs and State Highway 1 along the westerly boundary of the Ranch. Figure 3-1 provides a map of the SPR and Study Area locations. Shown in closer view in Figure 3-2, the area is an appropriate paradigm for the historical queries of this thesis as it contains several types of vegetation and natural features and includes the sites of former immigrant settler farming and dairy operations with appurtenant crop fields and grazing lands. The inclusion of this early settler ranching element as part of the Study Area provides a historical tie for which there is primary source evidence regarding the use of the land and modifications of the vegetation during the twentieth century. Descriptions of the vegetation alliances and historical farming and ranching land uses pertaining to the Study Area are discussed in this chapter, and in Chapter 4, respectively.

3.1.1 Historical Mapping

Historical mapping imagery is valuable for ecological historiography addressing vegetation change by providing resource and landscape observations from earlier periods. The Wieslander Vegetation Type Map (VTM) data for SPR and the greater Santa Cruz area provides early twentieth-century maps of vegetation types.

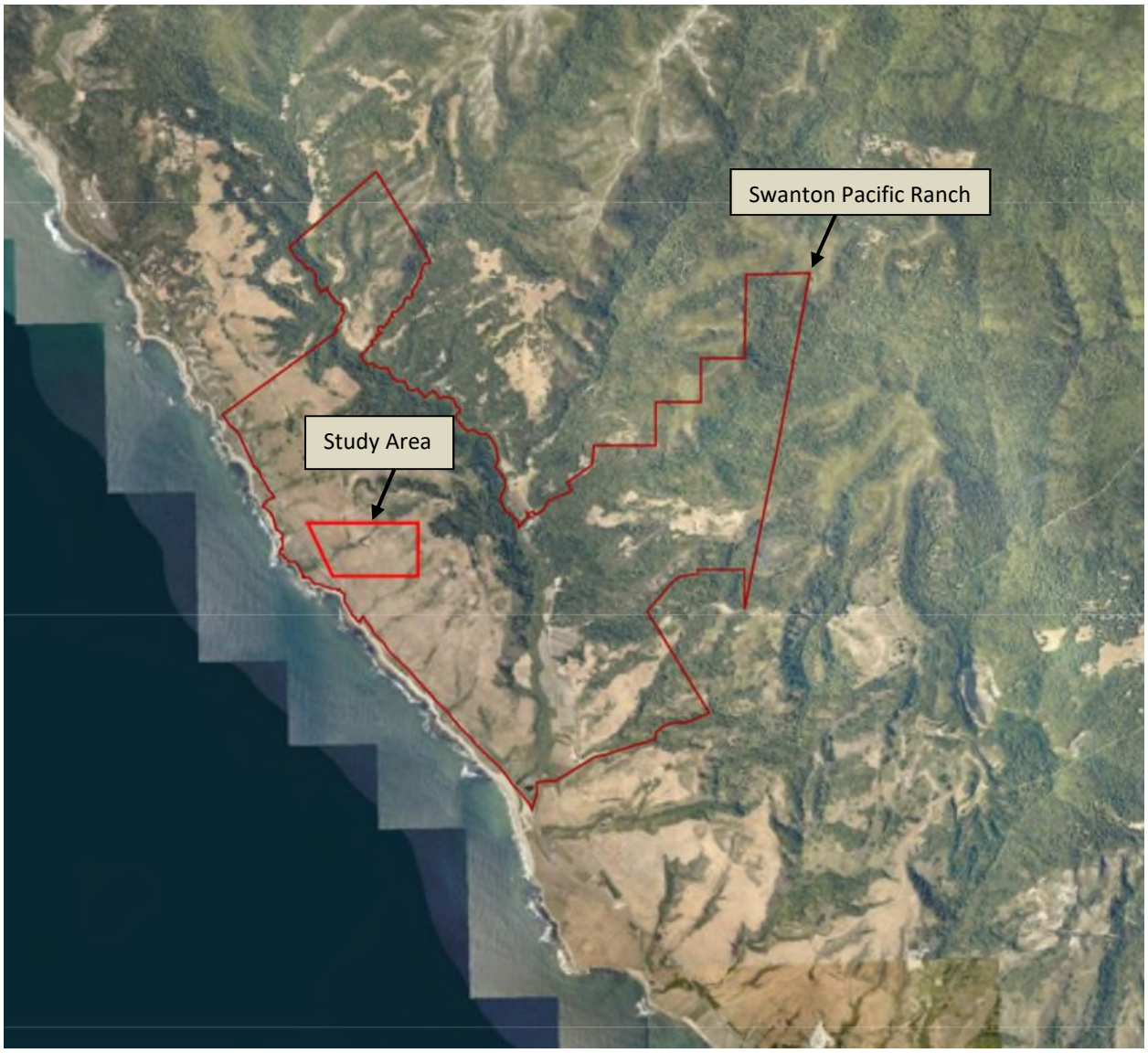


Figure 3-1. Swanton Pacific Ranch and Study Area, 2016 Aerial Photography

Source: ESRI, County of Santa Cruz, USDFFSA, 2016, accessed October 8, 2018, https://calpoly.maps.arcgis.com/apps/webappviewer/index.html?id=107735f5730e4a5a9fce4c4e6068e287.

Figure 3-2. Thesis Study Area in the "Western Terrace"

Source: ESRI, County of Santa Cruz, USDFFSA, 2016, accessed October 8, 2018, https://calpoly.maps.arcgis.com/apps/webappviewer/index.html?id=107735f5730e4a5a9fce4c4e6068e287.

The VTM was part of a larger project conducted by the U.S. Forest Service and led by silviculturalist Albert E. Wieslander that mapped vegetation types of approximately one-third of California (over 16 million hectares) beginning in the 1930s.

Figure 3-3 depicts the Wieslander Veg Type Map information for the Study Area and overall Ranch environs.[77] As shown in Figure 3-3, the Wieslander VTM indicates the following vegetation types for the entire SPR area: Redwood forest in the northeastern and central-east sections of the Ranch, Coastal Scrub in the eastern wing and along the coastal length of the western wing of the property, Douglas fir forest in the central and northern portions bracketing the Scott Creek alignment, and several small polygons of Coastal Oak Woodland type, one of which is in the northeast corner of the Study Area. The Wieslander mapping indicates two main vegetative types within the 110-acre-Study Area: Cropland (one of two pale yellow color identifiers of the mapping) and Coastal Scrub. A small portion of Annual Grassland is mapped in the eastern third of the Study Area. Although the data sets were geo-referenced as part of the digitizing project, the vegetative types shown by colored polygons (spatial representations) over the SPR property area appear slightly offset/misaligned along the coastal boundary of the property. The data is valuable nonetheless as an historic reference material for early twentieth-century observations about vegetation types.

The historic Wieslander VTM is also of interest in that it may reveal that vegetation types have changed in the Study Area since the mapping was prepared in the first half of the twentieth century. Specifically, the mapping shows such a large covering

[77] The mapping data in Figure 3-3 is from M. Kelly, B. Allen-Diaz and N. Kobzina, "Digitization of a historic dataset: the Wieslander California Vegetation Type Mapping Project," *Madrono* 52.3 (2005), 191-201, and M. Kelly, K. Ueda, and B. Allen-Diaz, "Considerations for ecological reconstruction of historic vegetation: Analysis of the spatial uncertainties in the California Vegetation Type Map dataset," *Plant Ecology* 194.1 (2008), 37-49, accessed September 7, 2018, http://vtm.berkeley.edu. The Wieslander team drew vegetation types by hand onto topographic maps during field observations to capture spatial locations of broad vegetative categories. The mapping collection was eventually digitized for online access for Geographic Information Systems (GIS) applications in ecological and other scientific studies.

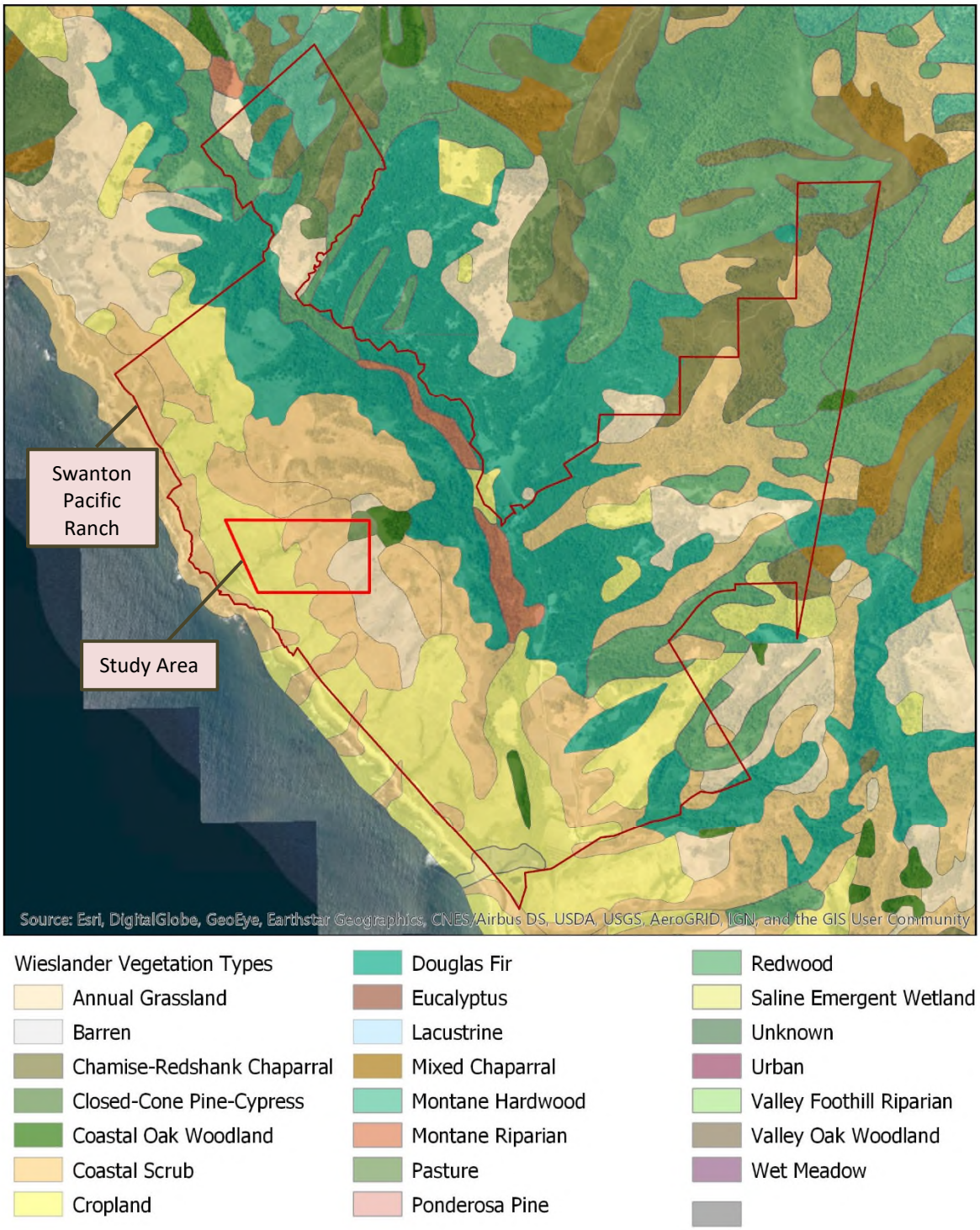


Figure 3-3. Wieslander Veg Type Map, Swanton Pacific Ranch and Study Area

Source: Data from Wieslander Vegetation Data Set, University of California, Berkeley, accessed September 9, 2018, http://vtm.berkeley.edu/#/data/vegetation.

of what appears to be indicated as Cropland within the Western Terrace area, as opposed to the presently predominant grassland interspersed with shrub vegetation.[78] The Wieslander mapping uses very similar color polygons for different vegetation types, particularly several pale yellow shades that represent grassland and cropland. Therefore, the vegetation type indicated for the majority of the Study Area may have been intended to represent grassland rather than cropland. It is possible, although unlikely, that the predominant land use in the Study Area could have shifted after the 1930s from cultivation (crops) to livestock grazing (grassland); however, cropland is usually arranged in square or rectangular plots or other designed shapes such as contouring rather than the undulating polygons indicated on the Wieslander mapping for the vegetation within the Western Terrace area. Further, it is known from the investigations conducted for this study as discussed in Chapter 4 that the early twentieth-century farming families grew crops in the Western Terrace, but it is questionable based on the evidence obtained through this research whether they would have encompassed that extensive of an area and in such nonconforming shapes. Thus, it is more likely that the mapping is indicative of Grassland rather than Croplands within the Western Terrace along with the Coastal Scrub, even though the color polygon appears closest to the Cropland color.

A more recent vegetation mapping project of the SPR property was prepared by Cal Poly student John R. Todd for his senior project in 1988 with the purpose of providing a baseline vegetation inventory that could be used in planning for timber management and wildlife habitat enhancement projects on the Ranch. Todd applied U.S.

[78] The current vegetation classification system referenced in this thesis uses the updated nomenclature of Herbaceous and Shrubland alliances for the traditionally named Grassland and Coastal Scrub plant communities. See discussion beginning with Sub-section 3.2.5, "Vegetation Alliances and Habitat Types on Swanton Pacific Ranch."

Forest Service specifications and guidelines widely used at that time for delineation of polygons of various vegetation types overlain on aerial photographs and topographic maps. While the information in Todd's report may have some inaccuracies in places inherent in mapping vegetation types from aerial photography, it was the first complete vegetation mapping effort conducted of SPR and is, therefore, useful as a relatively recent historical reference.[79] In addition, Todd's mapping elements served as baseline data for current vegetation type mapping in use for the *Swanton Pacific Ranch Management Plan*, the mapping having been further updated in 2003.[80] Todd's vegetation mapping of the Study Area and vicinity within SPR is provided in Appendix A.

Additional historical map sources include the original Diseño (sketch map) of the Mexican land grant comprising the Rancho Agua Puerca y Las Trancas prepared around 1867 by or for Rancho owners Ramon Rodriguez et al.; about 55% of the Rancho eventually became the SPR property. The hand drawn Diseño, shown in Figure 3-4 denotes various features of the Rancho including tree-like symbols in the upper (hillier) portions of the plot, "Arroyo de Jarro" (Jar or Pitcher Creek) running mostly north-south through the center of the site likely representing the present-day alignment of Scott Creek, adjacent "Cañada y Cañada," (ravines) on the east side along the Arroyo,

[79] John R. Todd, "Vegetation Type Map for Swanton-Pacific Ranch," Research paper submitted to the Natural Resources Management Department, Cal Poly State University, San Luis Obispo, California, November 1988. An example of a potential inaccuracy is Todd's labeling of the primary vegetation type in the Cowboy Shack Gulch drainage of the Study Area as "brush fields." As riparian (stream/drainage) habitat, its primary vegetative classification, according to SPR botanist Grey Hayes, Ph.D., is *Salix lasiolepis* Shrubland (Arroyo Willow Thickets), vegetation alliance which is extremely unlikely to have changed in the past three decades since Todd's study given the adjacency to the wet creek habitat.
[80] Russ White, verbal communication with author, January 29, 2019.

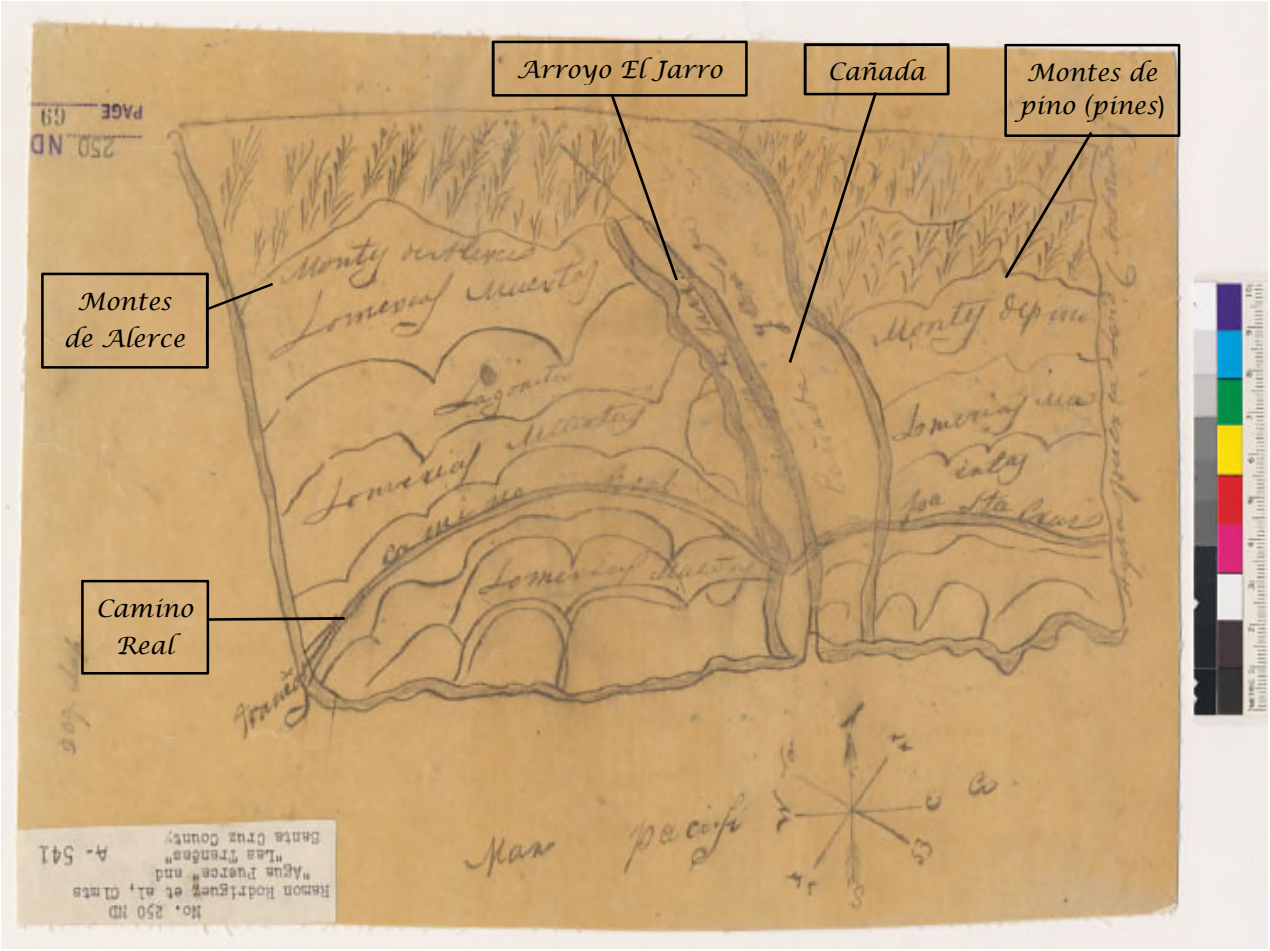


Figure 3-4. Diseño (Sketch Map) of Mexican Land Grant for Rancho Agua Puerca y Las Trancas, ca. 1867

"Lomerías Muertas" is noted on several locations of the map, meaning "dead or barren hills."

Source: Maps of private land grant cases of California, Land Case Map A-541, Courtesy of The Bancroft Library, University of California, Berkeley.

"Lomerías muertas" (dead or barren/denuded hills) in several locations, and "Montes de pino," (pine mountains) in the eastern central portion of the site which remains Monterey Pine and other forest alliances today. The map-makers also interpreted the trees in the upper hill area of the Rancho to be larch ("Montes de Alerce"). Larch forests are in the

northeastern United States and Canada, originally from Europe; with similar needle-like leaf clusters and overall tree shape of Monterey pine or Coast Redwood; those may have been thought by the mid-nineteenth century observers to be Larch trees.[81] Other features on the sketch include the "Camino Real," known today as the Coast Highway/State Route 1, "trancas" (bars) at the westerly edge near the Camino Real road, from which a portion of the Rancho name originates, and "Mar Pacifico," the Pacific Ocean, in the lower front of the image.

A Bureau of Land Management General Land Office Township plat map for a triangular portion of land between the Agua Puerca y Las Trancas and San Vicente land grants is shown in Figure 3-5. The survey for this plat map was conducted in 1869 and the map notes several vegetative and topographic details of the area between the two ranchos, such as deep canyons, grasslands, chaparral and timber locations, all of which are consistent vegetative and environmental features today. The plat showing a portion of the Agua Puerca y Las Trancas land grant surveyed in 1868 (see Figure 3-6) locates "numerous deep and impassible cañons" along the easterly boundary of the Rancho Agua Puerca y Las Trancas, the "North fork Scott's Creek" north and outside of the Northeastern corner of the Rancho boundary, and the alignment of Scott Creek through the Rancho.[82] This plat also denotes "brushy ridge," "rocky bluff," "high ridge" and "flat land" areas along the parallel north and east of the northeast corner of the Rancho.

[81] Grey Hayes, e-mail communication with author, May 30, 2019.
[82] Scott Creek is generally referenced in this thesis without the plural "Scotts" or "Scott's" found in some historical sources. Exceptions are made when quoting specific references, for example in the plat map shown in Figure 3-6.

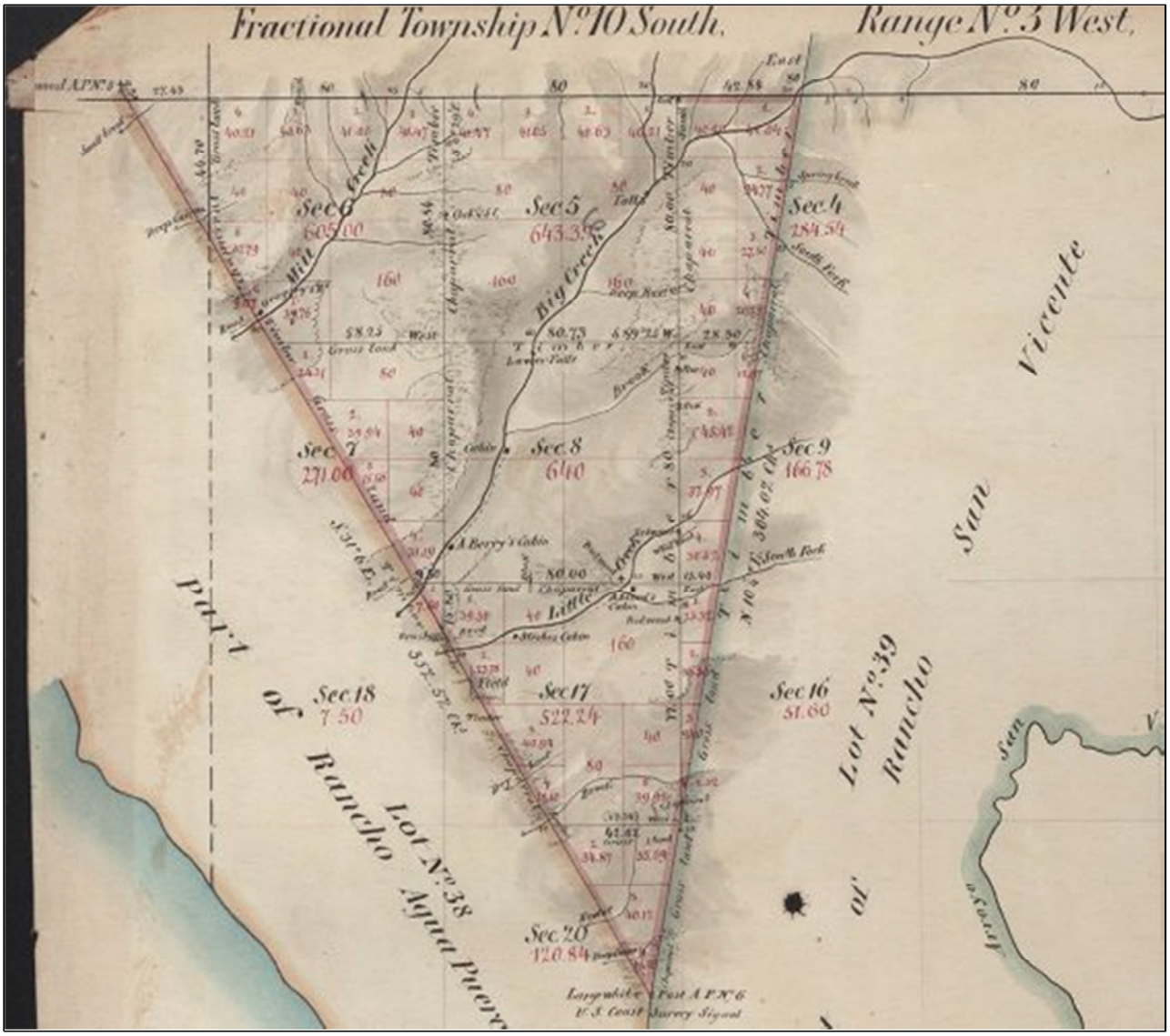


Figure 3-5. BLM General Land Office Township Map, Plat No. 380776, East of Study Area

Examples of vegetation and terrain notes identified. General Land Office website notes the survey approval date for this plat of December 9, 1869.

Source: U.S. Department of the Interior, Bureau of Land Management, General Land Office Records, accessed May 4, 2018, https://glorecords.blm.gov/details/survey/default.aspx?dm_id=380776&sid=cug0kjn4.bm0&surveyDetailsTabIndex=1.

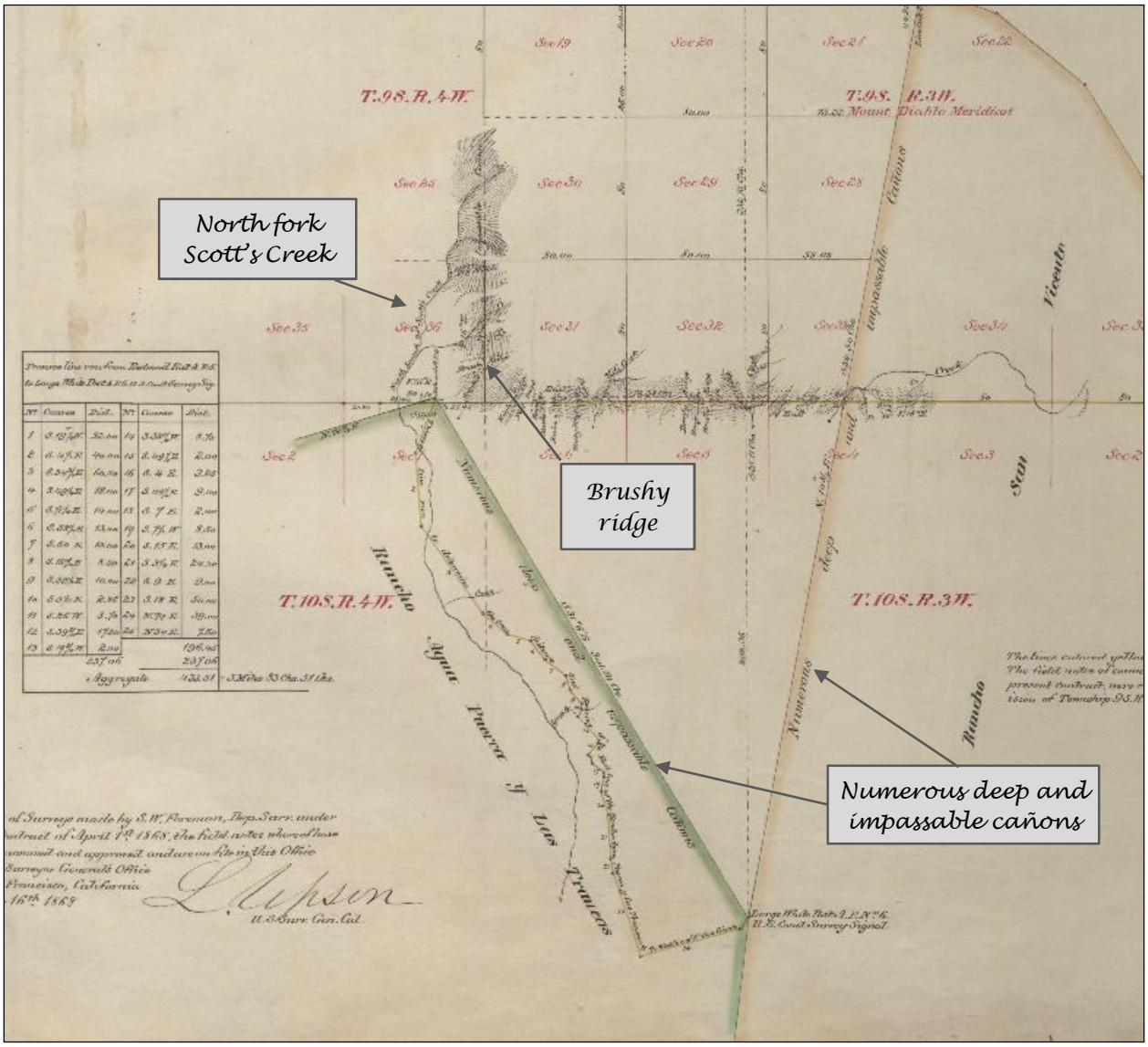


Figure 3-6 BLM General Land Office Township Map, Plat No. 380771, Eastern Portion of Rancho Agua Puerca y Las Trancas

Examples of landscape notes identified.

Source: U.S. Department of the Interior, Bureau of Land Management, General Land Office Records, accessed February 1, 2019, https://glorecords.blm.gov/details/survey/imaging/plat.aspx?viewer=html&imageFile=plat\CA\21\0090S0030W\CA210090S0030W00002.SID#.

Historical topographic maps are also valuable as primary source reference materials for the Study Area and Ranch environs that enable interpretation of geographic conditions and historical features over time. The earliest of these sourced herein is a T-Sheet for the Swanton Area produced in 1853 shown in Figure 3-7. In referencing guidance from the San Francisco Estuary Institute (SFEI) for interpreting the mapping symbols on historical T-Sheets, the majority of the vegetation type mapped in this U.S. Coast Survey (USCS) in 1853 is denoted as grassland, with some areas of sand and marsh, as well as some rectangular plots of crops, perhaps orchards in the drainage area denoted as the "Valley of El Jarro." The latter is interpreted to be the Scott Creek estuarine outlet into the ocean. According to SFEI, the USCS produced exceptionally accurate topographic mapping of the coastline area for the mid-nineteenth century, and it provides a view of selected ecological conditions prior to the majority of Euro-American settlement in the area. An enlarged version of the T-Sheet Swanton showing a greater level of detail is provided in Appendix B.[83]

[83] Assistance with analysis of the vegetation symbols on the 1853 T-Sheet for Swanton is provided by Andrea Woolfolk, Stewardship Coordinator at the Elkhorn Slough National Estuarine Research Reserve, e-mail communication, November 20, 2018, and Charlie Endris, GIS Specialist, Elkhorn Slough Foundation and National Estuarine Research Reserve, e-mail communication, November 21, 2018. Also see Robin M. Grossinger, Ruth A. Askevold and Joshua N. Collins, *Historical U.S. Coast Survey Maps to Environmental Management in the San Francisco Bay Area* (Oakland: San Francisco Estuary Institute, 2005), 3.

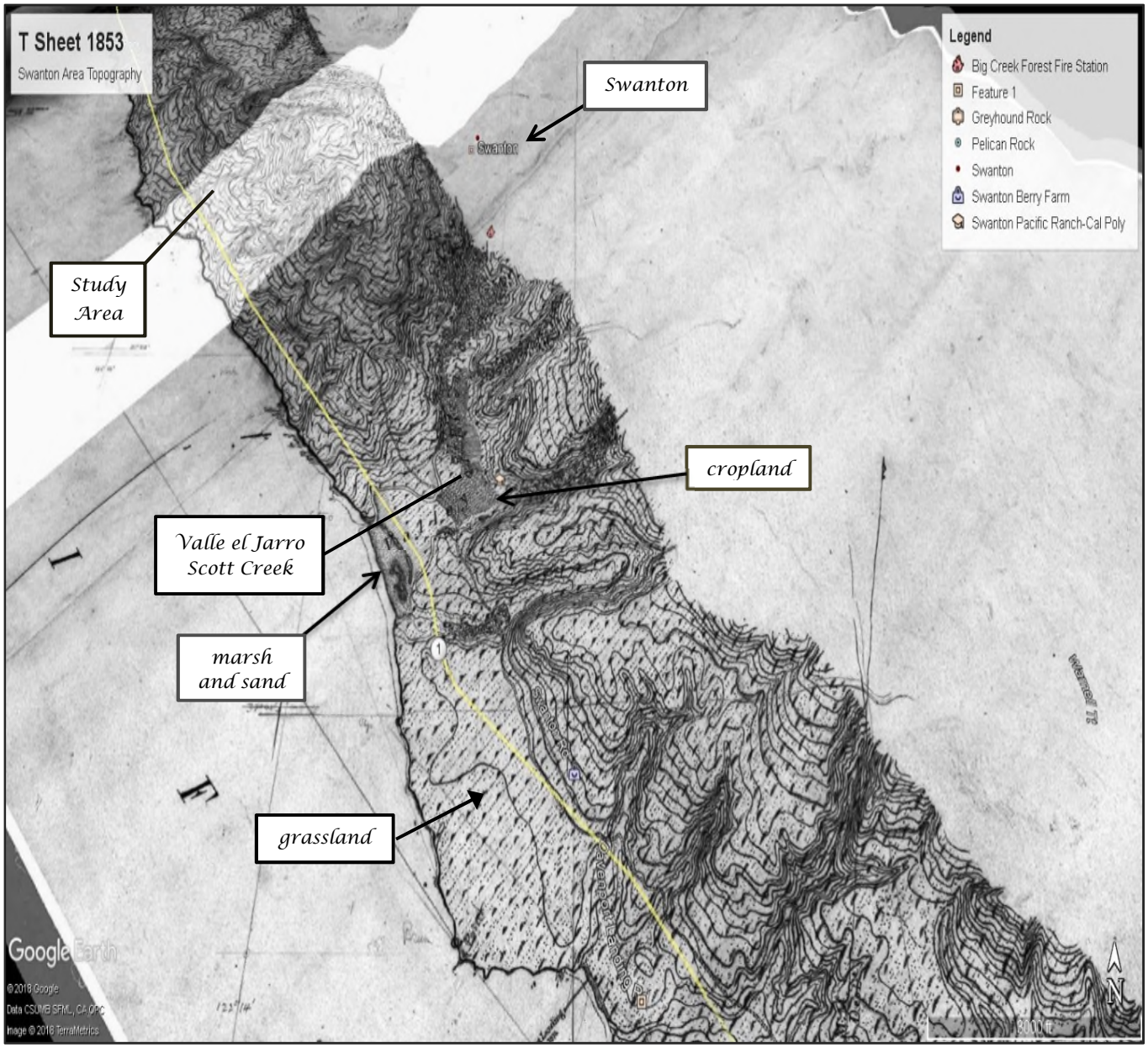


Figure 3-7. T-Sheet 1853, Swanton Area Topography

An enlargement of this map is included in Appendix B.

Source: National Oceanic and Atmospheric Administration, *NOAA Shoreline Website*, accessed May 4, 2018, https://shoreline.noaa.gov/data/datasheets/t-sheets.html.

Additional historical topographic mapping of the Swanton area is found with the U.S. Geological Survey which provides topographic maps circa 1902 and 1943 as shown in Figures 3-8 and 3-9, respectively. The 1902 map shows a solitary square symbol left of center in the Study Area, and the Old Coast Road leads to this symbol. This symbol could potentially be the old Cowboy Shack structure which was originally built and used by a dairy operation in 1944 and renovated in the mid-1980s.[84] The 1943 map depicts five square symbols in the same area as the single symbol in the 1902 map. As discussed in Chapter 4, a small "village" of family ranch homes and affiliated structures were built in the early 1920s for farming families who leased 178 acres of the old Archibald Ranch which included the Study Area; the 1943 topographic map appears to reflect these structures.[85] A more recent topographic map produced in the 1980s by the U.S. Forest Service (Figure 3-10) is included for comparative value with the other earlier mapping. The Old Coast Road is also shown between the topographic contour lines, and in this timeframe three structures are located in the same area as the Cowboy Shack, two relatively smaller squares and one larger square, indicating fewer structures remained at this point in time compared with the 1940s. This assemblage of historical topographic mapping relays a history of how certain features of the land have been graphically depicted over time, showing aspects that have changed, such as development and loss of structures within the Study Area, as well as those that have remained consistent such as the Old Coast Road and overall topographic relief contours.

[84] Gordon Claassen, Swanton Pacific Ranch Livestock Manager (retired), verbal communication with author, March 4, 2019; Cal Poly, *Swanton Pacific Ranch Management Plan (2015)*, 108.
[85] As discussed in Chapter 2, Scotsman James Archibald purchased Rancho Agua Puerca y Las Trancas in 1867 from then owners Ramon Rodriguez and Francisco Alviso.

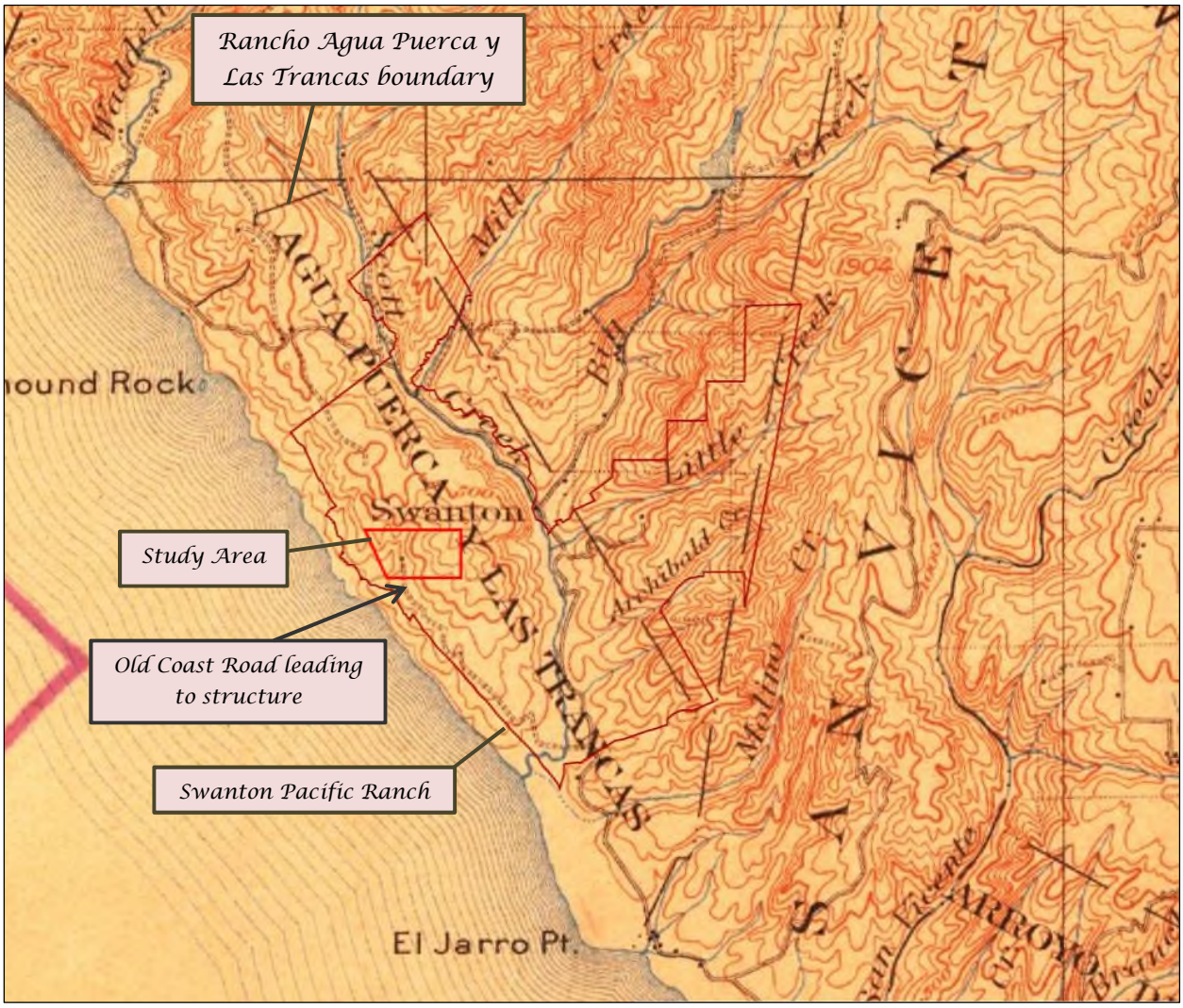
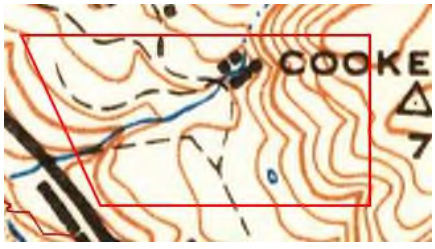


Figure 3-8. 1902 Topographic Map Santa Cruz Quadrangle (1:125000 scale) with Swanton Pacific Ranch and Study Area Boundaries

Source: U.S. Geological Survey, *Historical Topographic Map Collection*, 1902, Santa Cruz Quadrangle, accessed October 2, 2018, http://bit.ly/VZ3buu, via ESRI, County of Santa Cruz, USDFFSA, 2016, https://calpoly.maps.arcgis.com/apps/webappviewer/index.html?id=107735f5730e4a5a9fce4c4e6068e287.

Figure 3-9. 1943 Topographic Map (1:62500 scale) with Swanton Pacific Ranch and Study Area Boundaries

Source: ESRI, County of Santa Cruz, USDFFSA, 2016, accessed October 10, 2018, https://calpoly.maps.arcgis.com/apps/webappviewer/index.html?id=107735f5730e4a5a9fce4c4e6068e287.



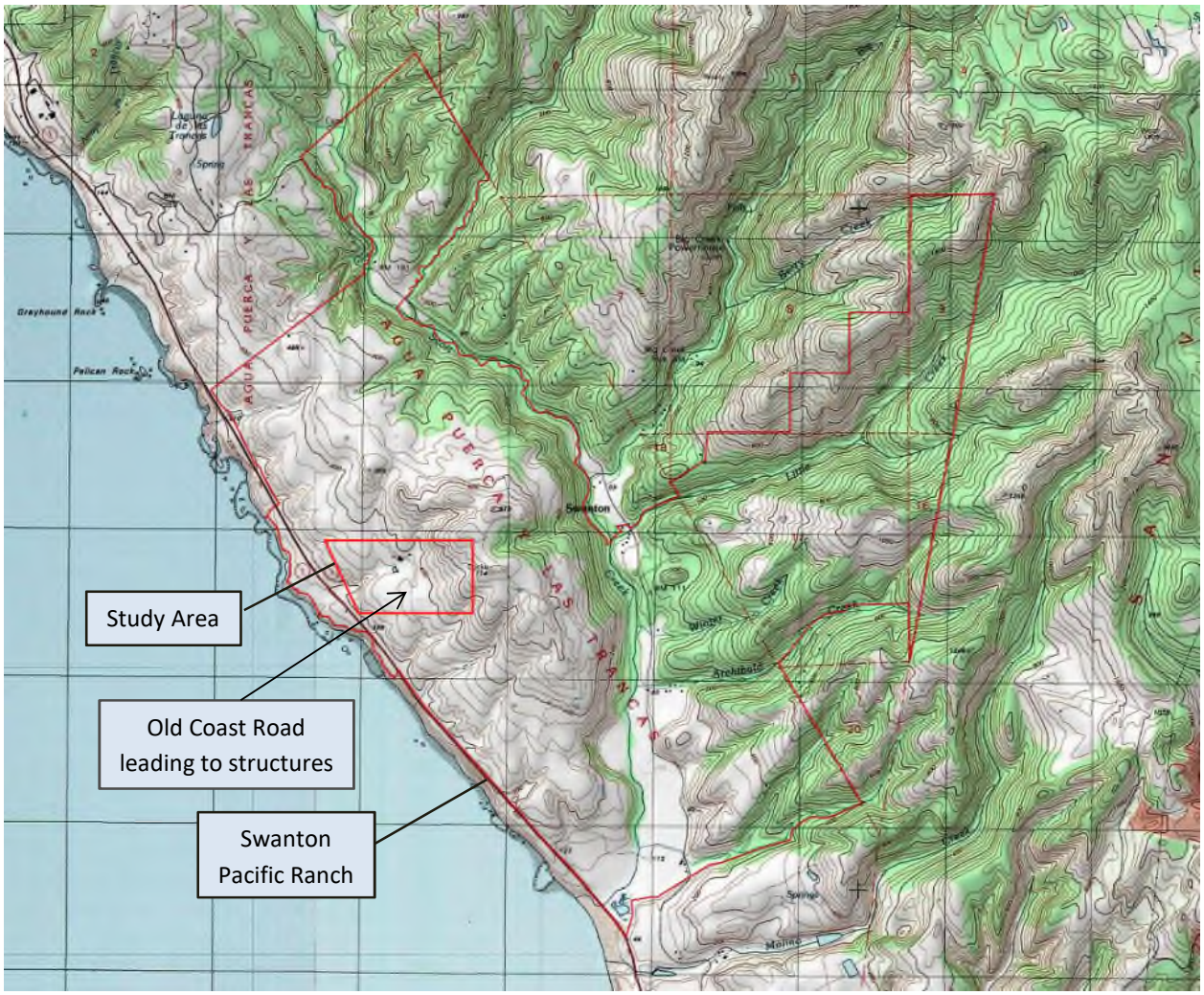


Figure 3-10. Topographic Map (1:24000 scale), Swanton Pacific Ranch, ca. 1980s

Source: ESRI, County of Santa Cruz, USDFFSA, 2016, accessed October 3, 2018, https://calpoly.maps.arcgis.com/apps/webappviewer/index.html?id=107735f5730e4a5a9fce4c4e6068e287.

3.2 Ecological Setting: Geology, Climate, Vegetation and Natural Events

3.2.1 Geologic and Climatic History Affecting Vegetation in California

A brief overview of the geological history of vegetation change in California provides a backdrop for more recent evolutionary changes in the Santa Cruz region including the SPR area. Approximately 75 million years ago the northern half of the North American continent was occupied by a primary vegetative unit referred to as the Arcto-Tertiary Geoflora which consisted of mixed deciduous hardwoods and conifers.[86] The West American Element of the Arcto-Tertiary Geoflora contained fossil species closely related to present-day dominant species in three primary forest habitats: the Coast Forest, the Sierran Forest and the Border-Redwood Forest. Many of the plant families in these habitats have been present in the Central Coast Ranges in which Santa Cruz region is located, including characteristic families such as redwood species (*Sequoia spp*.) oaks (*Quercus* spp.) firs (*Abies* spp.) and pines (*Pinus spp*). The vegetative species within the West American Element of the early Tertiary period (around 65 million years ago) included species similar to present-day western conifer forests; species became acclimatized to summer drought and winter rains. In the early Pliocene (5.3 to 2.5 million years ago) more diversity of types of climates in the west were generated by major topographic changes, including the elevation of the Sierra Nevada, and the Coast, Transverse and Peninsular mountain ranges. As climate became more arid, vegetation of the Coast Forest type, e.g., redwood (*Sequoia),* cypress and cedars (*Thuja)* and firs (*Abies*) gradually shifted from the coastward slopes of the northern Sierra Nevada by the

[86] A geoflora is a major vegetation unit that has maintained its essential identity through time and space. Philip A. Munz and David D. Keck, *A California Flora and Supplement* (Berkeley: University of California Press, 1973), 5, 6.

end of the Miocene epoch (23 to 5.3 million years ago) to more coastal locations during the Pliocene.[87]

3.2.2 Geologic Conditions of the Swanton Pacific Ranch Area

The majority of SPR is underlain by Santa Cruz Mudstone described by geologist Joseph C. Clark as a medium to thick bedded, laminated siliceous mudstone which grades to a sandy consistency locally in the Ranch area. This mudstone is from the upper Miocene era, marked by areas of pronounced break in slope.[88] The coastal Western Terrace portion of the Ranch which includes the Study Area contains two primary formations including Santa Cruz Mudstone and the overlaying surficial sediments of the fine- to medium sandy Marine Terrace Deposits from the geologically-recent Pleistocene-era (2.5 million to 11,700 years ago). Cretaceous quartz diorite and tertiary Santa Margarita Sandstone, Paleozoic or Mesozoic sediments underlay the northeast portion of the Ranch, and the riparian drainages including Scott Creek and its tributaries contain deposited Quaternary-era alluvium.[89] Along Big Creek and Berry Creek in the Davenport Quadrangle (U.S. Geological Survey topographic quadrangle) the Santa Cruz Mudstone rests directly atop Quartz diorite where Santa Margarita Mudstone is absent, per Clark.[90] Figure 3-11 illustrates these geologic and soils components on the SPR and environs.

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[87] Munz and Keck, *A California Flora and Supplement*, 5-7.
[88] Joseph C. Clark, "Stratigraphy, Paleontology and Geology of the Central Santa Cruz Mountains, California Coast Ranges," Geological Survey Professional Paper 1168 (Washington D.C.: U.S. Government Printing Office, 1981), 29, 30; Plate 1: Geologic Map and Sections of the Año Nuevo – Davenport Area, San Mateo and Santa Cruz Counties, California, accessed January 17, 2019, https://pubs.er.usgs.gov/publication/pp1168.
[89] Cal Poly, *Swanton Pacific Ranch Management Plan,*" 27.
[90] Clark, "Stratigraphy, Paleontology and Geology," 32.

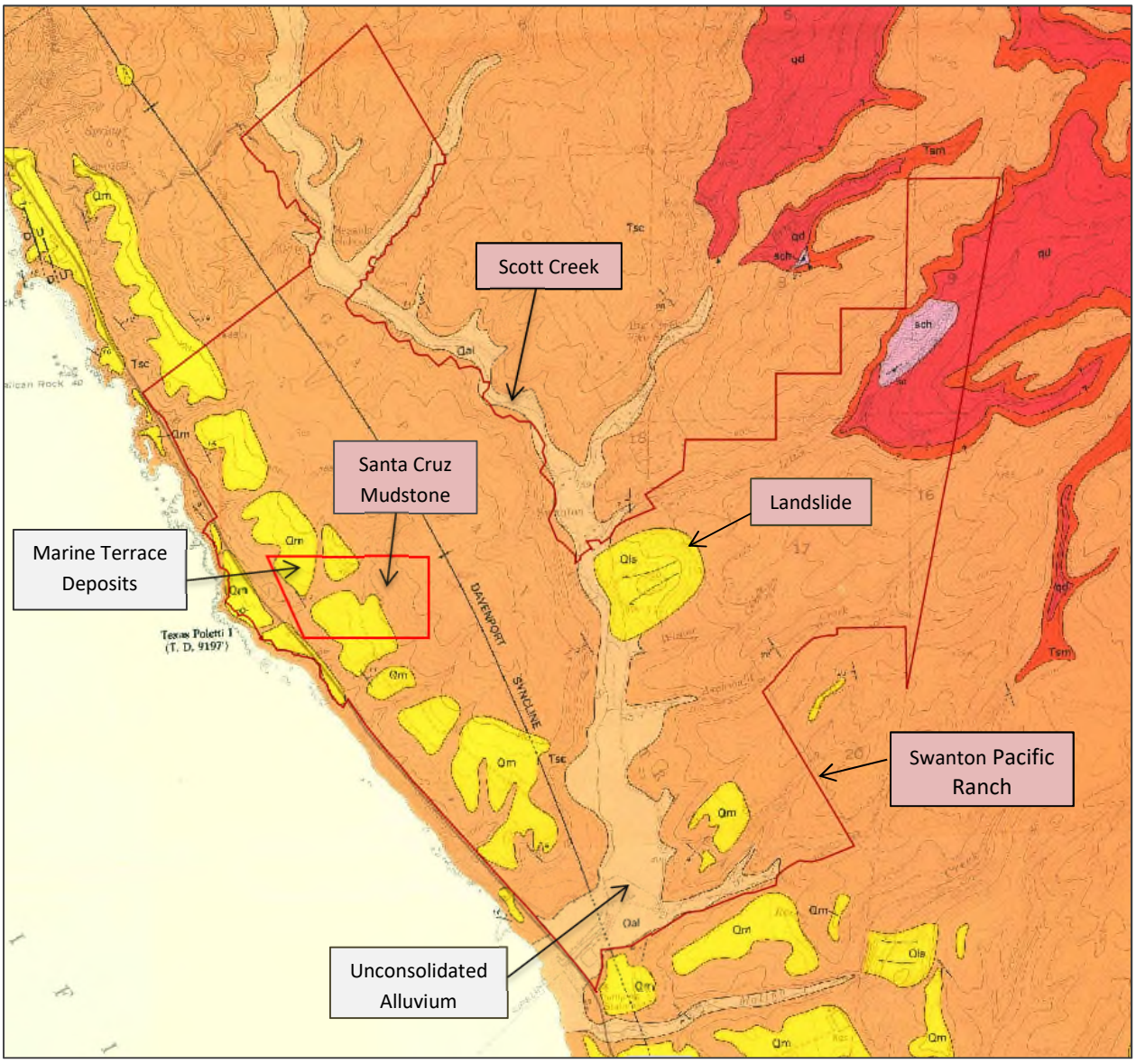

Figure 3-11. Geologic and Soils Map of Swanton Pacific Ranch Area

Source: Joseph C. Clark, "Stratigraphy, Paleontology and Geology of the Central Santa Cruz Mountains, California Coast Ranges, Geological Survey Professional Paper 1168" (Washington D.C.: U.S. Government Printing Office, 1981), 29, 30; Plate 1: Geologic Map and Sections of the Año Nuevo – Davenport Area, San Mateo and Santa Cruz Counties, California, accessed January 17, 2019, https://pubs.er.usgs.gov/publication/pp1168.

Earthquake faults in the Swanton area include the San Gregorio Fault which lies closest to the Ranch and runs in a northwest-southeast alignment along the coastal terrestrial area and then moves offshore south of the Año Nuevo Point where it appears to closely follow the coastal edge. Other faults include the Zanante and Ben Lomond faults north and east of Ben Lomond Mountain, roughly eight miles east of the Study Area. The active San Andreas Fault Zone is approximately 17 miles east of the Study Area and coastline of the Ranch (see Figure 3-11). According to Clark, the geologic construct of the Swanton area has a good potential for landslides, particularly within the highly fractured rocks of the Santa Cruz Mudstone and in the northern and western sections where steeper slopes are underlain by the mudstone units.[91] Figure 3-11 locates one landslide within the Rancho Agua Puerca y Las Trancas, specifically within an outflow of Little Creek into Scott Creek in the area of alluvial streambed comprised of unconsolidated sand, gravel and silt. As shown in the figure, the landslide is not in or near the Study Area, however, there may be other landslide areas within the environs of the Rancho; per Clark, only the "larger, definite landslide deposits" could be mapped in the field surveys and thus shown on the geologic map (Figure 3-11).[92] According to the *Swanton Pacific Ranch Management Plan*, numerous destructive landslides occurred in the Little Creek drainage as a result of the record rainfall and resultant storm damage in 1955.[93] Therefore, the SPR area has the geologic potential for additional landslides which, along with earthquakes and other ground-disturbing natural events could cause non-anthropogenic damage to soils and vegetation types.

[91] Clark, "Stratigraphy, Paleontology and Geology," 41.
[92] Ibid., 40, Plate 1.
[93] Cal Poly, *Swanton Pacific Ranch Management Plan*, 31.

3.2.3 Streams and Flooding

SPR and the partially-overlapping Rancho Agua Puerca y Las Trancas are bifurcated by an 11-mile section of the south/southwest-flowing Scott Creek, the major stream and drainage corridor within the watershed which originates in the Santa Cruz Mountains between Eagle Rock and Blooms Creek. Three perennial (year-round) streams are tributary to Scott Creek: Big Creek, Mill Creek and Little Creek. Two intermittent tributary streams, Archibald Creek, and Queseria Creek, are geographically located north to south within the southern portion of the Rancho area. Scott Creek is just under one mile east of the Study Area at its closest distance, on the east side of the hills that divide the Western Terrace/coastal prairie area of the Ranch from the more heavily forested and riverine habitat adjacent to and east of Swanton Road. Scott Creek drains into an estuary adjoining the Pacific Ocean near the southernmost boundary of the SPR property. Figure 3-8, the 1902 topography of the area, identifies these stream locations, with the exception of Queseria Creek, which is just south of Archibald Creek. In addition to the major flooding during the storms in December of 1955, other floods of record on the Rancho occurred in 1940, 1982 and 1998.[94] The Study Area contains a single bifurcated drainage referred to as Cowboy Shack Gulch, shown in Figures 3-13a through 3-15 subsequently in this chapter. This drainage is one of about a dozen or more northeast-southwest-flowing gullies within the Western Terrace area of SPR that carry the majority of rain runoff from the downslope terrace to the ocean.

[94] Cal Poly, *Swanton Pacific Ranch Management Plan*, 29, 31.

3.2.4 Climate

Historical climatic conditions and changes involving moisture and temperature have been integral to the emergence and dissipation of vegetation types in western North America. Climate information pertaining to the North Coast-Santa Cruz region is relevant to the environmental factors that contribute to the vegetation types, variety and geospatial cover areas on SPR's Western Terrace area. Between the Eocene and Miocene geologic time periods (roughly from 56 million to 5.3 million years ago) aridity during the summer months increased throughout the region that is now present-day California and plant species adapted accordingly, for example, sclerophyllous types (i.e., possessing stiff, firm leaves) of woody plants increased.[95] A flora evolved that included more small-leaved drought-deciduous and drought-resistant plants compared to the early Tertiary floras.[96]

Along the coast of California the maritime climate is generally cool with relatively low variation in temperature on the lower seaward slope of the outer Coast Ranges. The prevailing westerly wind moderates the climate, and temperatures are affected primarily by the isotherms which trend north-south and follow the wide-ranging topographic contours within the state. The state has distinctive wet and dry seasons with the wet portion falling in cooler months and increasing from south to north, and heavier on southern and western slopes. Fog is an important climatic control factor affecting vegetation, most frequently in coastal and adjacent foothill areas as contained in the Santa

[95] Geologic time period information from the University of California Museum of Paleontology, "Geologic Time Scale," accessed January 18, 2019, http://www.ucmp.berkeley.edu/help/timeform.php. Botanical term definitions from Michael Charter's Home Page, "Botanical Terms," accessed January 18, 2019, http://www.calflora.net/botanicalnames/botanicalterms.html.
[96] Munz and Keck, *A California Flora and Supplement*, 9. Floras are groupings of plants that live in a particular area, time period, or environment.

Cruz region. Fog increases in higher altitudes and latitudes and is prevailing along the coast in summer months.[97] Coast redwoods (*Sequoia sempervirons*), which are prevalent in the forest vegetation alliances areas of the Ranch, are an example of a species that has prime habitat in the summer fog belt. Redwoods are inefficient water managers as a result of their shallow roots and wide cell pores and, as such, they cannot tap and store sufficient amounts of water through their root systems. As partial compensation for their root system shortcomings, they absorb about one-third of their annual moisture uptake directly from fog through their leaves.[98] Shrub and herbaceous species that inhabit the coastal prairie habitat on the Western Terrace of SPR discussed in the following section are also acclimatized to the wind, fog and generally cool temperatures of the coastal area.

Historic climate data for the North Coast-Santa Cruz region was investigated for this study in order to potentially compare and correlate climatic conditions such as temperature, wind levels, fog, rainfall and other moisture components with the vegetation conditions shown in the historic aerial photography of the SPR and the Study Area. Historical data from the Western Regional Climate Center (WRCC) indicates that average daily temperature and rainfall values for the National Oceanographic and Atmospheric Administration (NOAA) Cooperative Station at Santa Cruz during the 123-year period from January 1893 to June 2016 include an average maximum temperature of 68.9 degrees (Fahrenheit), an average minimum temperature of 45.0 degrees, and average

[97] Munz and Keck, *A California Flora and Supplement*, 4, 5.
[98] Jared Farmer, *Trees in Paradise: A California History* (New York: W.W. Norton & Company, 2013), 7, 10. Per Farmer, Giant Sequoia *(Sequoiadendron giganteum)* and Coast Redwood (*Sequoia sempervirons*) are the two redwood species known only in California.

precipitation of 29.33 inches, with the peak rainfall in January and the low in August.[99] The WRCC database has a short period of available data for the NOAA Cooperative station at Davenport from September 1960 through June 1977.[100] During those seventeen years, Davenport had average maximum and minimum temperatures of 60.66 and 48.87 degrees, respectively, and average annual rainfall of 25.73 inches. This relatively recent data period correlates only to the 1975 historical aerial photograph of the Study Area.[101]

3.2.5 Vegetation Alliances and Habitat Types on Swanton Pacific Ranch

Early vegetation types of a region can be detected through scientific evidence such as pollen core sampling. Geological studies of Santa Cruz Mudstone, prevalent on the SPR Western Terrace including the Study Area, find abundant historical pollens according to the previously referenced geologic and paleontological study of the Central Santa Cruz Mountains by geologist Joseph C. Clark. Clark references core sampling data in the area analyzed by W. R. Evitt in 1965 that found mostly angiosperm pollens (the classification of plants with their ovules and seeds enclosed within an ovary) including the genus *Quercus* (oaks), *Juglans* spp. (walnut), *Carya* spp. (hickory), and *Alnus* spp. (alder). Pollens of grass taxa were also present in the core sampling, including several types within the botanical family Compositae (aster) and Ericaceae (heath). Historic pollens within the gymnosperm classification (plant species with exposed seeds) included the families of pine and *Taxodium*, i.e. evergreen tree species with spiral and/or

[99] Western Regional Climate Center data accessed January 18, and March 25, 2019, https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca7916, "Santa Cruz, California (047916), Period of Record: 01/01/1893 to 06/09/2016," accessed March 25, 2019, https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca2292.
[100] The Town of Swanton does not have a weather station. The Town of Davenport, two miles south, is the closest weather station, and is generally referenced for weather data pertaining to SPR.
[101] No data was found on historical fog and wind conditions or drought periods for the study timeframe of the twentieth century for Santa Cruz or Davenport. Additional research into available data on historical annual peak and low periods of fog and wind as well as drought periods could provide supplemental values that have affected vegetation conditions during the late nineteenth and early to mid-twentieth centuries.

needle-like leaves such as Sequoia and cypress species. This historic pollen evidence from the Santa Cruz Mudstone shows a consistency with the primary present-day plant taxa on SPR and vicinity, indicating a substantial degree of stasis or continuum in vegetation types in the area over time.[102]

Present-day vegetation alliances on SPR are described herein at a broad level as a basis for assessment of vegetation changes and/or static conditions over time using historical imagery and mapping evidence. Information regarding present-day vegetation types and locations is obtained from botanical documentation, input from local botanists, field observations, current aerial photography, as well as the most recent edition of the *Swanton Pacific Ranch Management Plan* (2015). Major vegetation types such as grassland, shrubland, forestland and the like are referred to as vegetation alliances, or types, groupings of plants that form repetitive patterns over a landscape. Pursuant to the vegetation classification system implemented in *A Manual of California Vegetation* published by the California Native Plant Society (CNPS), vegetation alliances are assemblages of plant species, traditionally referred to as plant communities, which have specific characteristics reflective of the effects of environmental components such as climate, soils, hydration, disturbances and other factors. The vegetation patterns of the alliances present a characteristic appearance, based on size, shape and spacing of the plant species.[103]

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[102] Joseph C. Clark, "Stratigraphy, Paleontology and Geology," 32; Munz and Keck, *A California Flora and Supplement*, 57-58.

[103] California Native Plant Society, *A Manual of California Vegetation*, Online Edition, accessed March 23, 2019, http://www.cnps.org/cnps/vegetation. This classification authority is utilized by the California Department of Fish and Wildlife and the U.S. Fish and Wildlife Service as the standard system for vegetation classification. The terms "vegetation alliances" and "vegetation types" are used synonymously in this study.

The vegetation descriptors and the vegetative mapping discussed below are based on information from the *Management Plan* as this source is the most current pertaining to quantification and geospatial mapping of vegetation types for the Ranch. CNPS' *A Manual for California Vegetation* is the preferred current botanical authority for California vegetation classification, and as the *Management Plan* uses a different nomenclature method, there will be some inconsistency in terminology between the information in the discussion below and that in Table 3-A which lists vegetation alliances within the SPR property. However, an attempt is made herein to minimize the variation in terminology while remaining true to the source material of the *Management Plan*.[104]

The *Swanton Pacific Ranch Management Plan* categorizes the vegetation on the Ranch into three primary categories referenced as plant communities: Forestland, Grassland and Cropland.[105] The largest of the vegetation types that comprise the 3,200 acres of the Ranch is Forest, with Coast Redwood/Douglas Fir types (*Sequoia sempervirons* and *Pseudotsuga menziesii* Forest alliances) covering 1,435 acres. Grassland is the second largest vegetation type with 1,238 acres (*Nassela pulcra* Herbaceous and potentially multiple additional grassland alliances), and brush fields vegetation encompasses approximately 332 acres. *Baccharis pilularis* Shrubland and potentially numerous other Shrubland alliances are interpreted to be associated within this brush fields category. Additional vegetation types include about 125 acres of

[104] The CNPS explains in the Online version of *A Manual for California Vegetation* (https://www.cnps.org/cnps/vegetation) that, although there has been traditional usage of the terms "plant community" and "vegetation types" essentially synonymously, there has been controversy among ecologists as to the accuracy of "plant community." Therefore, in *A Manual of California Vegetation* the CNPS uses the term "vegetation type" (or alliances) to refer to plant assemblages. As such, the author endeavors to reflect this preference while attempting to bridge the terminology inconsistency with the SPR *Management Plan*, and minimize the number of terms in use.
[105] Cal Poly, *Swanton Pacific Ranch Management Plan*, 47.

cultivated cropland that produces apples, vegetables, herbs, oat hay and Christmas trees, and wetland-riparian and riverine habitat along drainage corridors of Scott Creek and other creeks account for about 14 acres. There is also a minor amount of marginal barren landscape to account for any balance of the total acreage.[106]

Figure 3-12 illustrates the general geospatial locations of various vegetation types and wet habitats within Swanton Pacific Ranch boundaries based on mapping data from the SPR database. This data was initially based on mapping work conducted by Cal Poly student John R. Todd in 1988 and updated in 2003 by David In Yun as part of a master's thesis in GIS database applications for Swanton Pacific Ranch.[107] However, the types and geospatial areas of the vegetation are considered approximate and on a general level for study purposes until such time as additional vegetation studies update the botanical database. For example, the western half of the Study Area contains the Cowboy Shack Gulch drainage which contains *Salix lasiolepis* Shrubland alliance (Arroyo Willow Thickets) plant species. On the Swanton Pacific Ranch vegetation mapping, however, the drainage area is depicted as "brush fields" with no wetland or riparian vegetation types indicated.

[106] Cal Poly, *Swanton Pacific Ranch Management Plan*, 4, 45; Todd, "Vegetation Type Map for Swanton-Pacific Ranch, 17.
[107] David In Yun, "Utilization of Geographic Information System for Research, Management and Education in the Natural Resources Management Department" (M.A. thesis, California Polytechnic State University, San Luis Obispo, 2011), accessed January 29, 2019, https://digitalcommons.calpoly.edu/cgi/viewcontent.cgi?article=1472&context=theses.

Table 3.A. Vegetation Alliances within Swanton Pacific Ranch

Vegetation Alliance (Scientific Name)	Vegetation Alliance (Common Name)	Traditional Vegetation Community Name (a)	In Study Area
Bromus carinatus-Elymus glaucus Herbaceous	California brome-blue wild rye prairie	Coastal Prairie	Yes
Danthonia californica Prairie	California oat grass	Coastal Prairie	Yes
Nassela pulcra Herbaceous	Needlegrass	Valley Grassland	Yes
Baccharis pilularis Shrubland	Coyote brush scrub	Northern Coastal Scrub	Yes
Arctostaphylus crustacea tomentosa Shrubland	Brittle leaf-wooly leaf manzanita	Chaparral	No
Pinus radiata Forest	Monterey Pine Forest	Closed Cone Pine Forest	Yes
Pinus attenuata Forest	Knobcone Pine Forest	Closed Cone Pine Forest	No
Pseudotsuga menziesii Forest	Douglas Fir Forest	Douglas Fir Forest	No
Sequoia sempervirons Forest	California (Coast) Redwood	Redwood Forest	No
Quercus parvula, shrevei Forest	Shreve Oak	Mixed Evergreen Forest	No
Umbellaria californicus Forest	California Bay Laurel	Mixed Evergreen Forest	No
Arbutus menziesii Forest	Madrone	Mixed Evergreen Forest	No
Notholithocarpus densifolium Forest	Tan Oak	Mixed Evergreen Forest	No
Acer macrophyllum Forest	Big Leaf Maple Forest	North Coast Coniferous Forest	No
Aesculus californica Woodland	California Buckeye groves	Foothill Woodland	No
Quercus agrifolia Woodland	California Live Oak Woodland	Northern Oak Woodland	No
Quercus wislizenii Forest	Interior Live Oak	Northern Oak Woodland	No
Salix lasiolepis Shrubland	Arroyo Willow Thickets	Riparian Scrub (b)	Yes

Table 3.A Cont'd			
Vegetation Alliance (Scientific Name)	**Vegetation Alliance (Common Name)**	**Traditional Vegetation Community Name (a)**	**In Study Area**
Juncus lescuri Herbaceous	Salt Rush Swales	Coastal Strand	No
Typha latifolia Herbaceous	Cattail Marshes	Coastal Salt Marsh	No
Distichlis spicata Herbaceous	Salt Grass Flats	Coastal Salt Marsh	No

(a) Nomenclature utilized in Philip A. Munz and David D. Keck, *A California Flora and Supplement* (Berkeley: University of California Press, 1973). This authority has been superseded by others, including *A Manual of California Vegetation* published by CNPS cited herein.

(b) Munz and Keck did not classify riparian woodland plant communities, however, other botanical classification systems do, e.g., CalVeg which is utilized by the USDA Forest Service.

A best attempt is made by the author to provide a representative list of the vegetation alliances on SPR in this table, however, it may not be completely comprehensive.

Swanton Pacific Ranch contains plant species that are deemed rare which further informs the ecological value of the Ranch and also contributes to the argument posited herein of vegetation alliance continuum, or relative stasis, during the study time period as potentially due to low intensity agricultural usage. An earlier inventory of plant species listed as Threatened, Endangered or Rare, in accordance with the status criteria established by the CNPS and the State of California, Department of Fish and Game (now Department of Fish and Wildlife) was prepared as part of an ecological study of SPR conducted in 1990 by graduate student Catherine Coe.[108]

[108] The special status species list prepared by Catherine Coe is included in the *Swanton Pacific Ranch Management Plan,* Appendix C, available online at https://www.spranch.calpoly.edu/.

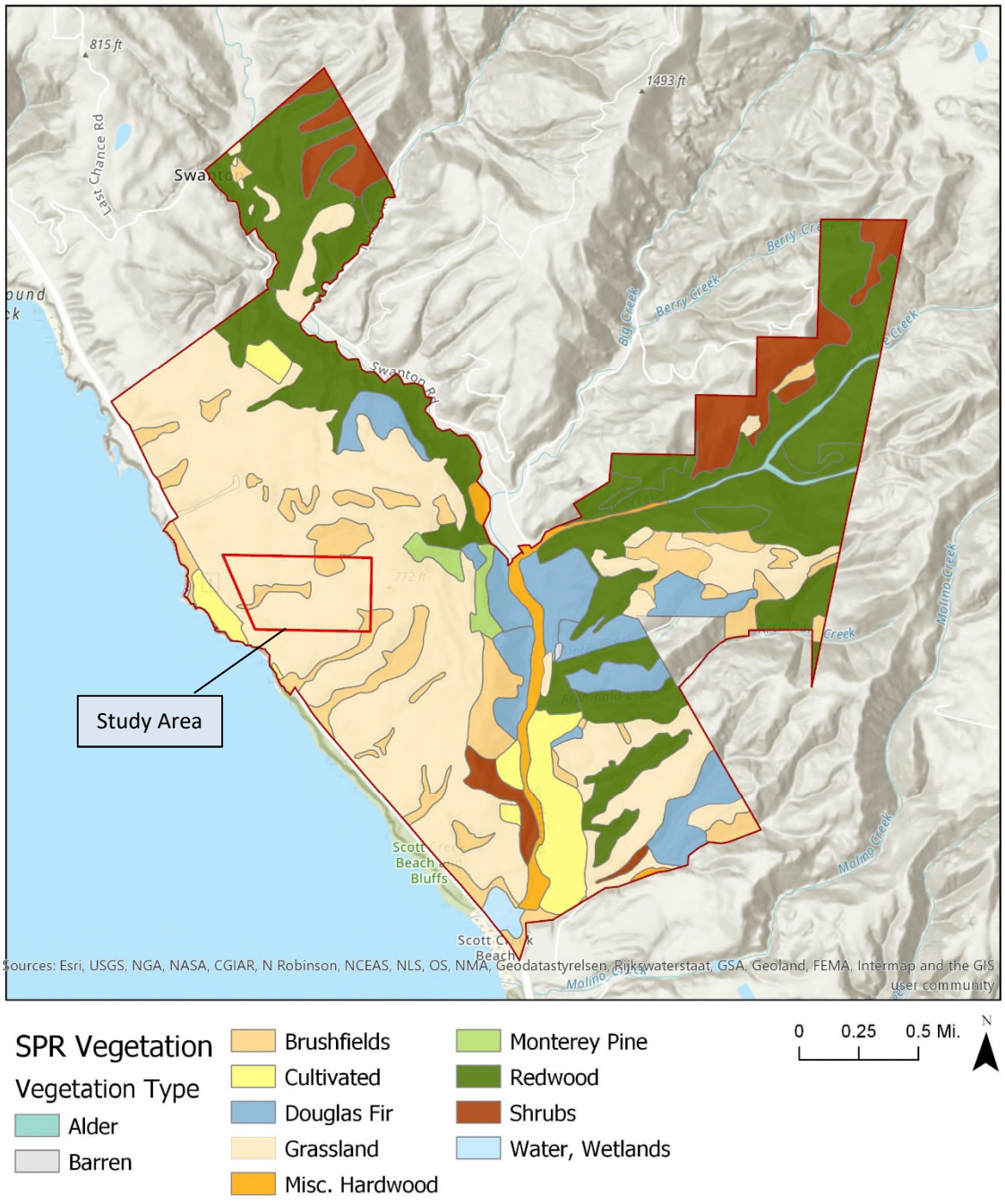

Figure 3-12. Vegetation Map of Swanton Pacific Ranch

Source: Data from David In Yun, "Utilization of Geographic Information System for Research, Management and Education in the Natural Resources Management Department, California Polytechnic State University, San Luis Obispo" (M.A. thesis, Cal Poly, San Luis Obispo, 2011), accessed January 29, 2019, https://digitalcommons.calpoly.edu/cgi/viewcontent.cgi?article=1472&context=theses.

More recent botanical information pertaining to occurrence of plant species on the Ranch is available, for example in Jim West's 2016 field examination, "Traversing Swanton Road," and an in-progress study of plant species within the entire Ranch property by Cal Poly graduate student Reed Kenny. According to the more recent botanical studies of Swanton, SPR contains about a dozen plant species considered to be rare. Table C-1 in Appendix C provides a listing of rare plant species within the entire ranch property and within the Study Area analyzed herein. None of the rare plant species are listed as endangered or threatened by either the state of California or the federal government, however, they are considered rare by the CNPS. A ranking of rare by the CNPS is considered important by the California Department of Fish and Wildlife and in environmental impact assessments prepared under the requirements and guidance of the California Environmental Quality Act.[109] CNPS rare plants known to be within or near the Study Area of this thesis are ranked 1B and include *Agrostis blasdalei* (Blasdale's bent grass), *Amsinkia lunaris* (in the Fiddleneck group), and *Stebbinsoseris decipiens* (Santa Cruz microseris).[110] The relatively undisturbed marsh habitat of Scott Creek near its outlet into the coastal estuary upstream of California Highway 1 contains over six vegetation alliances and numerous plant species, including some listed as rare or endangered.[111]

[109] California Native Plant Society's California Rare Plant Rank (CRPR) 1B indicates plants that are rare throughout their range, the majority being endemic to California, and most having declined significantly over the last century. 1B plant species meet the definitions of the California Endangered Species Act of the California Fish and Game Code, and the definitions of Rare or Endangered under the California Environmental Quality Act Guidelines Section 15380. Plant species with CRPR 1B are eligible for State listing as rare or endangered. The CNPS rare plant ranking system ranges from presumed extinct species (CRPR 1A) to species of limited distribution that warrant regular monitoring (CRPR 4). CRPR 1B species are second in rank under 1A, or, the rarest among still-existing plant taxa. Information accessed February 18, 2019, https://www.cnps.org/rare-plants/cnps-rare-plant-ranks.
[110] Jim. A. West, e-mail communication with author, January 23, 2019.
[111] Cal Poly, *Swanton Pacific Ranch Management Plan*, 46.

The *Swanton Pacific Ranch Management Plan* describes the vegetation "mosaic" on the Ranch property as "bands along a transect starting from the coast and changing as elevation increases and moving east toward the top of Ben Lomond Mountain."[112] The interstitial connections between the various types of vegetation alliances serve as habitat borderlands which can and do evolve over time from both anthropogenic uses and natural causes such as wildfires and flooding events. There are numerous examples of these types of transition areas on Swanton Pacific Ranch and environs. The rangeland of the Coastal Prairie habitat where the Study Area of this thesis is located is predominantly composed of herbaceous vegetation alliances such as Needlegrass (*Nassela pulcra).* Commonly and traditionally referenced as grassland, this vegetation type is prevalent along the west-facing slopes of the coastal band in the northwesterly section known as the Western Terrace of the Ranch property, and inland to a ridge that divides Scott Creek from the coastal plain. The ridge just outside of the Study Area to the north and east maintains a Monterey Pine (*Pinus radiata)* Forest alliance which has expanded further onto the coastal plain area over a period of roughly a half century.[113]

Figures 3-13A and 3-13B show the grassland (Herbaceous) and Monterey Pines in the hilly Coyote Brush (*Baccharis pilularis)* Shrubland vegetation within and to the northeast of the Study Area. The Arroyo Willow Thickets (*Salix lasiolepis*) alliance in the drainages of Cowboy Shack Gulch is shown in the foreground of Figure 3-14, as well as the grassland and Coyote Brush Shrubland-dominant hill slopes with individual Monterey pines in the middle and distant views, respectively, of the southeastern portion of the

[112] Cal Poly, *Swanton Pacific Ranch Management Plan*, 47.
[113] Grey Hayes, personal communication with author, August 27, 2018.

Study Area. Douglas fir (*Pseudotsuga menziesii)* Forest alliance intersperses with Monterey pine on the east side of the steep ridge transitioning into the Scott Creek riparian habitat drainage; there, the pine transitions to a Douglas fir/hardwood forest alliance. Coast Redwood (*Sequoia sempervirons*) and nutmeg (*Torreya californica*) are also primary vegetative alliances in the Scott Creek riparian habitat corridor. Coast Redwoods and red alder (*Alnus rubra*) are typically found near water courses such as Scott Creek, Little Creek and other drainage riparian habitat types. Transitioning away from wetland and water-course habitats, Redwoods mix with Douglas fir for a heavy hardwood forest alliance. In higher elevations up the sides of ridge the vegetation types transition to a chaparral habitat and Knobcone pine (*Pinus attenuata*) Forest alliance. The forest vegetation alliances on the Ranch identified in Figure 3-12 also include other dominant or co-dominant tree species such as Tanoak (*Notholithocarpus densiflorus*), Madrone (*Arbutus menziesii*), California bay laurel (*Umbellularia californica*), Big leaf maple (*Acer macrophyllum*), Nutmeg (*Torreya californica*), California buckeye (*Aesculus californica*), Shreve oak (*Quercus parvula var. shrevei*), coast live oak (*Quercus agrifolia*) and Interior live oak (*Quercus wislizenii*).[114]

[114] Cal Poly, *Swanton Pacific Ranch Management Plan*, 48; Urban Forest Ecosystems Institute, "Selectree: A Tree Selection Guide," accessed February 4, 2019, https://selectree.calpoly.edu/tree-detail.

Figure 3-13A. Vegetation Alliance Borderlands: Looking northeast from south side of Cowboy Shack Gulch

Foreground: fence along south side of Cowboy Shack Gulch drainage and Arroyo Willow Thickets Shrubland in drainage. Middle ground: grassland/herbaceous vegetation with Cowboy Shack and corrals. Background: Hills with Coyote Brush Shrubland and Monterey Pine Forest alliances. Photo by author, November 2, 2018.

Figure 3-13B. Vegetation Alliance Borderlands: Looking east from northwest quadrant of Study Area

Foreground: grassland/herbaceous. Middle ground: Arroyo Willow Thickets Shrubland in drainage of Cowboy Shack Gulch, and grassland/herbaceous vegetation, Cowboy Shack and corrals. Background: Hills with Coyote Brush Shrubland and Monterey Pine Forest alliances. Photo by author, December 17, 2018.

Figure 3-14. **Vegetation Alliance Borderlands: Looking southeast from north side of Cowboy Shack Gulch**

Foreground: Arroyo Willow Thickets Shrubland alliance in the Cowboy Shack Gulch. Middle ground: grassland/herbaceous alliance. Background: Coyote Brush Shrubland on hill flanks with individual Monterey Pines. Photo by author, December 17, 2018.

3.2.6 Study Area Vegetation Alliances and Field Reconnaissance for Historic Features

The present-day composition of vegetation alliances within the 110-acre Study Area is predominantly herbaceous (grassland), with Coyote Brush (*Baccharis pilularis)* Shrubland on the steeper hill flanks and Arroyo Willow Thickets *(Salix lasiolepis)* Shrubland contained within the bifurcated drainage of Cowboy Shack Gulch.

This composition is best shown in Figure 3-15 as the vegetation type polygons in Figure 3-12 are based on a broad vegetative study of the Ranch as previously noted regarding the vegetation type mapping prepared by John Todd. Vegetation taxa in the 110-acre Study Area contains an overall mix of endemic (native to the area) and non-native (also referred to as exotic or introduced species) and yet the representation of native species is particularly rich in certain areas, according to Swanton-area botanist James (Jim) A. West. West is considered an expert in Swanton area botany, having extensively studied the local flora taxa and alliances for over thirty years. In his field study "Traversing Swanton Road," West concludes, for example, that the Scott Creek watershed corridor contains a high percentage, 10 to 12%, of the floral taxa within California.[115] Pertaining to the Study Area of this thesis, the upper portion of Cowboy Shack Gulch (some of which is just outside to the north of the Study Area boundary) and the slopes with Coyote Brush Shrubland and Douglas fir/Monterey pine forest interspersed with Coast live oaks and Shreve oaks contain a substantial representation of native plant species, according to West. The current presence of native species such as species in the Bent Grass, Dock/Sorrel and Fiddleneck groups amongst non-native vegetation on the rangeland pastures is remarkable in light of the historical uses of the land for livestock grazing and crop growing which disturb the native soil regime and can remove whole plant structures, including roots. (Historical land uses are addressed in Chapter 4.)[116] Figure 3-15 indicates the approximate locations within the Study Area where native grasses and shrubland plant species are surviving despite historical disturbances of the land.

[115] Jim A. West, "Traversing Swanton Road," University of California Santa Cruz Arboretum, 2016, accessed May 2, 2018, https://arboretum.ucsc.edu/pdfs/traversing-swanton.pdf., 1, 2, and 107-115. "Taxa" refers to hierarchical groupings of plant species, i.e., orders, families, genuses, species, varieties/subspecies.
[116] Ibid., 2, 107-115.

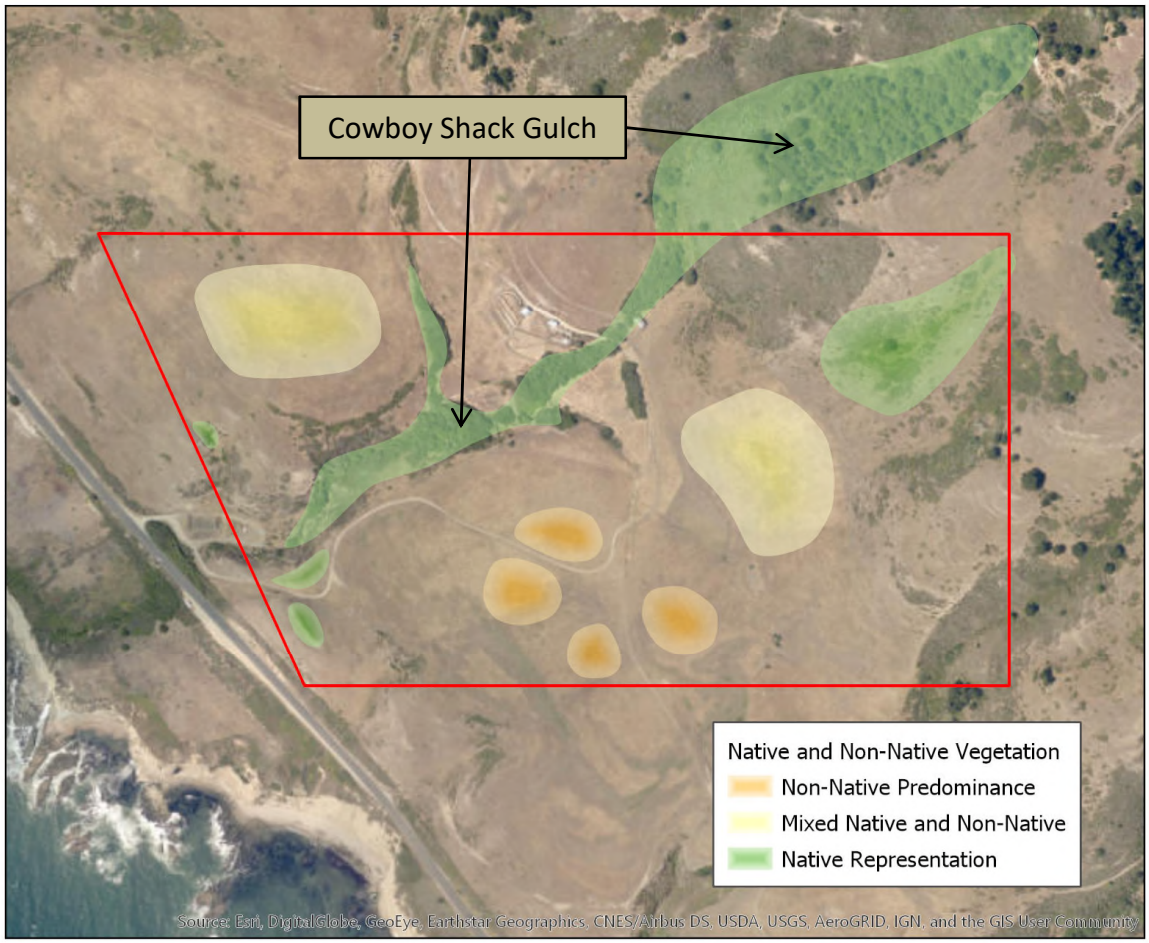

Figure 3-15. Vegetation Map of Study Area with General Native and Non-Native Plant Taxa Locations

Source: ESRI, County of Santa Cruz, USDFFSA, 2016, accessed October 8, 2018, https://calpoly.maps.arcgis.com/apps/webappviewer/index.html?id=107735f5730e4a5a9fce4c4e6068e287. Graphic prepared by Russ White, Cal Poly GIS Department.

The following discussion addresses the native and non-native vegetation in the Study Area in particular.

A field reconnaissance walk over the Study Area was conducted on December 18, 2018 with the author, botanist and SPR Education and Research Coordinator Grey Hayes,

botanist Jim A. West and Cal Poly graduate student Reed Kenny. The purpose of the site visit was to review the existing vegetation types within the area and environs to determine, if possible, the general locations and types of endemic as well as non-native plant species, and to assess whether there is a relative overabundance or predominance of non-natives in any particular portions of the Study Area. In addition, the site visit participants sought observations of the presence of any distinguishing historic features and/or remnants of prior land uses in the area, such as evidence of historic fence lines that may indicate previous pasture delineations, infrastructure associated with farming and ranching activities, and recognition of areas that had been tilled or plowed perhaps indicated by changes in vegetation types and/or patterns. Historic features such as those can help locate and shed light on earlier land use activities.

No portions of the Study Area walked during the site visit could be identified with confidence as having been tilled or plowed previously, i.e., there were no distinguishable demarcation lines or areas observed that could be interpreted as plowed or unplowed fields. Although the majority of the Study Area was traversed during the December 2018 site visit, it is possible that historically-farmed areas may not have been observed. Future studies utilizing belt transects or other similar methods of quantitative data collection would potentially uncover additional site disturbances from historical farming practices. The lack of confirmed tilling or plowing evidence from this preliminary framework study, however, indicates that either the historical cultivation areas were limited in area, or grassland and shrubland vegetation alliances have rebounded relatively successfully in certain areas of the rangeland pastures.

According to West, the greater concentrations of native taxa within this Study Area are particularly found on the more vertical flanks of the Cowboy Shack Gulch, the bifurcated sole drainage/ravine within the Study Area. The steeper slopes of the northern portion of the Gulch have healthy alliances of Coyote Brush (*Baccharis pilularis)* Shrubland vegetation and Arroyo Willow Thickets (*Salix lasiolepis*) Shrubland. A substantive proportion of native taxa are in the grassland (herbaceous) alliances adjacent and on the south side of the Cowboy Shack Gulch in the southwest portion of the Study Area, and small pockets of benched marshes are in the ocean-facing grassland near the westerly edge of the Study Area north of the Gulch. The main channel and westerly fork of the Gulch contains robust riparian habitat with Arroyo Willow thickets. The latter vegetation types, as well as the channel of the gulch just north of the Study Area in the hillsides above the Cowboy Shack and Hay Barn structures (shown on Figure 3-15) are the richest with botanical native species in this area of the coastal prairie.[117]

By comparison, the larger concentrations of exotic/non-native species are found in the topographically flatter sections of the Western Terrace pastureland and the bottoms of swales through which surface runoff drains into the main channel of the Cowboy Shack Gulch. While the Gulch drainage bottom is botanically compromised and soil-degraded because of erosion contributed to by presence of exotic plant species such as *Rumex acetosella* (common sheep sorel), *Hypochaeris radicata* (rough cat's ear) and *Plantago lanceolata* (English/buckhorn plantain), West notes that one native grass, *Elymus Triticoides* (beardless wild rye) is succeeding in this area currently despite the proliferous presence of non-native species, likely due to its tolerance of the saline and

[117] Jim A. West, verbal communication with author, March 5, 2019.

arid soil conditions on the Western Terrace.[118] Other sections of mixed native and non-native species are in the herbaceous (grassland) vegetation alliances in the northwest section of the Study Area, and predominantly non-native grasses are in the pastures on the south side of the Lower Cowboy Shack Gulch, as shown on Figure 3-15. As this thesis is an historical study of whether and how vegetation alliances may have changed over time particularly related to anthropogenic uses of the land, future botanical studies of the area could delve more precisely into the delineation and constitution of native and non-native taxa of the Western Terrace and other ecological systems within SPR.

As ecological systems are interlinked with the human imprint from uses of the land as previously discussed, evidence of historical features can help identify specific types and locations of those activities and their associated modifications to resources. During the field reconnaissance on December 17, 2018, a linear depression in the grassland vegetation was observed in the southeast quadrant of the Study Area toward the base of the Coyote Brush Shrubland-covered hill along the easterly perimeter. The linear depression form runs in a somewhat northeast-southwest direction in a semi-circular alignment. This depression was shallow, approximately several inches in depth at most, shaped in a half-circle as if a conduit or pipe-like structure had lain in the grassland for an extended period. The direction and extent of the linear depression fit with a hypothesis considered by the field visit participants of the possible location of an historical redwood water flume that was constructed in the 1920s to supply water from Scott Creek to several reservoirs on the rangeland pastures and the ranch buildings of tenants who leased lands to farm artichokes and Brussels sprouts. Identifying the old flume and any other

[118] West, e-mail communication with author, March 30, 2019.

historical infrastructural features on the ground is useful to potentially inform vegetation changes on or around such features within the Study Area.

There are no visible structural remnants of the old flume other than several partial redwood boards at a drainage crossing about one-quarter mile southeast of the Study Area, as noted by retired SPR Livestock Manager Gordon Claassen. While the alignment of this linear depression appeared to be in the likely general location of the historic flume line, the compressed grassland is in fact the location of a diversion ditch for runoff from the upper slopes of the hills on the east side of the Study Area constructed by Claassen in 2018; the ditch had partially filled with soil and herbaceous vegetation had regrown since it was originally dug. However, Claassen indicated that the old flume alignment location is near the diversion drainage ditch, slightly visible on historical aerial photography from 1928. Chapter 4 further discusses vegetation and other historical features including the former flume location as part of the analysis of potential vegetation changes in the Study Area during the historical study period.

Potential evidence of former (historic) fence locations was investigated during site visits of the Study Area on November 2 and December 17, 2018 as historic fence locations could inform historic effects on vegetation types and geospatial borders from earlier land uses, i.e., livestock grazing and crop cultivation. Two existing fences to the south and along the cliff edge adjacent to the dirt road that connects up into the Study Area from corrals at the bottom of the hill near Highway 1 were installed in the late 1990s. Other existing fencing that separates the various grazing pastures, i.e., the Pond Pasture and the Upper Ocean and Lower Ocean Pastures, and the fencing dividing the

latter pastures was installed in 2018.[119] No historic fence location indicators were observed during the December 2018 reconnaissance site visit, however, as discussed in Chapter 4, grid-like demarcations are evident in the series of historical aerial photographs from the early 1920s, indicating a likely continuum of fenced pastures for livestock since at least that time.

3.2.7 Natural Events: Historical Fires, Floods and Landslides

An inquiry into natural events in the SPR area was conducted in order to consider potential catalysts of vegetation change other than human-induced activity. Catastrophic ecological events such as severe fires, flooding and landslides could potentially disrupt and alter alliances and successive stages of vegetation and habitat types. There have been numerous flood events causing damage in Santa Cruz County since the early twentieth century, including in 1907, 1940, 1941, 1982, 1995, 1998 and 2006. The most significant event with the highest recorded flood levels thereafter occurred after high rainfall on December 22, 1955.[120] Portions of SPR experienced flood damages during that storm; for example, the water level at the Red House along Swanton Road rose up to the walls of the basement.[121] No reported flood events were found for the Study Area or the greater Western Terrace portion of the Ranch. The most significant wildfire event in the greater Santa Cruz County area since the early twentieth century was the Lockheed Fire in mid-August 2009. According to CalFire (California Department of Forestry) data, the fire burned 7,817 acres and destroyed thirteen out-buildings over a

[119] Gordon Claasse, Swanton Pacific Ranch Livestock Manager (retired), verbal communications with author, December 17, 2018 and March 4, 2019.
[120] City of Santa Cruz, "Disaster History," accessed February 17, 2019, http://cityofsantacruz.com/community/emergency-management/recovery/sc-disaster-history.
[121] Cal Poly, "*Swanton Pacific Ranch Management Plan*, 31.

two-week period.[122] The burned area consumed Redwood and Douglas fir forest, shrubland, and grassland alliances primarily adjacent and to the east/northeast of the SPR property, however, approximately 1,100 acres of primarily forest type burned within the Ranch boundaries as well.[123] The Lockheed Fire did not burn vegetation or property on the west side of Swanton Road, and therefore, it did not reach vegetation on the Western Terrace including the Study Area.

As depicted on the Geologic and Soils Map of SPR, Figure 3-11 and discussed in the earlier Subsection 3.2.2, "Geologic Conditions of the Swanton Pacific Ranch Area," there is one landslide location mapped by geologists south of the Study Area in the alluvial streambed of Little Creek as it outflows into Scott Creek. The soil types on the Ranch have the potential for more landslide locations than were observed during geological site studies to date. Based on this preliminary inquiry, natural disasters haven not been a primary cause of change in the vegetation types or spatial coverage in the Study Area since the early twentieth century; however, the damage to forest, shrubland and grassland vegetation alliances from the Lockheed Fire has had a more profound effect, or likely set of effects, over nearly 8,000 acres of vegetation in the SPR environs. A notable number of studies have been conducted on the effects of the fire on various aspects of the region's ecosystems. Although not the focus of this study, further investigations will undoubtedly be promulgated in light of the recent dynamic of increasing frequency of intensive fire episodes related to climate change parameters.

[122] California Department of Forestry, CalFire Large Fire Incidents, 2009, accessed February 18, 2019, http://cdfdata.fire.ca.gov/incidents/incidents_details_info?incident_id=361/.
[123] Cal Poly, *Swanton Pacific Ranch Management Plan*, 68.

4. HISTORICAL LAND USES AND VEGETATION ALLIANCES

4.1 Selected Land Use History In and Around Swanton

In order to better understand historical modifications of an ecological system or community of resources, in this case, vegetation alliances, it is necessary to examine specific societal, cultural and historical activities occurring prior to and during the period of interest. The local land uses can then be assessed in relation to a larger socio-economic context, for example, the greater San Francisco region as an immigrant draw to the state of California. This chapter begins with selected land use history of the local Swanton area as well as the greater North Coast-Santa Cruz region in the late nineteenth and early to mid-twentieth centuries. Around the turn of the century, various agricultural and industrial industries were beginning to hit their stride in the rural California Central Coast after initial ventures a few decades prior. Agricultural production (dairy, vegetables, fruits, fiber and livestock), construction (lumber, cement, and lime) and transportation (rail extensions and shipping piers) were all burgeoning modes of commerce in the region in the early twentieth century.

This chapter provides both micro- and macro-perspectives on the production of crops such as artichokes and Brussels sprouts, the raising of dairy and beef cattle after the early twentieth century in the SPR Study Area, as well as the cultural backdrop of Italian immigrant farmers and ranchers in California.[124] At the local level, an historical map of the Rancho Agua Puerca y Las Trancas around the turn of the century depicts individual

[124] There have been multiple ownerships and numerous land leases of property within the Rancho Agua Puerca y Las Trancas, and specifically related to this historical study, the property comprising the Study Area and adjacent portions of the Western Terrace. It is important to note that there has not been comprehensive documentation of the specific ownership and tenancy chronology of the Study Area and the affiliated land uses of each owner and tenant. Therefore, this thesis reflects the information pertaining to crop production and ranching uses available from the sources utilized herein.

lot ownerships, most of which were of Italian and Swiss heritages. In the larger regional context, the history of an entrepreneurial influencer of the time, the Coast Dairies & Land Company started by two Swiss immigrants, sheds light on the multiple industries that were being infused to further develop the North Coast region of Santa Cruz as an important economic, social and political offshoot (or hinterland) of the greater San Francisco metropolis and economic center.

Historical crop production data for Santa Cruz County focusing on artichokes and Brussels sprouts and comparative data for California shows the region's importance in contribution of specialty crops to the state and the country. A more general history is provided with exploration into Italian immigration into California, and the migration to hinterland rural regions such as the North Coast of Santa Cruz County which sets the stage for two case studies of immigrant farming and ranching families on SPR and around the Swanton area. It is important to emphasize that from about the mid-nineteenth to mid-twentieth centuries, the Central Coast region of California was home to immigrants from Mexico and several Asian and European countries. These immigrants brought various skills to the area, all of which were necessary to survive and build a range of community enterprises. In addition to Italian farmers who grew artichokes and Brussels sprouts for commercial sale and the Swiss and Portuguese dairy purveyors, Chinese immigrants harvested abalone in the intertidal zone in the mid-nineteenth century; decades later they were followed by Japanese abalone fishermen who introduced hard hat underwater equipment to expand the harvesting area. Japanese farmers also tilled the coastal terrace areas. Greek stonecutters worked the quarries in San Vicente Canyon, Azorean whalers plied the North Coast waters, and in the 1930s to 1960s, the bulk of

farm labor was provided by Mexican and Filipino émigrés.[125] Each of these various ethnicities has important histories in which to engage. The cultural discussion herein focuses mainly on Italian immigration (and Swiss to a somewhat lesser degree) into California in order to provide historical background to the primary source family case studies of crop farming and ranching uses in the Swanton area discussed in this chapter. There remains a strong contingent of Italian and Swiss descendants of émigrés in the North Coast region and Santa Cruz whose families grew from agricultural origins. This chapter concludes with a preliminary assessment of vegetation alliances within the Study Area to discern whether any changes in vegetation types and/or geospatial coverage are distinguishable utilizing historical aerial photography and in consideration of the land use activities obtained from the case studies and other sources utilized herein.

4.1.1 Rancho Agua Puerca y Las Trancas

Property ownership of the Rancho Agua Puerca y Las Trancas at the turn of the century is shown in Figure 4-1. Appendix D includes a slightly larger version of the map including the full rancho boundaries. This rancho map was surveyed around 1901 and indicates lot boundaries, sizes and ownership information.

[125] Santa Cruz Public Library, "Coast Dairies Property: A Land Use History," n.d., accessed February 5, 2019, https://history.santacruzpl.org/omeka/items/show/134498#?c=0&m=0&s=0&cv=0, 6, 21, 35.

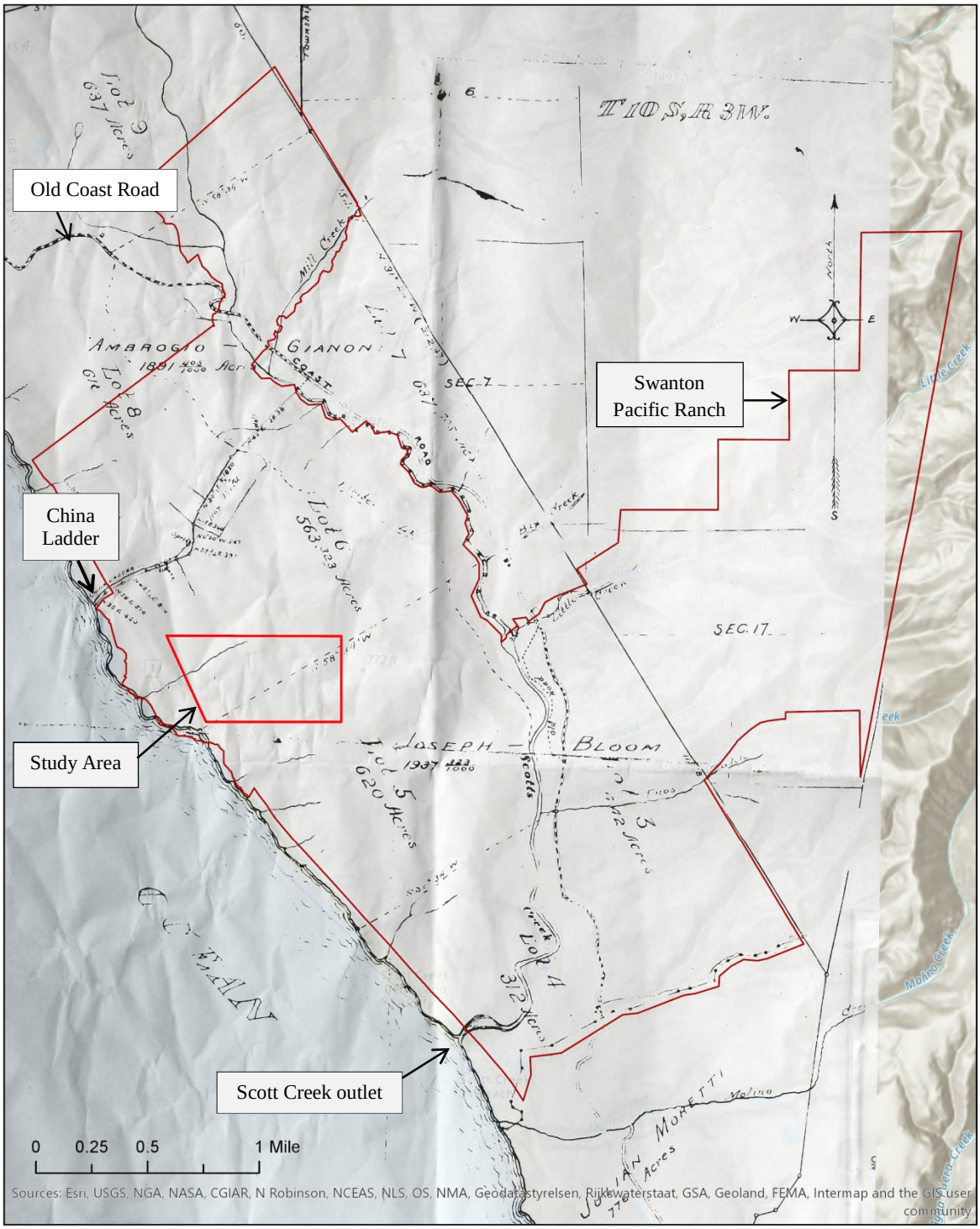

Figure 4-1. Rancho Agua Puerca y Las Trancas Lot Ownership Map, ca. 1901

Map courtesy of Kim Stoner, with permission to the author to reproduce.

The Study Area falls almost equally within Lot Nos. 5 and 6, with Joseph Bloom indicated as owner of those lots and the center third of the rancho in general. The map does not have an ownership name indicated for each individual lot, however it appears that the names apply to the upper, middle and lower thirds of the rancho. The upper third which includes Lot nos. 7, 8 and 9 north of the Study Area are shown as owned by Ambrogio Gianone, a Swiss dairyman who, several decades earlier, had operated the dairy owned by James Archibald. Gianone was the great-grandfather of current Swanton resident and botanist Jim West, who along with other fourth-generation family members, still lives in the northern portion of the old Rancho, just north of present-day Swanton Pacific Ranch property. The southernmost portion of the Rancho lot ownership map identified as 776 acres with no lot number is indicated to then be owned by Julian Moretti, the same surname as Louis Moretti, co-founder of the Coast Dairies & Land Company which incorporated the same year, 1901, that this rancho map was prepared. Further research into any relation between these individuals would shed additional light on the land ownership history of the Study Area and environs. It is noted also that subsequent Italian and other immigrant families, including the Morelli, Philippini and Poletti families, purchased lots on the Rancho south of Little Creek around 1938.[126]

This map is interesting for its additional historical details about the land grant area, such as the location of "China Ladder" at the coast where the junction of Lots 6 and 8 intersect, the alignment of the Old Coast Road, and the various creeks that ran through the Rancho including Scott Creek (referred to as "Scotts Creek" on the Rancho map), Big Creek, Little Creek, Mill Creek and Molino Creek. China Ladder was the name of an

[126] Jim A. West, personal communication with author, February 21, 2019.

access point on the beach about one half mile south of Pelican Rock (and just north of the Study Area) where a ladder on the beach against the bluff enabled some local Chinese abalone fishermen who lived in a shack atop the bluff to access the tide pools to harvest abalone in the intertidal zone. Whereas European and Anglo-American settlers who came to California for gold viewed abalone as inedible snails, the Chinese immigrants considered abalone a delicacy and had a process to dry the meat and ship it across the Pacific. They also sold the shells to jewelry and button manufacturers, often gaining a better price for the shells than the meat. Chinese immigrants were the first to commercially harvest abalone in California, thus filling a specific economic niche in Santa Cruz County during the post-Gold Rush period into the late nineteenth century until the implementation of the 1882 Chinese Exclusion Act.[127]

4.1.2 Coast Dairies & Land Company: Entrepreneurial Agency through Land Accumulation

The Coast Dairies & Land Company played a major role in the North Coast region of Santa Cruz County's agricultural and industrial development in the early twentieth century. The corporation owned approximately 7,500 acres within the former ranchos north of Davenport, including the Rancho Agua Puerca y Las Trancas, maintaining a further historical link in the land ownership of the area that became SPR. The following overview of the company's history illustrates its role in spurring the various agricultural, construction and transportation industries in the North Coast.

[127] Santa Cruz Public Library, "Coast Dairies Property," 20, 21. The Chinese Exclusion Act of 1882 prohibited immigration and naturalization of Chinese laborers for ten years and in 1892 the law was extended for another ten years. An intended permanent ban on Chinese immigration legalized in 1902 was rescinded in 1943.

In the early years of California statehood (post-1850) newly-arrived settlers bought lands from the earlier Mexican land-grantees of the ranchos of the North Coast, such as Agua Puerca y Las Trancas (James Archibald), Rancho Laguna (the Williams brothers) and Rancho San Vicente (Peter Tracy). The dairy industry began to develop in earnest around this time facilitated by the large land parcels of coastal terrace and hillsides where herds of dairy cows could graze and dairies could be settled near streams in valleys out of the wind. Cheese and butter were produced and shipped via Davenport and Williams' landings to the City of Santa Cruz. The developing dairy industry in the North Coast-Santa Cruz region in the 1870s was linked to that of Marin County, which was the primary source of cheese and butter for the San Francisco market. Some of the dairymen from Marin migrated south to Santa Cruz and the attendant burgs around it such as Davenport and Swanton, finding the climate, soil and grasses similarly exceptional for producing dairy products that commanded high prices in San Francisco.

This interrelationship between the larger urban center of San Francisco, the draw for so many immigrants to California, and these rural hinterlands, and the element of nature in each is exemplary of the paradox so astutely analyzed by William Cronon in *Nature's Metropolis.* Here, he examines the interstitial connection of Chicago with its outlying rural areas in the nineteenth century, each supporting the other in necessities such as supply and demand for agricultural products. As the population of San Francisco expanded and the cost of living and producing commodities in the city escalated, the rural farmlands of Santa Cruz and the North Coast region provided alternative, more

affordable environments for small-production farmers and ranchers to supply the city, while the city, in turn, supplied services to the rural hinterlands of the North Coast.[128]

The Swiss came to dominate the Santa Cruz dairy industry in the latter nineteenth and early twentieth centuries. Some of the Swiss-born dairymen in Santa Cruz County during this dairy establishment period included Ambrogio Gianone (who operated the dairy for James Archibald off Swanton Road), John Staub and Jacques Martin. There were also dairymen who hailed from other geographic origins, including Scotland (James Archibald), Ireland and New England.[129] Local land owners and Swiss immigrants Louis Moretti and Jeremiah Respini combined their substantial real estate assets in 1901 and formed the Coast Dairies & Land Company, a transaction that created a gateway to bolstering and accelerating industrial enterprises in the Santa Cruz region, including the logging, lime and cement industries and the infrastructural systems that they needed, particularly railroad connections to the rural North Coast. For example, in 1905 Standard Portland Cement Company owner William Dingee decided to move his cement plant out of Santa Cruz to the more rural outskirts of the North Coast (noise and dust were frequent complaints from the town residents), and negotiated with Louis Moretti to acquire 130 acres of Coast Dairy property on the north side of San Vicente Creek. In addition, Dingee negotiated with the Southern Pacific Railroad to extend rail line up the coast, because locating the cement factory in an area without infrastructure necessitated the improvements that Santa Cruz already possessed, i.e., the ship landings and railroads.

[128] William Cronon, *Nature's Metropolis: Chicago and the Great West* (New York: W.W. Norton & Company, 1991), 8.
[129] Santa Cruz Public Library, "Coast Dairies Property," 12, 14.

As a closely-related industrial development to that of cement, the lime industry had been developing in Santa Cruz County from the mid-nineteenth century as the North Coast region was rich with natural limestone deposits, particularly underlying the Ben Lomond Mountain area, approximately 5.6 miles east of Swanton. Toward the turn of the century, concrete was superseding brick and mortar in construction materials, and powder made from ground limestone and shale created cement. In the 1890s, the lime industry found increased life with the Santa Cruz Lime Company purchasing 7,500 acres upstream (San Vicente Creek) of Louis Moretti's Coast Dairies land, and a lime kiln was built and operated, using the creek as transport for the lime product to Davenport Landing. The lime kiln property was purchased thereafter by the Standard Portland Cement Company, establishing an exclusive limestone quarry to supply the cement plant.[130]

The lumber industry gained prosperity in Santa Cruz environs after the turn of the century. The San Vicente Lumber Company was formed in 1908 by a group of lumbermen from Salt Lake City who purchased timber rights in the Scott Creek and Little Creek drainages and built a lumber mill on the north side of the City of Santa Cruz. The mill was the largest in the history of the county and over the next 14 years clear cut an estimated 400 million board feet of Coast redwood timber, much of which went to rebuilding San Francisco after the earthquake of 1906. The Ocean Shore Railroad transported the logs to the mill in Santa Cruz via nine miles of new rail line constructed by the lumber company in the mountains behind Davenport.[131] The Coast Dairies & Land Company also developed, owned and managed two new "towns" for the cement plant employees: one in 1905 for the workers (all men), as an extension of the small burg of

[130] Santa Cruz Public Library, "Coast Dairies Property," 17, 24, 25, 32.
[131] Ibid., 32.

Davenport, and the other in 1909 for the workers and families. The latter town was upwind of the plant and its dust and noise, and came to be known as New Town to distinguish it from Davenport.[132] The company ultimately accumulated land holdings of 7,500 acres and operated five dairies on their lands with a total of 800 cattle during the early few decades of the twentieth century, with sales of butter and cheese to merchants in San Francisco comprising the bulk of their dairy business. The Ocean Shore Railroad, which was a separate rail development project from the Southern Pacific Railroad, had side-by-side tracks within the coastal right of way and provided transportation service for the dairy products through Santa Cruz and beyond. In addition to dairy, the company also raised and sold hay and other farm products.

Thus, beyond the initial dairy businesses, Coast Dairies & Land Company engaged in, and/or facilitated multiple entrepreneurial ventures that contributed to the industrial and infrastructural development of the greater Santa Cruz region, including the remote North Coast area that included Swanton and Davenport, among other enclaves. This historical construct of land-rich entrepreneurial entities enabling industrial growth follows an overarching trend in California during the later nineteenth and early twentieth centuries of rural towns seeking to develop into prosperous business environments in the veins of their larger urban paradigms such as San Francisco. By the early period of World War I, company founders Louis Moretti and Jeremiah Respini moved with their families back to Switzerland for reasons related to Swiss law prohibiting Swiss citizens from participating in other nations' wars. The Santa Cruz region was then shifting back to agriculture along with the continuing operations of the Portland Cement Company.

[132] Santa Cruz Public Library, "Coast Dairies Property," 23, 25, 31.

Forest logging had diminished in the area with the closing of the San Vicente Lumber Company in 1923.[133] The Depression of the 1930s combined with emerging regulations aimed at quelling disease and improving sanitation for livestock operations diminished the economic viability of operating small dairies in the North Coast. Coast Dairies & Land Company, then managed by local company employees, continued to lease various portions of its ranch properties for livestock and agriculture although profits were not robust.

As the decades of the mid- to late twentieth century ensued, various options for re-use and sale of portions of the company land failed due to complications of the land-holding legalities as well as publically controversial development proposals. The company property was ultimately purchased through a cooperative effort by several land trusts and charitable foundations which transitioned five pocket beaches along the stretch of State (Coast) Highway 1 into public conservation land as Coast Dairies State Park.[134] The company property on the inland (east) side of Coast Highway which encompassed 5,800 acres in a generally rectangular area about two miles wide between Highway 1 inland, from north of Laguna Creek to the southern edge of SPR, is managed by the U.S. Department of the Interior, Bureau of Land Management (BLM) as the Cotoni-Coast Dairies National Monument.[135] Appendix E contains a map of the Cotoni-Coast Dairies State Park and National Monument properties. This map gives an idea of the magnitude

[133] Santa Cruz Public Library, "Coast Dairies Property," 32, 34.
[134] Ibid., 38, 40; Friends of Santa Cruz State Parks, "Coast Dairies State Park," accessed February 5, 2019, https://thatsmypark.org/parks-and-beaches/coast-dairies-state-park.
[135] Sempervirons Organization, "Campaign for Cotoni-Coast Dairies National Monument," accessed February 17, 2019, https://sempervirons.org/protect-redwoods/cotoni-coast-dairies-national-monument/; Department of the Interior, Bureau of Land Management, "Cotoni-Coast Dairies Map," accessed February 17, 2019, https://www.blm.gov/catonicoast. Cotoni-Coast Dairies National Monument was designated by executive order on January 12, 2017. The Monument lands exclude SPR and other private land holdings.

of the original Coast Dairies & Land Company properties and, thus, the influential agency of the company during the early twentieth century.

4.2 Historical County Agricultural Production

Historical agricultural production data in Santa Cruz County for the study period (twentieth century or earlier as available) provides a framework to view farming and livestock land use activities on the Western Terrace portion of SPR and attendant effects upon vegetation alliances in the Study Area during the early twentieth century. This data also frames a socioeconomic context in which immigrant Euro-American agricultural producers in the rural North Coast-Santa Cruz region (primarily Italian in the SPR area) were interconnected with the larger metropolis of San Francisco from which many of them moved. The data also shows the important contribution that this region has made to statewide production of certain specialty crops such as artichokes and Brussels sprouts which were grown by Italian tenant farmers on the Study Area.

Data on crops, livestock and livestock products were obtained from the United States Department of Agriculture (USDA) Agricultural Census, Mann Library at Cornell University.[136] In an overview of the USDA Historic Archival records of the Agricultural Census for crops grown and livestock production in the United States, County-level data

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[136] The Agricultural Census was conducted every ten years between 1840 and 1920, and every five years thereafter. The Census counts U.S. farms and ranches, including small urban and rural plots that produce at least $1,000 worth of vegetables, fruit or dairy products for each census period. The Census provides various data including land uses, ownership, operator characteristics, production practices, income and expenditures. It is notable that the available Agricultural Census information becomes more detailed and quantified over time, although the types of data parameters fluctuate, i.e., the listing of specific types of vegetables, fruits and grains varies between census years. For example, separate production data on Brussels sprouts and artichokes among the other vegetable crops is not provided in every census table, they are only listed in two specific years of selectively searched censuses between 1900 and 2000.

becomes available by 1925. For example, cattle (the majority were dairy cows), horses, sheep, goats, swine and chicken were raised in Santa Cruz County in 1924, and based on the reporting data, the County's contribution was a mere 0.4% of the statewide production. Dairy farmers produced milk, eggs, wool and mohair in the same year, and the County's contribution of milk was about six percent of the statewide total. By comparison, a decade later the County produced slightly less cattle (no beef cattle listed, only dairy) and much less milk to the statewide totals in 1934, at 0.36% and 0.38%, respectively.[137] This livestock production data for these two decades in the early twentieth century for Santa Cruz County correlates to the early years of primary source information from farmers and ranchers in the Swanton area and the earliest of the historical aerial photography of the area. This data is provided as more of a snapshot of the time and is not intended to enable drawing of trend conclusions for the livestock industry during the course of the twentieth century in Santa Cruz County, which fluctuated each decade due to various economic factors.

Inquiry into the QuickStats database model of the USDA's Agricultural Census sought historic crop data for Santa Cruz County selecting the years 1946, 1950, 1956, 1960, 1970, 1975, 1980, 1990 and 2000 to provide a reasonable sampling during the historic time period of this thesis and specific years of the primary source historical aerial photography utilized herein. The inquiry resulted in data for oats, barley, sorghum, corn,

[137] USDA, Agricultural Census, "Census of Agriculture: 1925 – California, County Table III. Livestock on Farms, January 1, 1925; and Livestock Products, 1924 and 1919," accessed March 21, 2019, http://agcensus.mannlib.cornell.edu/AgCensus/CensusParts.do?year=1925; USDA, Agricultural Census, "County Table V. Specified Livestock Products on Farms and Ranches – Number of Cows, Sheep, Goats and Chickens, Jan. 1, 1935 and Apr. 1, 1930, and Turkeys, Jan. 1, 1935, Production of Milk, Wool, and Mohair, 1934 and 1929; and Chickens Raised and Eggs Produced, 1934," accessed March 21, 2019, http://agcensus.mannlib.cornell.edu/AgCensus/CensusParts.do?year=1935.

wheat and milk commodities.[138] The detailed results of the query are included in Appendix F, and summarized in Table 4-A. As shown in the table, the majority of data received was for barley production and yield, with nominal information for several other commodities, although we know from additional inquiries into the Agricultural Census database discussed further below that the County produced a wide variety of grains, vegetables, fruits, and livestock products. However, the QuickStats model allows a substantial timeline for which data can be obtained in a single query. As Table 4-A indicates, barley production in Santa Cruz County fluctuated significantly between 1946 and 1975 in both acreage farmed and output.[139] Reasons for these fluctuations may vary, for example, production in 1950 is significantly higher than at the end of World War II in 1946, likely reflecting the post-war economic boom; production dips to lows in 1970 and 1975, another war period; or production may have been shifted to other crops in the County at that time. A key factor in the level of accuracy of the censuses is the fluctuation of the percentage of the farms reporting production numbers in a given year.

Artichokes and Brussels sprouts were grown on the Western Terrace and Study Area in particular from the 1920s to the 1940s (as discussed in further detail later in this chapter), and possibly on until approximately the 1980s. In addition, a Portuguese family named Gomes operated a small dairy farm in the 1930s at the western edge of the Study

[138] Further study of the QuickStats database may be useful to possibly determine more specifically where in Santa Cruz County the commodities listed in Table 4-A were grown and whether or not the Agricultural Census included data on logging/lumber production.

[139] This query yielded one set of data for crop and milk commodities in the County of Santa Cruz for this long range of selected years. However, data for other crop types could be obtained depending on customization of the variables input into the database query and if the older census or survey years were not requested.

Table 4-A. Partial Crop Statistics for Santa Cruz County in Selected Years 1946-2000

Year	Oats	Barley	Milk	Sorghum	Corn	Wheat
1946		600 ac. harvested				
1946		18,000 BU produced				
1950		1,000 acres harvested				100 ac planted and harvested
1950		38,000 BU produced				2,600 BU produced
1956		600 ac. planted				
1956		500 ac. harvested				
1956		13,500 BU produced				
1960		800 ac. planted			400 ac. planted	
1960		700 ac. harvested				
1960		24,500 BU produced				
1970		200 ac. planted				
1970		100 ac. harvested				
1970		3,000 BU produced				
1975	600 ac. planted	200 ac. planted	8,252,000 lbs. prod.	300 ac. planted		
1975		100 ac. harvested		200 ac. harvested		
1975		4,000 BU produced		12,000 BU produced		
1980	600 ac. planted		8,836,000 lbs prod.			
1990	1,000 ac. planted		10,523,000 lbs. prod.			
2000	700 ac. planted					

BU = bushel (8 dry gallons per bushel).

Data source: USDA National Agricultural Statistics Service, Quick Stats Agricultural Census, accessed January 24, 2019, https://www.nass.usda.gov/agcensus/index.php and https://quickstats.nass.usda.gov/data/printable/DBE230E4-15E1-35FC-86OC-B82D5DD573FD.

Area, north of Cowboy Shack Gulch and in the present location of the horse corrals.[140] In addition to the dairy cows that grazed near the dairy, beef cattle production has also been a long-term use of the coastal prairie pastures of the Western Terrace since the Spanish and Mexican land grant eras through the present day with Cal Poly's stocker and cow-calf operations. Examination of the historical Agricultural Census data can be tailored relevant to these known uses of the Western Terrace area during the early twentieth century, particularly to the case studies of Italian-American farmers and ranchers provided further in this chapter. As such, available data is presented herein for artichokes and Brussels sprouts, as well as the level of production in Santa Cruz County in relation to statewide production and other regions of the state. In comparing production of artichokes and Brussels sprouts in California counties in 1940, one of the two census years that specified these crops, Table 4-B provides data for the four counties in the state which had the highest production of these two crops: Santa Cruz, Monterey, San Mateo and San Luis Obispo.

[140] Artichokes and Brussels sprouts timeline on the Western Terrace of Swanton Pacific Ranch is estimated by Gordon Claassen, communication with author, March 4, 2019. Dairy information provided by Jim A. West, communication with author, March 5, 2019.

Table 4-B. Artichoke and Brussels Sprouts Production in California by County, 1940

	The State	Santa Cruz County	% of State	San Mateo County	% of State	Monterey County	% of State	San Luis Obispo County	% of State
Artichokes									
Farms	262	49	19	72	28	64	24	36	14
Acres	10,366	1,734	17	2,292	22	5,162	50	624	6
Value ($)	1.098M	229,024	21	194,540	18	623,135	57	48,627	4
Brussels Sprouts									
Farms	133	38	29	60	45	13	10	21	16
Acres	3,082	1,278	42	1,485	48	184	6	125	4
Value ($)	783,974	252,668	32	478,885	61	33,491	4	18,180	2

Farm data reflect those that reported; Value is gross value, not including production costs; M = million; Counties' percent of State production values is rounded to whole numbers.

Source: USDA, "Census of Agriculture – California; County Table XIII – Vegetables Harvested for Sale, 1939, 1934, and 1929; Value of Farm Garden Vegetables, 1939 and 1934; and Horticultural Specialties, 1939," accessed March 18, 2019, http://agcensus.mannlib.cornell.edu/AgCensus/censusParts.do?year=1940.

Two hundred and sixty-two (262) farms grew artichokes in California in 1940 according to the Agricultural Census. Santa Cruz County contained 19% of those farms, 17% of the acreage under artichoke production, and 21% of the gross crop value statewide, representing the second-largest producer in terms of economic value among California counties. Although San Mateo County had the largest number of artichoke producing farms, the acreage and crop value for 1940 were third behind Monterey County which had 24% of farms, 50% of acreage under artichoke cultivation, and the highest percentage by county of crop value at 57% statewide. San Luis Obispo County contributed the fourth-largest amount of artichoke crop value at a distant four percent. These top four counties produced approximately 100% of the total statewide crop value of artichokes in 1940. Santa Cruz County farmers combined to be the second-largest

producer of Brussels sprouts with a one-third share of crop value in the state, behind San Mateo County which produced 61% of the crop value; the two counties combined to produce 93% of the Brussels sprouts crop value. Monterey and San Luis Obispo counties combined to produce the remaining 6% of the state's crop value. Therefore, Santa Cruz County was in the top three counties statewide growing artichokes and Brussels sprouts in 1940. A case study of farming land use addressed later in this chapter provides an example of how the cultivation of artichokes and Brussels sprouts in the early twentieth century is interwoven with the Italian immigrant cultural component of Santa Cruz and Swanton.

The Agricultural Census Historical Archive also provides production data by County for artichokes and Brussels sprouts in 1974, included herein as a comparative reference using a more recent historical timeframe. Table 4-C includes data for quantities of farms and production acreage for these vegetables; the Agricultural Census data for 1974 did not include crop value. The counties of Santa Cruz, San Mateo, Monterey, Santa Barbara and San Luis Obispo are the only counties in the state that reported growing artichokes and/or Brussels sprouts in 1974, similar to indications from the 1940 agricultural census shown in Table 4-B. It is noted that these are all coterminous counties in the Central Coast region of California, which can be inferred to indicate that this region provides the optimum climate and soil conditions for these vegetables.

Table 4-C. Artichoke and Brussels Sprouts Production in California by County, 1974

	The State	Santa Cruz County	San Mateo County	Monterey County	Santa Barbara County	San Luis Obispo County
Artichokes						
Farms	58	N/A	14	30	5	3
Acres	11,070	N/A	501	9,505	631	21
Brussels Sprouts						
Farms	59	18	17	10	N/A	14
Acres	5,417	2,869	1,056	1,400	N/A	93

Other counties produced artichokes, however, their quantities were individually less significant, combining for a cumulative production on six farms and 412 acres. Therefore, the state totals may in some cases be greater than the sum of the four counties.

Source: USDA, 1974 Census of Agriculture, "Table 10: Vegetables Harvested for Sale: 1974," accessed March 18, 2019, http://agcensus.mannlib.cornell.edu/AgCensus/censusParts.do?year=1974.

The data indicate that no artichokes were grown for commercial sale by farms in Santa Cruz County in 1974, however, the county likely produced the largest percentage of the state's Brussels sprouts, with over 50% of the total farm acreage for this crop in the state.[141]

As another example of the importance of Santa Cruz County's contributions to statewide agricultural production, strawberries have historically been one of the leading crops grown in the County at least since the 1920s. In the 1925 Agricultural Census for Santa Cruz County reported 560 bushels of strawberries produced on 183 acres.[142]

[141] Investigation into the chronological production of crops, including and in addition to Brussels sprouts and artichokes in the Study Area as well as livestock production statistics would potentially clarify whether these uses were continuous throughout the twentieth century or whether there were vacant periods of usage prior to ownership by Al Smith and Cal Poly State University.

[142] USDA, Agricultural Census, "Table IV – Value of Crops and Acreage and Production of Principal Crops: 1924," accessed March 21, 2019, http://agcensus.mannlib.cornell.edu/AgCensus/censusParts.do?year=1925.

Comparatively, in the 1935 census, the farms in the County reported growing 1,092,292 quarts of strawberries on 425 acres, an impressive 7.5% of the statewide total.[143] Strawberries have been grown on or near SPR at least since the early twentieth century; for example, Sal and Trini Celebrado, a Filipino family whose members still reside in Davenport, cultivated strawberries on the "Strawberry Shack Hill" across from the current SPR administration offices in the Casa Verde building on Swanton Road in the 1920s.[144] More recent historical agricultural production trends in Santa Cruz County indicate that strawberries have been the county's leading crop since the 1980s. For example in 2017, the County's strawberry production was worth nearly $212 million on 2,600 acres, significantly increasing in value from the crop in 2007 which was valued at just under $197 million on 3,679 acres, an additional one thousand acres and about $15,000,000 less in value than a decade later.[145]

Artichokes and Brussels sprouts continue to be cultivated for commercial sale in Santa Cruz County to the present day. Noteworthy comparisons for production of these two vegetables in recent years are provided by data in the County Agricultural Commission's annual Crop Reports. In 2007 for example, the crop value of Brussels sprouts was $8,848, 000 with 1,230 acres under production. Artichokes, however, are included in the "Miscellaneous Vegetables" group along with other vegetables including beans, beets, broccoli, cabbage and cauliflower. As such, artichoke production was not a key crop in 2007 according to this data. A decade later, 2017 was one of the best years on

[143] USDA, Agricultural Census, "Table VI – Miscellaneous Crops – Annual Legumes, Farm Gardens, Vegetables for Sale, Specified Fruits Harvested, Forest Products Sold, and Irrigated Crop Land, 1934; Land in Orchards and Vineyards, and Number of Specified Trees and Vines, Jan. 1, 1935," accessed March 21, 2019, http://agcensus.mannlib.cornell.edu/AgCensus/censusParts.do?year=1935.
[144] Jim A. West, e-mail communication with author, March 30, 2019.
[145] Value is measured in gross dollar value, which includes income and loss factors to producers and production expenses.

record for Brussels sprouts production, with a 37% increase in value from 2016 ($19,417,000 value on 1,167 acres, 13,7122 tons). However, as in 2007, artichokes were again included in the "miscellaneous" vegetable category, indicating a trend of reduced production of artichokes in the most recent decade in the County. Selected Crop Reports in the 1990s report Brussels sprouts and artichoke crop values individually, that is, artichokes are not in the "miscellaneous vegetables" category. Acreage of Brussels sprouts fields, however, is substantially greater than acreage of artichokes, with about 6,000 acres of Brussels sprouts in the years 1991 and 1981, and about 500 acres of artichokes in 1991 and none in 1981.[146]

After Cal Poly received ownership of SPR in the mid-1990s, crop production focused on artichokes, Brussels sprouts, lettuce and hay. However, according to the most recent edition of the *Swanton Pacific Ranch Management Plan* (2015), those crops are no longer produced for commercial sale, due primarily to their provision of a limited educational experience and because of their vulnerability to damage by feral pigs. In addition, the crops' requirement for substantial treatments of chemical fertilizer and pesticides is no longer consistent with sustainable agricultural management practices at SPR.[147] Nonetheless, given the long history of artichoke and Brussels sprouts production in Santa Cruz County, including on the Rancho Agua Puerca y Las Trancas and later on SPR, these two specialty vegetables represent not only a part of the anthropogenic changes to the land and vegetation alliances since the turn of the century, but also serve

[146] County of Santa Cruz, Department of Weights and Measures, Agricultural Commission, "Santa Cruz County Agricultural Crop and Livestock Report," various years, accessed March 23, 2019, http://www.agdept.com/agriculturalcommissioner/annualcropandlivestockreports.aspx.
[147] Cal Poly, *Swanton Pacific Ranch Management Plan*, 85.

as connections to both the cultural and socioeconomic fabrics of the county and statewide histories as examined further in the following section.

4.3 Italian Immigration in California and Santa Cruz

First generation Italian immigrants such as Celeste and Virginia Pini, and Battista Giovanni Ferrari who, as discussed herein, migrated to the North Coast-Santa Cruz region were part of the peak wave of Italian immigration into California during the early twentieth century. According to Hans Christian Palmer who studied the contributions of Italian immigrants to California agriculture, the largest migration period for Italians to the U.S. was 1891-1930 when they represented about 23% of the total European immigrants.[148] There were multiple push-and-pull factors engendering the emigration of almost nine million from Italy during the late nineteenth and early twentieth centuries, landing first in South America and the Mediterranean rim regions and later to North America.[149] The decade of 1910–1920 saw the fastest rate of growth of Italian immigrants, with a 200% increase to the region.[150] The political, economic and social circumstances surrounding this greatest of Italian migrations and the contributions of Italian Americans to California's early agricultural industry is useful to understand the backdrop for the Italian cultural component of the history of Swanton and environs.

The Gold Rush and all of the affiliated economic stimuli that ensued in the latter half of the nineteenth century was the most influential factor in Italian migration to

[148] Hans Christian Palmer, "Italian Immigration and the Development of California Agriculture" (Ph.D. dissertation, University of California, Berkeley, 1965), 11.
[149] Micaela di Leonardo, *The Varieties of Ethnic Experience: Kinship, Class and Gender among California Italian-Americans* (Ithaca: Cornell University Press, 1984), 55, accessed March 6, 2019, https://www.jstor.org/stable/10.7591/j.ctv3mtcwh.1.
[150] Paola A. Sensi-Isolani and Phylis Cancilla Martinelli, eds., *Struggle and Success: An Anthology of the Italian American Experience in California* (New York: Center for Migration Studies of New York, Inc., 1993), 12.

California, according to scholars Paola A. Sensi-Isolani and Phylis Cancilla Martinelli. As news of the discovery of the precious mineral reached Italy, Italians' impetus to emigrate was bolstered as they looked first to escape the economic and political turmoil resulting from failed insurrections against Austrian and French rule during the revolutions of 1848-9, and then after 1861, the sporadic and lopsided economy post-unification with regional polities favoring the wealthy rather than the populous peasantry. Economic inequality across Italy into the later nineteenth century continued with an aggressive industrialization plan for the country which caused an inequitable taxation and subsidy system that financially stifled the low-earning peasant majority.[151]

Episodic internal migration of peoples in Italy was a long-held process well before the upsurge in migration to the Americas in the mid-nineteenth century. Workers traditionally followed the shifting demand for labor forces in accordance with agricultural growing cycles and industrial production.[152] As such, continental Italians were, along with other western European nationals, conditioned to migration on a temporary, seasonal basis. A perceived improvement in economic stability in the U.S. was a strong draw for what became a more substantive "chain" migration (i.e., large scale movement of people for economic reasons), and for many, a permanent change of setting. Around the turn of the twentieth century, Italian-American bourgeois business owners implemented several methods to gain a larger Italian labor pool for their enterprises in California, including direct advertisement in Italy, partnerships with shipping companies to facilitate transportation, and encouragement of Italian-Americans via Italian-language newspapers

[151] Sensi-Isolani and Martinelli, *Struggle and Success,* 8; Sebastian Fichera, *Italy on the Pacific: San Francisco's Italian Americans* (New York: Palgrave MacMillan, 2011), 39-42.
[152] Di Leonardo, *The Varieties of Ethnic Experience,* 49.

to recruit their kin and kith to come to California for work.[153] As seen by the two case studies discussed subsequently of the Pini and Ferrari families in the Santa Cruz/Swanton area, that latter method of following kin already in San Francisco was the impetus for others to settle in California.

As the gold and other precious metals mining boom was relatively short-lived, by the 1870s the dominant economic drivers in California transitioned to agriculture and manufacturing. In the post-Civil War U.S., industrial manufacturing growth spurred, along with the attendant demand for inexpensive labor, which in turn generated demand for increased food production.[154] California afforded certain unique economic avenues to the Italians who made their way there, specifically, work in commercial agriculture, fishing, and viticulture industries. Author Sebastian Fichera posits that the Old World agricultural knowhow that the Italians possessed facilitated their work in agricultural enterprises after immigration.[155] For these reasons, Italian immigrants were more concentrated in California than the rest of the country, developing their livelihoods as fishermen, truck gardeners and orchardists to serve residents and businesses predominantly in San Francisco.

Research from Sensi-Isolani and Martinelli indicates that Italians represented a greater percentage of agricultural producers and workers than any other ethnic group in California during the late-nineteenth century, and of the Italians who had immigrated to California, more than half were settled in the San Francisco Bay area.[156] There, Italian

[153] Di Leonardo, *The Varieties of Ethnic Experience,* 49-52, 61. For further discussion on chain migration see Sensi-Isolani and Martinelli, *Struggle and Success,* 7.
[154] Di Leonardo, *The Varieties of Ethnic Experience*, 50-52.
[155] Fichera, *Italy on the Pacific*, 48, 49.
[156] Sensi-Isolani and Martinelli, *Struggle and Success,* 10.

immigrants grew a variety of vegetables, from the more familiar: tomato, lettuce, Brussels sprouts, onions, cauliflower and cabbage, to the less-known: artichoke, eggplant, bell pepper and broccoli. As these foods became popular locally in San Francisco, Italian truck gardeners gathered in open produce markets to sell their vegetables from horse-drawn wagons, then later in co-op markets. As the population grew and land prices rose in San Francisco, small-production farmers were forced to move out of the city and into outlying rural towns and enclaves such as Colma, Visitacion, Oakland, and further out and south to San Jose, Stockton, Santa Cruz, the Central Valley and Santa Barbara. The majority of di Leonardo's Italian interview subjects had earlier immigrant relatives who worked in agricultural enterprises, either directly on farms or related occupations.[157] The majority of agricultural farmers were tenants, leasing their growing fields from landowners; according to Palmer, this form of land tenure persisted through the first half of the twentieth century even after a farmers' bank, the Colma State Bank, was established in 1920. Tenant partnership, such as that which the Pinis and other Italian farmers in Swanton engaged in, was common not only because of lack of capital, but also because the Italian farmers did not wish to be isolated in a strange environment, according to Palmer.[158] California's generally good soils, climate and long growing season enabled growers to tap into the dramatic increase in demand from other parts of the country for West Coast produce, including a variety of fruits along with vegetables. Industrial innovations such as the transcontinental railroad and refrigerated rail cars facilitated the California produce market across the country.[159] Thus, in the vein of the

[157] Di Leonardo, *The Varieties of Ethnic Experience*, 56, 57, 61-62; Palmer, "Italian Immigration and the Development of California Agriculture," 219.
[158] Palmer, "Italian Immigration and the Development of California Agriculture," 221.
[159] Fichera, *Italy on the Pacifi*c, 52, 53.

urban-rural connectivity theme posited by Cronon, produce from California, from both the hinterlands and San Francisco, served as sinew to connect with the even larger social economies and cultures of the country such as Chicago.

The Pinis, Ferraris and other first-generation Italians in the Santa Cruz region often came individually during the peak of the immigration of Italians into California during the early twentieth century, but then formed families and community bonds where they settled, undergirded by a strong sense of camaraderie and common foundation from their various places of origin in regions of Italy. The formation of community is likely the most important factor in the immigrants finding their way in a new land with unfamiliar language, terrain, and rules of governance and other aspects. Sebastian Fichera characterizes it to be the aspect of human nature that drives people to "maximize the utility value of whatever resources may be lying to hand," that is, to provide what we need.[160] Thus, joining together in groups and various organizations, both commercial and social, is a formative approach to achieve these basic goals, to make something out of opportunities afforded by the power in numbers and of community. In the most Italian-concentrated city, San Francisco, Italian-oriented financial institutions were established, such as the Banca Popolare-Operaia Italiana and the Italian-American Bank, as well as community organizations and media, such as the Italian-American Chamber of Commerce, the Italian Catholic Federation, and Italian-language newspapers and radio programs.[161]

Forty-four miles south of Santa Cruz, Sicilian immigrants were able to tie into the local sardine fishery and canning economy of Monterey during the late nineteenth and

[160] Fichera, *Italy on the Pacific*, 5.
[161] Ibid., 54-65, 106, 130-136, 156.

early twentieth centuries while forming a culturally-based community at the same time. According to author Carol Lynn McKibben, Sicilians immigrated to Monterey in the thousands between about 1920 and 1948 when the sardine population boomed and rapid development of technological advancements at the time enabled commercial processing of large quantities of the fish, which necessitated a large labor pool.[162] Sicilian women comprised about 30% of the cannery workforce in the 1930s, and as such, they held a particular camaraderie and agency among the workers as a method of preserving their ethnic culture in their new environment. They looked out for each other, spoke their Sicilian dialect rather than those of northern or other regions of Italy, and organized events for the local community, for example, the organization of the Italian Catholic Federation (ICF) in 1930, and the Santa Rosalia *Festa* in 1935. These activities were symbolic of the Sicilians' desire to come together and share their Italian community for themselves vis a vis a social religious group.[163]

According to author Pietro Pinna who investigates the history of the early Italian-American wine-makers and their struggle against Prohibition in California, culture and identity as Italians was foundational in the vintners' decision to side with the "wet" viewpoint and oppose Prohibition. Continuation of practicing their Italian foodways and the attendant custom of drinking wine was connected with their desire to not abandon their family and community traditions.[164] This cultural tradition extended to Italian-Americans wherever they settled in California. For example, during Prohibition the Pinis in Swanton (discussed below) operated a *grappa* still in a discrete location in the upper

[162] Carol Lynn McKibben, *Beyond Cannery Row: Sicilian Women, Immigration and Community in Monterey, California, 1915-1999* (Urbana: University of Illinois Press, 2006), 3.
[163] Ibid., 103.
[164] Pietro Pinna, "Fresh Water Triumphs: The Italian American Wine Industry's Struggle Against Prohibition in California," *Italian American Review* 8, no. 1 (Winter 2018), 26, 27.

portion of the canyon from their ranch buildings on their leased land on "La Siberia" Swanton. As a young girl there, Marie Pini was tasked with keeping a lookout up by the still in the event of visits from local law enforcement personnel.[165]

4.4 Farming and Ranching Around Swanton and Environs in the 1920s-30s: Italian American Experiences

Jeanine Scaramozzino's research included family histories from several early twentieth century farming and ranching families of Italian and Swiss heritages who worked the land in the Swanton region, portions of which later became the collective SPR property.[166] Further investigation was conducted for this thesis into the historical facilities and activities of two of these families, first, the Pinis, who farmed artichokes and Brussels sprouts exclusively on land that partially coincided with the Study Area for this thesis, and second, the Ferraris and extended family members who leased grazing lands outside of New Town near Davenport as well as on a portion of the present-day SPR. These farming and livestock ranching families' histories provide focused case studies that could exemplify these uses of the land that affected vegetation and perhaps modified succession of vegetation alliances in the Study Area and environs.[167] By the second decade of the twentieth century, niche vegetables such as artichokes and Brussels sprouts had markets in the United States where larger numbers of southern Europeans settled, such as Chicago and the Northeast. The Italian immigrant farmers who settled in

[165] Marie (Pini) Stoner, personal communication with author, March 5, 2019.
[166] Scaramozzino, "Una Legua Cuadrada," 54, 55, 116-124.
[167] Information regarding selected details of the Pini family ranch features and operations was provided to the author by Kim Stoner and Marie (Pini) Stoner through electronic and personal communications in December 2018, and January through May 2019. Information pertaining to the Ferrari family history was provided to the author by Marvin Del Chiaro via electronic and personal communications in December 2018, January through May 2019. Permission was granted to the author by Kim Stoner, Marie (Pini) Stoner and Marvin Del Chiaro to utilize any of the respective information they have shared regarding historical family activities and memorabilia, including imagery.

the North Coast region of Santa Cruz County found the soil and climate very suitable for those vegetables. An early accounting of artichoke production in San Mateo County south of Pescadero Creek is from the local *Surf* newspaper, March 10, 1916, which described the ranch of F. H. Widemann including 1,000 acres of artichokes on a 10,000-acre ranch. By 1919 an estimated 600 acres on leased ranch land was in artichoke production between Santa Cruz and Davenport.[168]

4.4.1. Farming on the Western Terrace

The Pini family was part of an early group of Italian immigrant settlers in the Swanton area beginning in the 1920s. Scaramozzino's interview with Marie (Pini) Stoner on February 1, 2014 provided an oral history of her family's time in Swanton, family memorabilia including a copy of their land lease, and selected family photographs of their time there.[169] Marie Pini Stoner's parents, Celeste Pini and Virginia (Cordano) Pini immigrated to the United States individually from Italy, he in 1910 from Parma, and she in 1921 from Bardi during the decade of the fastest growth of Italian immigration in California. As with many European immigrants in the U.S. they each had a family member who preceded them to California: Celeste followed his brother first to San Francisco, and Virginia had a sister in Santa Cruz. Therefore, family ties drew them to the Central Coast region. Celeste and Virginia met at the former Garibaldi Hotel on Front Street in Santa Cruz.[170]

[168] Santa Cruz Public Library, "Coast Dairies Property," 34, 35.
[169] Scaramozzino, "Una Legua Cuadrada," Appendix B: Pini Ranch and Family including land lease document, 116-124.
[170] Marie (Pini) Stoner and Kim Stoner, personal communication with author, March 5, 2019.

In 1922, Celeste and Virginia married and moved to Swanton and leased a 178-acre portion of the former Archibald Ranch (Rancho Agua Puerca y Las Trancas) on the Western Terrace in a joint agreement with eight other Italian immigrant farmers-lessees. They referred to their farming area as "La Siberia" (which they pronounced SEEberia) in reference to the strong cold winds that blow across the ranch fields and pastures. Marie Pini, their first child, was born the following year. The property lease was held between the landowner and lessor, C. H. Widemann (the same surname as the early artichoke rancher in San Mateo County mentioned previously) and nine named lessees: Attilo Venturini, Ermano Lombardi, Battista Giannini, Jio Pini, Celeste Pini (Marie Pini Stoner's father), Giacinto Conrado, M. Conrado, Paolino Faro and Peitro Vaggioli. The lease agreement was for a period of ten years, from February 1, 1922 and January 31, 1932 with an option to renew at the end of the initial term. According to Marie Pini Stoner, the lease was extended through mutual agreement between the parties until April 1940 when the Pinis purchased a home in Santa Cruz. The lease describes the 178 acres as located within "portion of the Archibald Ranch lying between Folger Station and Swanton on western side at top of the hill on the right bank of Scott Creek and designated as Rancho No. 5 and 6 comprising 178 acres."[171] The lot map of the Rancho shown in Figure 4-1 shows the Study Area, of which the Pinis' leased area is a part, in Lots 5 and 6. The lease also specifies that the Pinis and their lessee partners were to submit their lease payments at the Coast Dairies & Land Company office, linking their 178 acre-lease area to the property and entrepreneurial powerhouse.[172] It is unclear whether the lessor,

[171] Scaramozzino, "Una Legua Cuadrada," Appendix B: Pini Ranch and Family including land lease document, 122-124.
[172] Ibid.

C. H. Widemann, was the actual land owner, or whether he also leased and then sub-leased to the families. It is also unclear whether Widemann is the same person that was a pioneer of artichoke cultivation a few years prior (F. H. Widemann) as mentioned previously or whether perhaps the lessor to the Pinis was a relation. Research into the identity confirmation would contribute to clarification of historical land ownership and tenure.

The Pini, Conrado and Venturini families shared their "village" of houses, barns and other ranch structures (referenced herein as the Pini Village) in the draw of the upper portion of Cowboy Shack Gulch. The small settlement used by the three families and ranch workers was built in the mid-1920s in the approximate area of the present-day Hay Barn in the upper portion of Cowboy Shack Gulch drainage within the Study Area boundaries.[173] These structures can be seen in the historical aerial photograph from 1928 in Figure 4-8 presented subsequently in this chapter. The construction of ranch buildings and supporting infrastructure in a portion of the Western Terrace of the Rancho is relevant in the likelihood that there were no such structures previously, and if so, then these changes would have caused some level of effect or change upon botanical resources. The lease language stipulates that the lessor would furnish for the lessees all necessary water piping for domestic uses, and all (construction) materials required for a 14-room dwelling, barn(s), a packing house and fencing; lessees were to construct the fences, per paragraph 4 of the lease. The lessor also agrees to grade a "piece of road from

[173] Scaramozzino, "Una Legua Cuadrada," 119, 122-123. Drainage nomenclature from Jim A. West, "Traversing Swanton Road," 108.

Scott Creek to the top of the hill and to build or cause to be built a bridge across Scott Creek" for vehicles and horses to cross the creek.[174]

Figure 4-2 is a hand-drawn illustration by Marie (Pini) Stoner and her brother Geno Pini of the Pini et al. family ranch locations and features which shows the location of the road and bridge across Scott Creek. Figure 4-3, a portion of the hand-drawn map by Marie (Pini) Stoner and Geno Pini, shows a schematic drawing of the ranch buildings, personal family gardens, seed planting plot (which was fenced), the water flume up the canyon behind the structures, and the "dirt road to Hiway #1." As stated in the property lease, the property owner/lessor agreed to provide among other infrastructure for the lessees' use, a pumping plant and pipeline as well as "a flume or ditch along the ridge on the eastern slope of said premises to bring water for irrigating premises," and "all necessary pipes to carry water for domestic and household use."[175] The hand-drawn map of the ranch buildings, Figure 4-3, clearly shows the flume line behind the houses. As discussed in Chapter 3, Subsection 3.2.6, "Study Area Vegetation Alliances and Field Reconnaissance for Historic Features," the linear imprint in the grassland observed during the December 17, 2018 field reconnaissance of the Study Area was in fact a recently constructed diversion ditch for runoff flow off the hill slopes above and south of the Cowboy Shack Gulch, and not the old water flume alignment location that served these Swanton agricultural families.

[174] Scaramozzino, "Una Legua Cuadrada," Appendix B: Pini Ranch and Family, 122-124, which includes a copy of the land lease between C. H. Widemann and Attilio Venturini, Giuseppe Pini, Ermano Lombardi, Battista Giannini, Celeste Pini and Peitro Vaggioli, December 23, 1922.
[175] Ibid.

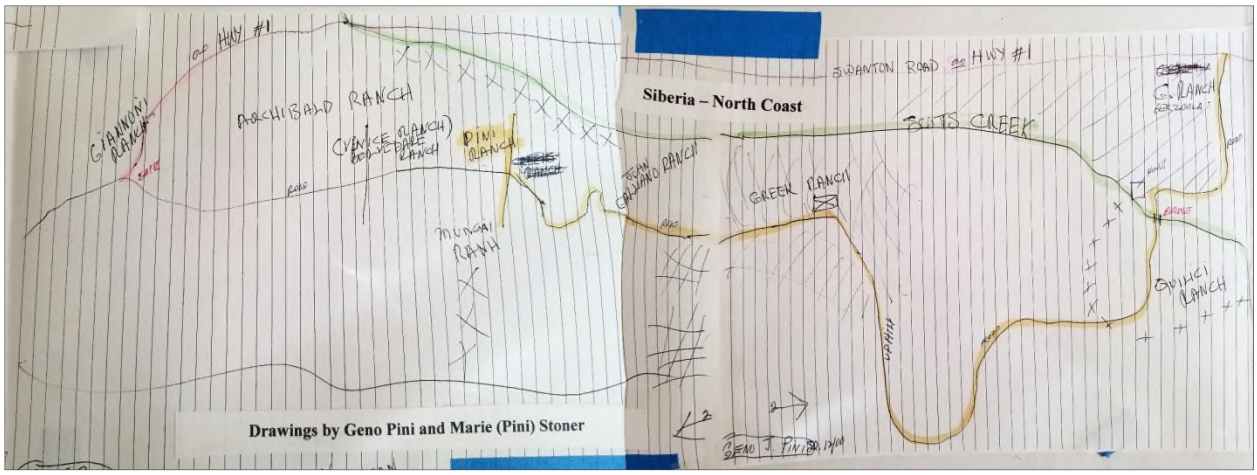

Figure 4-2. Hand-Drawn Map of Pini and Neighboring Ranches on "La Siberia," 1924

Map courtesy of Marie (Pini) Stoner and Kim Stoner, personal family historical memorabilia, with permission to the author to reproduce.

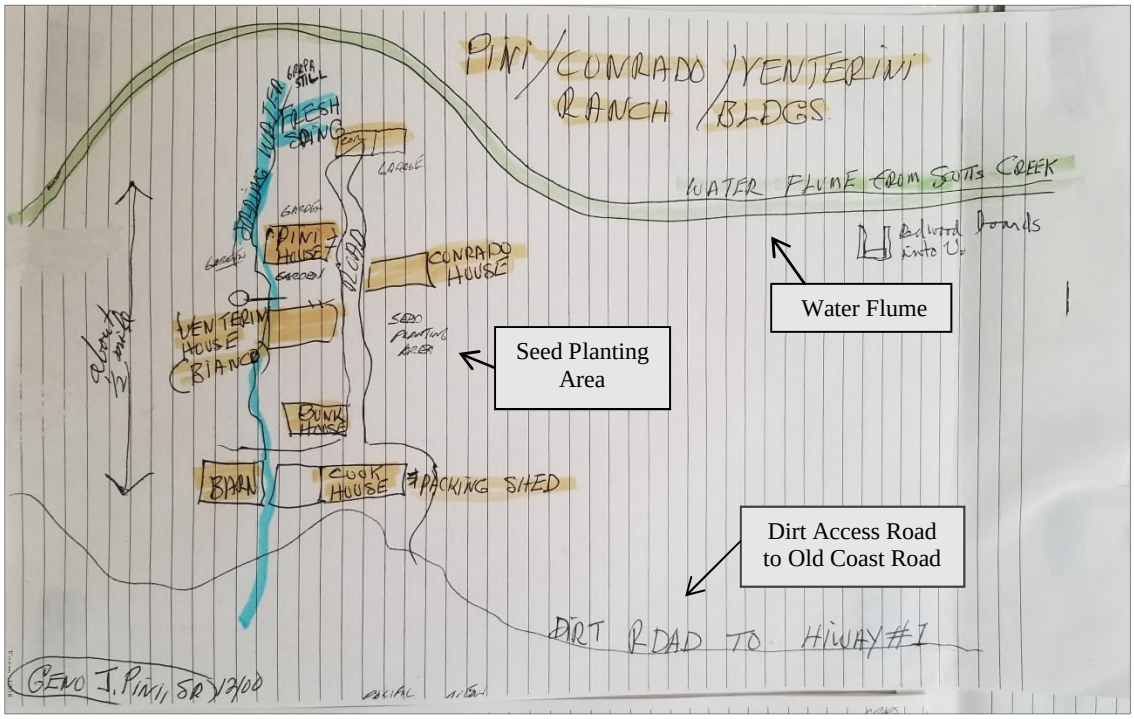

Figure 4-3. Hand-Drawn Map of Pini Village and Water Flume

Map courtesy of Marie (Pini) Stoner and Kim Stoner, personal family historical memorabilia, with permission to the author to reproduce.

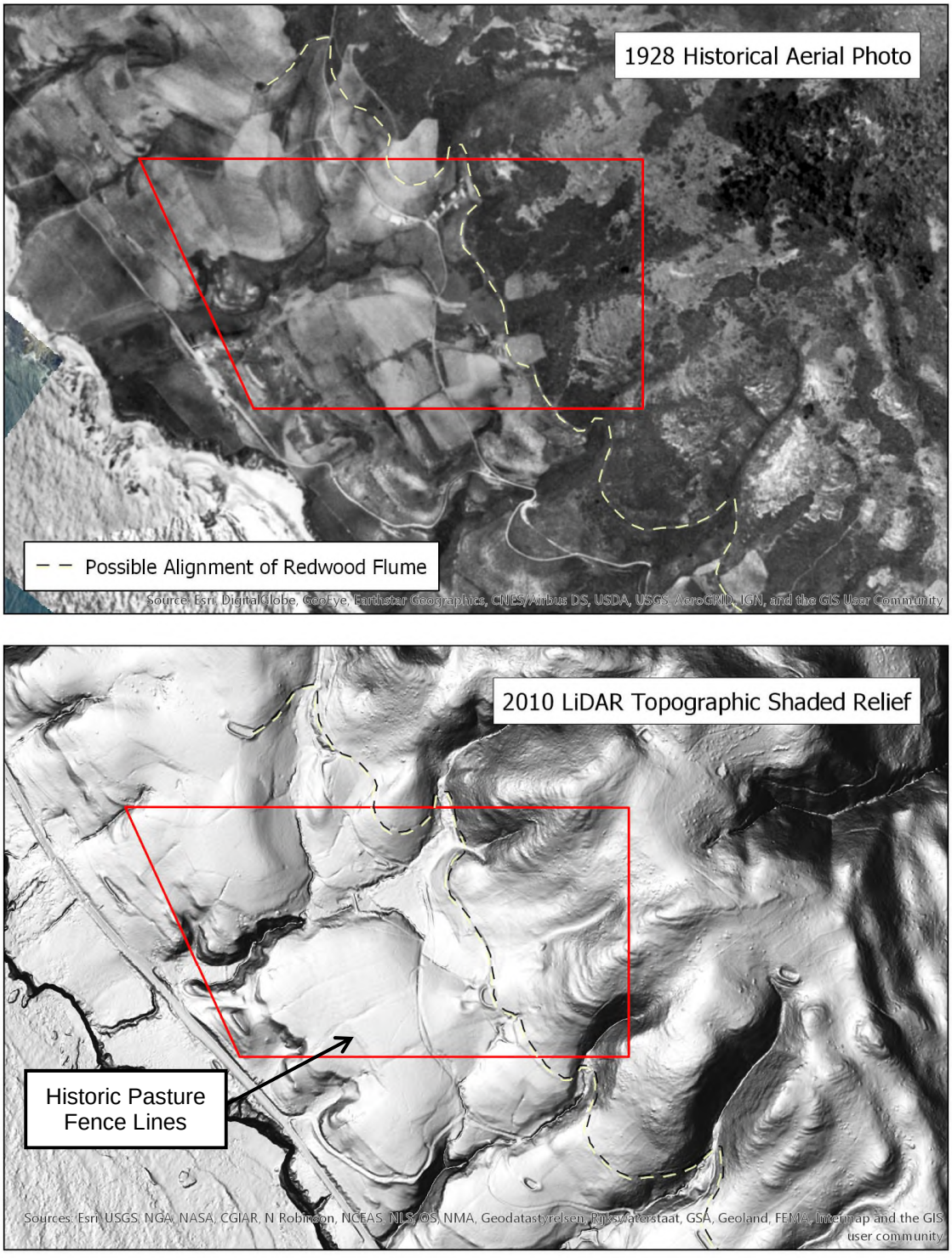

Figure 4-4. LiDAR Shaded Relief Map of Study Area with 1928 Historical Aerial Photograph

The actual location of the old flume line however, is nearby and somewhat visible in the 1928 historical aerial photograph shown in Figure 4-8 along with the LiDAR relief map of the Study Area in Figure 4-4 and an historical family photograph (Figure 4-5) discussed subsequently. LiDAR (Light Detection and Ranging) technology illustrates the features of the surface terrain of the Study Area including linear depressions and other potential historical features of the surface topography.[176] The flume line represents an historical remnant of the early twentieth century ranching and farming infrastructure on SPR, which, along with other ranch homes, barns and structures, combined to potentially further modify, or modify differently the soil and vegetation types beyond what earlier migrant livestock grazing activities from the Spanish and Mexican land grant periods may have done. The LiDAR imagery also shows other features including a linear grid pattern which corresponds with apparent pasture fence or other demarcation lines visible in the historical aerial photographs from the later periods addressed herein (Figures 4-9 through 4-11).

The majority of the redwood boards that made up the water flume are gone from the pastureland in or around the Study Area (there are some remnant pieces according to retired SPR Livestock Manager Gordon Claassen) and the herbaceous (grassland) vegetation in the location where the flume is estimated to have been aligned does not appear to have been altered by the water line. Therefore, it may be concluded that this structure has likely caused no or minimal obvious permanent change to the vegetation types on the Study Area. However, scientific evaluation of this aspect of early farming

[176] National Oceanographic and Atmospheric Administration, "What is LIDAR," accessed April 24, 2019, https://oceanservice.noaa.gov/facts/lidar.html. LIDAR (or LiDAR) technology uses a remote sensing laser light method to measure variable distances to the Earth's surface from an airborne system to generate precise three-dimensional information about the shape of the Earth's surface characteristics.

and ranching in the twentieth century on the Western Terrace would likely ascertain if there were long-term changes to the native/non-native taxa from this historic structure.

Several historical photographs of the Pini family are presented in Jeanine Scaramozzino's thesis. The research herein delves further into those images and others that may reveal details about, if not add more historical inquiries into, the use of the land in the Study Area in the early twentieth century, and whether or not the primary vegetation types and locations change in any manner over the course of the intervening decades. Field visits conducted on November 2 and December 17, 2018 included investigations of potential locations of where two of the Pini family photographs had been taken, using the background imagery of vegetation and landforms in the photographs. The "Artichoke Pioneers" photograph taken in 1924 (Figure 4-5) includes members of the Pini family, including Marie (Pini) Stoner at about age 1½ and her parents Virginia and Celeste Pini, and several of their farming partners, Attilio Venturini, Mike Conrado and Ermano Lombardi.[177] This photograph shows artichoke plants in the foreground, and two hills separated by a ravine in the background with *Baccharis pilularis* Shrubland vegetation on the steeper-sloped areas and herbaceous alliance (grassland) vegetation on the lesser slope to the right. The site visits confirmed that the shrubland and grassland alliances visible in this photograph are consistent with present-day vegetation types on those slopes. A portion of a small house and a wagon are visible in the middle-ground on the left side of the photograph; these were leased by the Conrado

[177] The photograph in Figure 4-5 is from the personal family memorabilia of Marie (Pini) Stoner. The Pini family has traditionally referred to the photograph as "The Artichoke Pioneers."

Figure 4-5. The "Artichoke Pioneers" in 1924

Left to right: Mike Conrado, Attilio Venturini, Virginia Pini, Celeste Pini holding Marie Pini (1+ years old,) Ermano Lombardi, John Conrado (son of Mike Conrado), Attilio Conrado (son of Mike Conrado), Jacinto Conrado (brother of Mike Conrado), unknown ranch worker and unknown ranch worker. The photograph was taken in an artichoke field southwest of the Pini ranch buildings and the present-day Hay Barn structure and east of the Cowboy Shack.

A. The house and wagon in the upper left area of the photograph were leased by the Conrado family.
B. The light-colored linear feature is a tear in the photograph.
C. Just below and parallel to the tear line is the likely water flume line location.

Photograph and information courtesy of Marie (Pini) Stoner and Kim Stoner, personal family historical memorabilia, with permission to the author to reproduce. Flume line location (C) information provided by Gordon Claassen, Swanton Pacific Ranch, to author, March 4, 2019.

family, according to Pini family information on the original photograph. Further, the house in the photograph is not the same location as the current Cowboy Shack structure according to Marie (Pini) Stoner.[178] The field visit participants in the December 17, 2018 site reconnaissance concluded that the "Artichoke Pioneers" photograph was most likely taken in what is presently the "Wire Lot," a livestock paddock south of the Hay Barn and east of the Cowboy Shack buildings which are below the site of the former Pini Village. Marie (Pini) Stoner believes that the photograph was in fact taken in the present-day Wire Lot.[179]

The "Artichoke Pioneers" photograph in Figure 4-5 has a light-colored line in the upper right-hand corner which has been thought by some who have studied the history of SPR to potentially be the redwood flume line that supplied water to the water reservoirs that fed the Brussels sprouts and artichoke fields as well as the ranch homes in the Pini Village. However, in communication with the Pini family for this research, the light line was clarified to be a tear in the original photo print, not the water flume. A darker line parallel to and just below the white tear is approximately the flume alignment location, according to Gordon Claassen, who has extensive familiarity with the Study Area and environs from fifteen years as Livestock Manager of SPR.[180] Therefore, in addition to the previous discussion pertaining to Figures 4-4 and 4-8, the flume line constructed in the 1920s is recognizable in this historical family image shown in Figure 4-5.

A family photograph of Marie (Pini) Stoner on her Confirmation Day in eighth grade in 1936 as shown in Figure 4-6 was also assessed in the field in an attempt to

[178] Kim Stoner, e-mail communication with author, January 5, 2019.
[179] Ibid.
[180] Gordon Claassen, personal communication with author, March 4, 2019. Claassen served as SPR Livestock Manager from 2005 through March 2019.

Figure 4-6. Marie Pini on her Confirmation Day, 1936.

According to Marie (Pini) Stoner, this photograph was taken up behind (north of) the Pinis' ranch house on the side of a hill overlooking the creek which ran east-west through the gulch by the ranch buildings (Kim Stoner, e-mail communication to author, January 5, 2019). Note the Coyote Brush Shrubland vegetation on the hills in the background.

Photograph courtesy of Marie (Pini) Stoner and Kim Stoner, personal family historical memorabilia, with permission to the author to reproduce.

determine its photographic location based on vegetation and landform features in the image. The origin location of this photograph could not be determined with confidence during either field reconnaissance visits (November 2, 2018 and December 17, 2019) from within the Study Area given the distinctive ridge line and ravine topography in the background of the photograph which was not evident during the field visits. However, Marie (Pini) Stoner stated subsequent to the author's field visits that the photograph location was up in the canyon area behind the family ranch home on the hillside that overlooks the creek which ran behind their "village" of ranch structures. Upon study of aerial photography of this area it appears that the photograph location was either just about at the northern boundary of the Study Area or just to the north of it on the facing hill slope outside of the Study Area.[181] The *Baccharis pilularis* Shrubland vegetation in background of the black and white photograph appears to be robust in density covering the hill slopes behind Marie Pini, as such those areas were not apparently disturbed by crops, grazing or other human activities which is likely given the steep grades of the slopes. These historical photographs (Figures 4-5 and 4-6) with vegetation in the background indicate that the vegetation in the Study Area has remained essentially static in terms of types and geospatial coverage since the early part of the twentieth century.

According to Marie (Pini) Stoner, her family's tilled crop fields were primarily located in some of the grassland pastures (Herbaceous alliance vegetation) below (to the south and southwest) including the present-day Wire Lot as discussed previously, and to the northwest of the Pini Village structures in the drainage of Cowboy Shack Gulch; the fields to the northwest were up on a hill. Marie (Pini) Stoner indicates that there were

[181] Kim Stoner, e-mail communication with author, January 5, 2019.

fields below the Cook House, a structure at the lower end of the ranch buildings, which also served as a shed for cleaning and packing the sprouts after picking.[182] Figure 4-8 in Section 4.5 indicates the approximate locations of the crop fields as well as the Cook House/Packing Shed. The current Hay Barn structure is the only building remaining from the ranch buildings during the Pinis time when it served as a bunk house for the farm workers. The crop fields were not fenced; the only fencing recollected by Marie (Pini) Stoner was around a "seeding" plot in the cluster of the ranch houses and buildings used by the Pinis, Conrados and Venturini families and for farm workers. The plot, which was on the west side of the Conrado house (Figure 4-3) was used to seed the Brussels sprouts and artichoke plants for transfer into the fields. Marie recalls the family farmers tossing out Brussels sprout seeds in the plot and planting cuttings from artichoke plants in the fields to grow starter plants in the plot; after those had become established they would be transferred into the regular fields and planted in rows.[183]

Fertilizer was applied to certain portions of the farm fields at differing times each year. In addition to the seeding plot, each of the three families in the Pini Village, the Pinis, Conrados and Venturinis, had their own family vegetable gardens near their houses as well as a small shared plot of peas for which the location was rotated annually. The three families did not raise livestock commercially, although the families owned plow horses and the Conrados owned one milk cow. Each of the three families had chickens

[182] At this time there is no primary source material known to be available by the author or the Pini family that would confirm the boundaries or acreage of the crop fields. The locations described herein are approximate based on Mari (Pini) Stoner's recollection.
[183] Kim Stoner, e-mail communication with author, January 14, 2019.

and rabbits, and the Pinis owned a goat in a small fenced area near the house. Two water reservoirs in the form of earthen dams were located on either side of the property.[184]

In general, soil-disturbing activities such as disking and plowing for crop production and grazing and hoof-pressure by livestock can impact the vegetation types, in terms of either the proportion of native to non-native (introduced) plant taxa or changing the vegetative alliances and/or modifying succession stages of vegetation. An example of the latter two extreme conditions of vegetative change is superbly uncovered by Elinor K. Melville who studied the introduction of pastoralism, specifically sheep grazing, in the Valle de Mezquital in central highland Mexico by Spaniards in the latter half of the sixteenth century. While Melville's study addresses the larger complex picture of political and economic conquest by the Spanish over the indigenous peoples and their agricultural traditions, the resultant ecological change from an irrigated agricultural mosaic to a sparsely vegetated mesquite desert is also a key component of her research and analysis. This history is an example of anthropogenic land use changes literally modifying the type of environment through overgrazing by sheep with the attendant loss of soil, change in hydrologic regime, loss of plant species and extinction of animals. The introduction of Old World domesticated livestock in combination with other European land uses including different methods of crop production than those of the indigenous peoples, logging, lime manufacture, road building and charcoal manufacture caused "universal baseline changes in the biological regime," per Melville.[185]

[184] Kim Stoner, e-mail communication with author, January 14, 2019.
[185] Elinor G. K. Melville, *A Plague of Sheep*, 9, 13, 14.

The above-described example of significant ecological changes in the land and the vegetation alliances from anthropogenic activities is valuable in that it provides a worst-case scenario in consideration of vegetation change in a given environment and associated origins. That is not the case, however, in the Study Area of the Western Terrace at SPR. The relative degree of potential alteration of vegetation in a particular area, be it the proportion of native to non-native taxa, changes to different alliances or associations of plant species, succession or regression, is dependent on factors such as the duration of these disturbance activities, short or long-term, and any fallow periods on the land thereafter.[186] The paddock on the north side of the Cowboy Shack structure where it is interpreted that some of the Brussels sprouts fields "up on the hill" were located according to Marie (Pini) Stoner, is fenced along the north side of the dirt access road in front of the Cowboy Shack and horse corrals. This paddock on the north side has been used for livestock grazing for approximately the last half century.

Cultivation and livestock range management uses would typically cause reduction in native plant taxa, from soil disturbance from plowing or disking, application of fertilizers and/or other amendments, and vegetation removal and soil compaction from grazing of herbaceous and some shrubland vegetation types. However, the crop field locations prepared and worked by the Pinis and the other families on their 178-acre leased land during the 1920s-1930s were in areas that today have some native species mixed in with non-native taxa despite relatively continuous usage during the twentieth century. For example, the eolian sandy-soil pasture of the Upper Ocean paddock (pasture) southeast of the Pini Village supports present-day populations of a significant native

[186] Jim A. West, e-mail communication with author, March 30, 2019.

herbaceous species *Elymus triticoides* (in the Rye grass family) which is tolerant of dry, saline conditions according to botanist Jim West. Also, in the sandy soil substrate between the Cowboy Shack and the upper horse pasture west of the Pini Village thrive several native taxa such as species in the *Amsinkcia* (Fiddleneck) family.[187]

There have also likely been periods of non-usage of these range paddock and cultivation areas, i.e., periods of time when crops were rotated or fields left fallow, for example, after 1940 when the Pini family left the ranch on "La Siberia" and moved to Santa Cruz, and when livestock grazing has been managed to rotate pastures regularly, such as during the recent period of Cal Poly management.[188] As indicated previously, the Arroyo Willow Shrubland vegetation alliance within the drainages of Cowboy Shack Gulch, both below and above the Cowboy Shack and Hay Barn structures and in the westerly arm of the Gulch, contain a high concentration of native taxa, including rare and uncommon species (see Figure 3-15). Further, about 0.3 mile north of the Study Area boundary in what is referred to locally as the Solar Panel Gate area (the uppermost extension of Cowboy Shack Gulch drainage) is essentially a vegetative "hotspot" of significant importance in which are documented 120 native plant species, despite this area having been exposed to livestock grazing.[189]

Because there are native herbaceous and shrubland taxa among non-native species in the areas formerly known to have been cultivated in the north-central portion of the Study Area where the Pinis and other farming families cultivated their crops in the early

[187] Jim A. West, e-mail communication with author, March 30, 2019.
[188] Although the author does not have specific confirmation of when the other Italian families left the Study Area, as discussed in the section in this chapter that evaluates the vegetation conditions shown on the various historical aerial photographs, the ranch buildings that the families used during their time there appear to be gone by the mid-1950s.
[189] Jim A. West, e-mail communication with author, March 30, 2019.

decades prior to World War II, it can be reasonably concluded that these farming activities did not wholly and irreversibly change vegetation alliances in these areas. Thus, the presence of native taxa in areas known to have been disturbed by human activities is a contributing factor to the argument made herein that primary vegetation alliances have remained relatively stable, or static, since the early twentieth century despite ongoing ranching and farming activities. Although land uses such as crop cultivation and livestock grazing leave residual botanical and other ecological footprints, periods of rest such as leaving crop fields fallow have resulted in reappearance of endemic plant species among non-native populations. Land use footprints can be restored to enable a native-dominant or co-dominant condition through development of targeted management planning.

Further studies using existing botanical documentation and historical land use documents and tools such as a more complete timeline of land leases and ownerships and the concomitant specific land uses associated with those operators could provide additional information in support of restoration plans particularly for areas with higher proportions of non-native (introduced) plant taxa. Such studies could include investigation into the existing ratio (relative proportion) of native to non-native plant species in particular portions of the Study Area and environs in accordance with historical uses of vegetable cultivation and livestock pasturing in order to identify appropriate locations for restoration plan implementation. This type of further research would be consistent with the following objectives of the *Swanton Pacific Ranch Management Plan*: “protection and enhancement of the natural functions and diversity of the varied ranch ecosystems” and “to improve the grassland and the water supply

resulting in a sustainable rangeland that supports biodiversity and protects the natural habitat for animals and plants." [190]

4.4.2. Ranching in Davenport, Swanton and Santa Cruz

As Swanton has a long history of livestock ranching and dairies in addition to vegetable farming, another example of the Italian-American cultural influence through agricultural use of the land is that of the Ferrari/Del Chiaro family. The historical family details are provided by Marvin Del Chiaro of Scotts Valley near Santa Cruz whose grandfather, father and uncle had cattle ranches and other agricultural businesses in the Davenport, Santa Cruz and Swanton areas, respectively, from the early to mid-twentieth century.[191] This analysis does not delve into vegetation change on these properties as they are not within the Study Area and there is insufficient information of the boundaries of each of these ranch properties. However, some historical details of these ranching operations serve as examples of the cultural and economic components of the region as well as some specific activities that would have affected vegetation alliances during the early to mid-twentieth century.

Del Chiaro's grandfather, Battista Giovanni Ferrari, known as John Ferrari, operated a dairy business and later a cow-calf operation on approximately 2,000 acres

[190] Cal Poly, *Swanton Pacific Ranch Management Plan* (2015), 8. Development of any restoration planning efforts for vegetation alliances should be coordinated with Cal Poly's range management system. The planned grazing system is considered holistic in that grassland vegetation is managed for livestock forage by using cattle density as a primary tool; the amount of time that cattle are in particular pastures is key to the goals of achieving a complex array of herbivorous plant species as well as more perennials which are good for soil vitality and minimization of erosion. Holistic components of the planned grazing consider weather conditions, moisture from rainfall, and resting the various grassland paddocks to enable vegetation recovery between grazing periods. This process also controls, i.e., truncates succession of vegetative alliances in order to maintain grassland stage for cattle grazing. Gordon Claassen, personal communication with author, March 5, 2019.

[191] Marvin Del Chiaro contact provided by Jeanine Scaramozzino. E-mail and verbal communications between Del Chiaro and author conducted January through May, 2019.

north of the Portland Cement Plant in the New Town area outside of Davenport during the 1930s and 1940s.[192] Although there is no mapping currently available of the ranch boundaries, according to Del Chiaro a large portion of the property was on federal government grant land which the family referred to as the "back ranch" and for which Ferrari would have paid grazing rights. The ranch headquarters, which entailed the main house, horse/hay barn, milking barn, cheese room, and potato shed among other facilities, was located near the intersection of Greek Ranch Road and the "Old Road," which was the original Coast Road (now Swanton Road) before State Highway 1 was constructed in the late 1930s.[193] The hand-drawn map by Marie (Pini) Stoner and her brother Geno Pini in Figure 4-2 shows the approximate relationship of the locations of the various ranches along the old dirt ranch access road west of Scott Creek on the Western Terrace. Included on the map in addition to the Pinis' ranch are the Greek Ranch (the family was from Greece), and the Gianoni, Venice, Belvedare, Galiano and Quilici ranches. Where the dirt ranch road intersects Scott Creek is the historical location of the Quilici Ranch; as another example of the extensive community of Italian and Swiss-born residents of the North Coast-Santa Cruz area, the Quilicis are cousins by marriage to Marvin Del Chiaro.

John Ferrari started as a hog farmer in San Francisco, where he collected left over food scraps from downtown restaurants and used the swill for hog feed. In 1920 he moved with his family to rural Davenport where he operated a dairy on his leased ranch land until the mid-1930s, when he switched to raising beef cattle after the devastating

[192] A cow-calf operation entails a permanent herd of cows kept for the purpose of breeding calves for later sale.
[193] Marvin Del Chiaro, e-mail and personal communication with author, January 14 and March 5, 2019.

economic downturn of the Great Depression.[194] Ferrari's story contains parallel threads to those of the Italian immigrants in San Francisco who eventually migrated out into smaller communities of the Bay Area region and elsewhere in California, as discussed previously. As shown in Figure 4-7, Ferrari also grew artichokes on his Davenport ranch. Often the beef cattle and dairy businesses in the Santa Cruz region were closely linked as was the situation with Ferrari; when he leased the ranch in 1920 and initially operated a dairy there he succeeded a Swiss dairyman named Antone Mocettini. Mocettini was among the pioneering Swiss dairymen in the Davenport and Davenport Landing sections of the County (also referenced as the Agua Puerca y Las Trancas District) including the Scaronis, Morettis, Gianones, Matteis and Filippinis, among others.[195]

Del Chiaro's father and uncle had agricultural histories on portions of the Rancho Agua Puerca y Las Trancas which later became SPR. His father, Lisandro Del Chiaro, raised Brussels sprouts from 1929 to 1935 on the present-day "Field 2" on SPR. He was also a renaissance man of multiple labor genres, having worked at the Portland Cement Plant in New Town near Davenport in 1939-1940, followed by two years as a highway construction worker on the Highway 1 bypass project from Aptos to Watsonville.

[194] Del Chiaro, personal communication with author, March 5, 2019.
[195] Obituary writer (no staff name), "Antone Mocettini, Pioneer of Coast Regions, Succumbs," *Santa Cruz Sentinel*, February 8, 1939. Del Chiaro is uncertain whether the ranch property his grandfather leased was owned by Antone Mocettini or the Coast Dairies & Land Company. Given the wide influence and involvement of the Coast Dairies & Land Company in regional land ownership and various business enterprises as discussed herein, verification of the chain of title as well as any federal jurisdiction on Ferrari's ranch near Davenport could potentially shape a framework of the effects of historical ranching on the botanical resources of this sizeable property.

Figure 4-7. Ranching and Farming near Davenport

Battista Giovanni (John) Ferrari (left) with an unidentified colleague in artichoke field, ca. late 1920s/early 1930s.

Photograph courtesy of Marvin Del Chiaro, personal family historical memorabilia, with permission to the author to reproduce.

He also worked at Stockley's cannery in Santa Cruz part-time throughout the years of World War II.[196] Del Chiaro's uncle Bob Musitelli leased range land for cattle in the mid-1950s on what is now SPR. Although there is no specific mapping currently available for the property he leased, the best estimate of the location is the present-day Horse Unit

[196] Marvin Del Chiaro, e-mail communication with author, April 1, 2019.

directly across Swanton Road from the Casa Verde building that serves as the administration offices for SPR, and the slopes and hill above called Strawberry Shack Hill.[197] Musitelli ran about 225 head of brood cows in a cow-calf operation and also cultivated twenty acres of artichokes. The final lessor to Musitelli was Al Smith, per Del Chiaro.

Del Chiaro worked as a cow-hand on his uncle's ranch in the 1950s and recalls that they planted artichoke cuttings by hand, similar to the Pinis' method of starting Brussels sprouts plants by cuttings at their ranch. Cattle were sometimes herded by foot rather than on horseback, and when on foot, Del Chiaro often had unfortunate encounters with poison oak (*Toxicodendron diversilobum* Shrubland alliance) of which there were robust amounts in the grassland and shrubland vegetation but which did not adversely affect the cattle. Del Chiaro mentions that "malva grass" grew wild and was used as a salve for horses on the ranch. Malva, or Mallow, is in the Malvacea plant family, consisting of approximately 25 to 30 herbaceous species, annuals, biennials and perennials. This plant family is found in the Swanton area within the *Malacothamnus fasciculatus* (*Malacothamnus* spp.) Shrubland vegetation alliance, or Bush Mallow Scrub, which is allied with chaparral and Shrubland alliance plants such as black sage scrub (*Salvia mellifera*), buckwheat (*Eriogonum fasciculatum*), chamise chaparral (*Adenostoma fasciculatum*), and toyon scrub (*Heteromeles arbutifolia*).[198]

[197] Marvin Del Chiaro and Gordon Claassen, personal communication with author, March 4, 2019. This is the same location mentioned in the discussion of strawberry production on SPR in the late 1920s (Section 4.2).
[198] California Native Plant Society, *A Manual of California Vegetation*, Online Edition, accessed March 23, 2019, http://www.cnps.org/cnps/vegetation.

Potential sources of non-native plant taxa, e.g., weed seed, coming onto the ranch lands were numerous, for example, through purchased hay, fertilizers and plant cuttings. Del Chiaro recalls that he and his uncle Musitelli spread rye grass seed on the hillside, having purchased it from farmers' co-ops in Santa Cruz and Watsonville. Chicken manure was used as fertilizer and was sourced from an egg farm; imported hay was spread out on the ground in winter for cattle which was sourced from a feed supply story near Natural Bridges State Beach in Santa Cruz. The cattle were fenced in to keep them off of Swanton Road, however, the crop fields were not fenced, similar to the fields on "La Siberia."[199] These case studies of farming and ranching activities in the Swanton region indicate some of the ways that the composition of vegetation can be modified over time. The following section provides an assessment of the vegetation alliances and other features of the Study Area using historical aerial photography to answer the research query pertaining to any changes in types or geospatial coverage.

4.5 Examination of Potential Historical Changes in Vegetation Alliances and Habitat Borderlands in the Study Area

With some historical land use activities highlighted in the case studies discussed in the previous section, the following provides a visual assessment of the vegetation alliances in the Study Area. Here I use historical photographic imagery to determine whether there have been any identifiable changes in the primary types, alliance borders or spatial coverage, or perhaps shifts of succession stages during the course of the twentieth century. This analysis provides a macro-lens perspective on the botanical environment in this portion of the Western Terrace in light of previous anthropogenic uses of the land.

[199] Marvin Del Chiaro, personal communication with author, January 21, 2019.

Comparison of the various historic maps that indicate some level of vegetation or landform information on the Rancho Agua Puerca y Las Trancas is informative when considering a more historically recent period such as the twentieth century. The Wieslander Veg Type Map on Figure 3-3, circa late-1930s, shows essentially three main types of vegetation alliances within the Study Area: cropland on the western third, shrubland on the center third and annual grassland (herbaceous) on the eastern third, and a small portion of Closed-cone Pine forest (now updated in CNPS's MCV2 classification system as Monterey Pine [*Pinus radiata*] and Knobcone Pine [*Pinus attenuata*] forest alliances) and cypress (*Hesperocyparis* spp.) in the northeastern corner. While vegetation patterns shown in the historical and current aerial photography differ from the Wieslander vegetation mapping, i.e., the geospatial locations of these vegetation types are not proportioned on the Study Area into thirds, the vegetation types identified for the area by the Wieslander project are essentially consistent, interpreting the Closed-cone Pine-Cypress to include Monterey Pine. The much older Diseño map from the early Spanish-American land grantees in the mid-nineteenth century shown on Figure 3-4 depicts Monterey Pines on the upper portions of the Rancho; the Diseño also indicates larch forest in the upper left of the map, however as discussed earlier, as larch are in the northeastern U.S. it is likely that the map preparer mistook either Monterey pines or Coast redwoods for the European-known larches. The township plat maps of the Rancho Agua Puerca y Las Trancas and neighboring land to the east (Figures 3-5 and 3-6) also identify timber, chaparral, and grassland vegetation, consistent with the vegetation alliances evident on the aerial photography.

A series of historical aerial photographs are used herein as primary sources to assess potential changes in vegetation types in the Study Area. Selected among the available years of aerial photography flights of Santa Cruz County were the earliest year, 1928, followed by 1943, 1956 and 1975; these photographs are in black and white. The most current available aerial photography at the time of this research and used for present-day representation of the area is from 2016. The following discussion provides assessment of the imagery of each of the four selected years of historical aerial photographs of the Study Area, including the photography dates (to consider the time of year represented in the images), descriptions of the vegetation types in terms of spatial coverage, patterns and type, and any observable features and objects that may have historical relevance to former uses of the area in consideration of the specific land use research conducted for this thesis. Each of the historical years of imagery is compared to discern whether there are any particular changes in patterns of vegetation coverage or type between these periods during the twentieth century, and if so, what historical land uses or events may have contributed to those changes. The overall objective is to provide some further information, even if details, regarding the ecological history of the Ranch pertaining to anthropogenic influences upon vegetation resources. Information obtained through research of written scholarship and mapping of the area, as well as from families with histories of farming and ranching of the Western Terrace in the early to mid-twentieth century is utilized herein to assist in provide some context for any vegetative changes on the land.

4.5.1 Late 1920s

The 1928 aerial photography of Santa Cruz County shown in Figure 4-8 is the earliest available for the Study Area and, therefore, serves as the baseline for the historical analysis and comparison of potential changes to vegetation types. This aerial flight of the Santa Cruz coastal area was taken on June 1, 1928. The image generally contains a greater contrast of dark and light compared with the later aerial photography, perhaps in part because of the relatively nascent level of technology in aerial photography at that time. The greater degree of contrast is notable but does not preclude obtaining information from the imagery, particularly the darkest areas.

The Pini Village buildings are visible in the north-central portion of the Study Area, laid out in a linear alignment in a generally north-south direction from the ranch access road. The forest and shrubland vegetation on the lower hill slopes to the east and southeast of the Pini ranch homes appear to have been graded or otherwise reduced, most notable in two areas of rectangular-shaped light-colored patches surrounded by darker vegetation. At the base of these hills in the eastern portion of the Study Area is a light-colored linear feature that appears from the north end of the Pini Village structures and progresses in a generally southeasterly direction and somewhat parallel and east of the dirt ranch access road. This linear feature leads to a round feature interpreted to be a pond or water reservoir in the southern section of the Study Area (see item C on Figure 4-8).

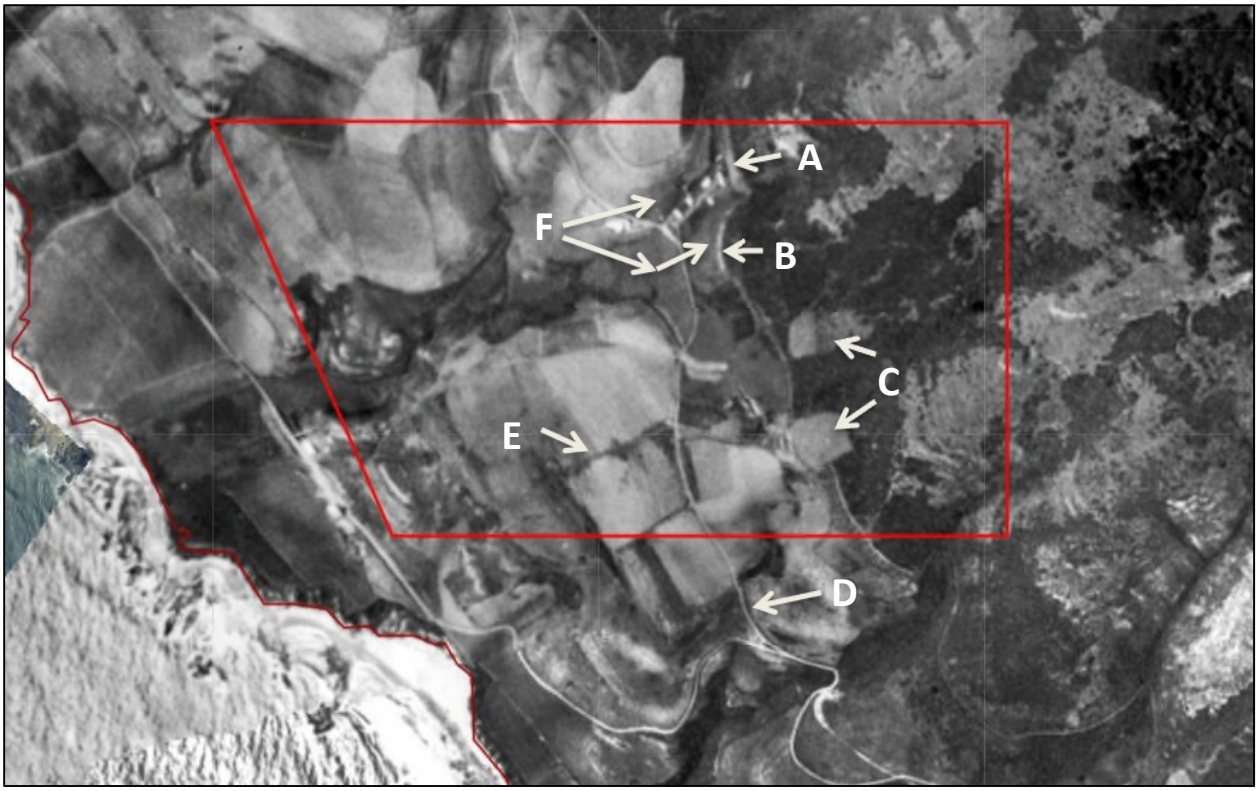

Figure 4-8. 1928 Aerial View of Study Area

A. Pini Village in draw of upper Cowboy Shack Gulch, and water flume above buildings. Marie (Pini) Stoner's Confirmation Day photo in Figure 4-6 was taken above the Village structures on the slopes of a hill overlooking the creek which runs parallel to the structures and through Cowboy Shack Gulch.

B. Water flume to ranch structures in the Village and to water reservoirs. The flume brought water from Scott Creek east of the Study Area (outside of this photograph) via pumping stations.

C. Two modified patches of Coyote Brush Shrubland vegetation. A water reservoir is at the western end of the southernmost of the two patches and received water from the flume line shown in B.

D. Dirt access road to Pini Village structures.

E. Vegetated pasture boundaries/fence lines (example).

F. Tilled artichoke and Brussels sprout fields (approximate locations). The "Artichoke Pioneers" photograph in Figure 4-5 was taken in the present-day "Wire Lot" below the Village structures on the southwest side of the dirt access road. The Cook House/Packing Shed building was at the lower end of the Village structures.

Source: University of California Santa Cruz University Library, Special Collections, http://digitalcollections.ucsc.edu/cdm/landingpage/collection/p16019coll5 and http://guides.library.ucsc.edu/maps/aerial.

The reservoir feature appears consistently in all of the historical and current aerial photographs (see Figures 4-8 through 4-12) as well as the LiDAR imagery on Figure 4-4. A likely explanation of this light colored linear feature, other than another dirt access road, is that it is the redwood water flume line discussed previously in Subsections 3.2.6 and 4.4.1. The water reservoir is one of several on the rangeland in and around the Study Area. According to the Pini family (see Figure 4-3) and documented in the family's land lease with C. H. Widemann, the flume went behind the ranch houses, barns and other structures in the Pini Village and brought water for domestic and farm uses up from Scott Creek via pumping stations to the various water reservoirs on the rangeland.

The lighter sections of vegetation on both south and north sides of the Cowboy Shack Gulch in this 1928 image show linear block-shaped demarcations, likely to be either boundaries of crop or grain fields or range pastures. In the grassland south of the Gulch in the south-central portion of the Study Area, thick dark areas indicating vegetative growth are apparent along linear separations between fields/pastures, most likely shrubland vegetation or possibly ungrazed grasses or other herbaceous taxa. The northwestern and north-central portions of the Study Area appear to be vegetated with mostly cultivated grain fields separated by linear lines which are interpreted to be fence lines. The dirt access road to the Pini Village and other ranch areas on the Western Terrace (north and south of the Study Area) is clearly visible in this early photograph of the rangeland and shrubland-vegetated coastal hills. The pastures and hillslopes to the west, south and east of the Pini Village have a medium hue relative to other areas which may indicate that they were in cultivation for artichokes and Brussels sprouts based on information provided by Marie (Pini) Stoner discussed previously. As the 1928 aerial

photograph shows, by the late 1920s, vegetation alliances, particularly portions of grassland/herbaceous and Coyote Brush Shrubland have been modified, or curtailed from moving into further succession stages by agricultural uses and associated infrastructure, including ranch buildings, water flume and reservoirs, and crop fields.

4.5.2 Early 1940s

The 1943 aerial photograph, taken in mid-October of that year (see Figure 4-9) clearly shows fencing or other linear demarcations between crop fields or pastures, particularly on the south side of Cowboy Shack Gulch. The dark vegetative borders in between fields observable in the 1928 image are not present in 1943. The Pini Village structures are still in place with what appears to be a few more small structures further north up the canyon draw from the original ranch homes and barns. The lighter image is of better quality so that the canyon topography is more detectable, specifically the ravines are more distinguishable from the areas of higher elevations. The intensely dark areas in the 1928 photograph are not as dark in 1943, but rather have a medium gradation. For example, the Monterey Pine Forest alliance on the hills east and southeast above the Pini Village in the draw is still identifiable as such. The two small somewhat rectangular-shaped sections of the lower-flank of the hill southeast of the Pini Village between the dirt ranch access road and the likely flume alignment (see item B on Figure 4-9**)** are changed primarily in that they are lighter in color than the 1928 photography and one of the areas appears to be smaller in size, that is, some of the shrubland vegetation on the hill slope may have grown back.

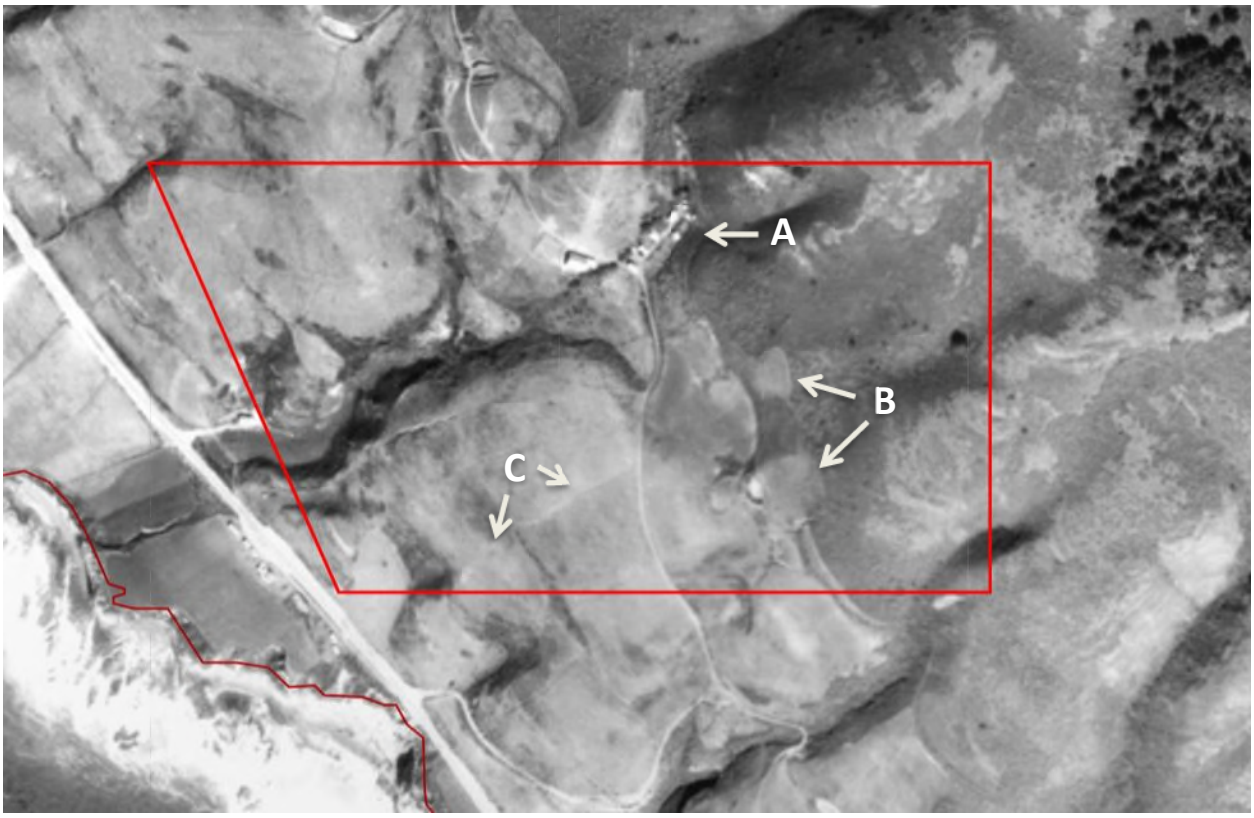

Figure 4-9. 1943 Aerial View of Study Area

A. The Pini Village structures remain, with some small additional structures.
B. Two rectangular-shaped sections of modified Coyote Brush Shrubland vegetation are still evident, with surrounding shrubland alliance on hill flanks lighter in color than in 1928 photograph likely due to improvement in quality of photography and/or the time of year (mid-October).
C. Fencing or other linear demarcations between pastures is visible, however, the dark vegetative borders in between fields evident on the 1928 photo not present in 1943.

Source: University of California Santa Cruz University Library, Special Collections, http://digitalcollections.ucsc.edu/cdm/landingpage/collection/p16019coll5 and http://guides.library.ucsc.edu/maps/aerial.

Alternatively, it is possible that the lighter coloration of these areas is due to less contrasting photography quality.

The grain or vegetable fields and pastures dominating the majority of the Study Area in the lower elevations both north and south of Cowboy Shack Gulch appear more uniform with some darker green grassland (Herbaceous alliance) in portions of the pastures on the south side. By 1943, the Pini family had departed their ranch and moved to Santa Cruz a few years earlier. As this research does not cover the historical activities of the other families who shared the lease, it is unclear when they departed the ranch in the Study Area. However, assessment of the 1943 aerial photograph reveals no discernable change in the vegetation alliances in the cultivation areas since the late 1920s shown on Figure 4-8. Overall, the vegetation types and their geospatial locations appear to remain generally consistent between the 1920s and 1940s with no significant shifting of alliance borderlands, or coverage areas.

4.5.3 Mid-1950s

The most notable aspect of change in the 1956 aerial imagery of the Study Area from the 1943 and 1928 periods is a much darker roughly square section of grassland/ pasture and/or crop fields adjacent and south of Cowboy Shack Gulch and west of the dirt ranch access road in the central portion of the Study Area. This much darker-hued square area, shown in Figure 4-10, looks to encompass at least two rectangular pastures (based on the more visible fence lines of the earlier photos) as well as a triangular area in the southwest corner of the Gulch and the ranch access road; the darker area measures approximately 16.5 acres.

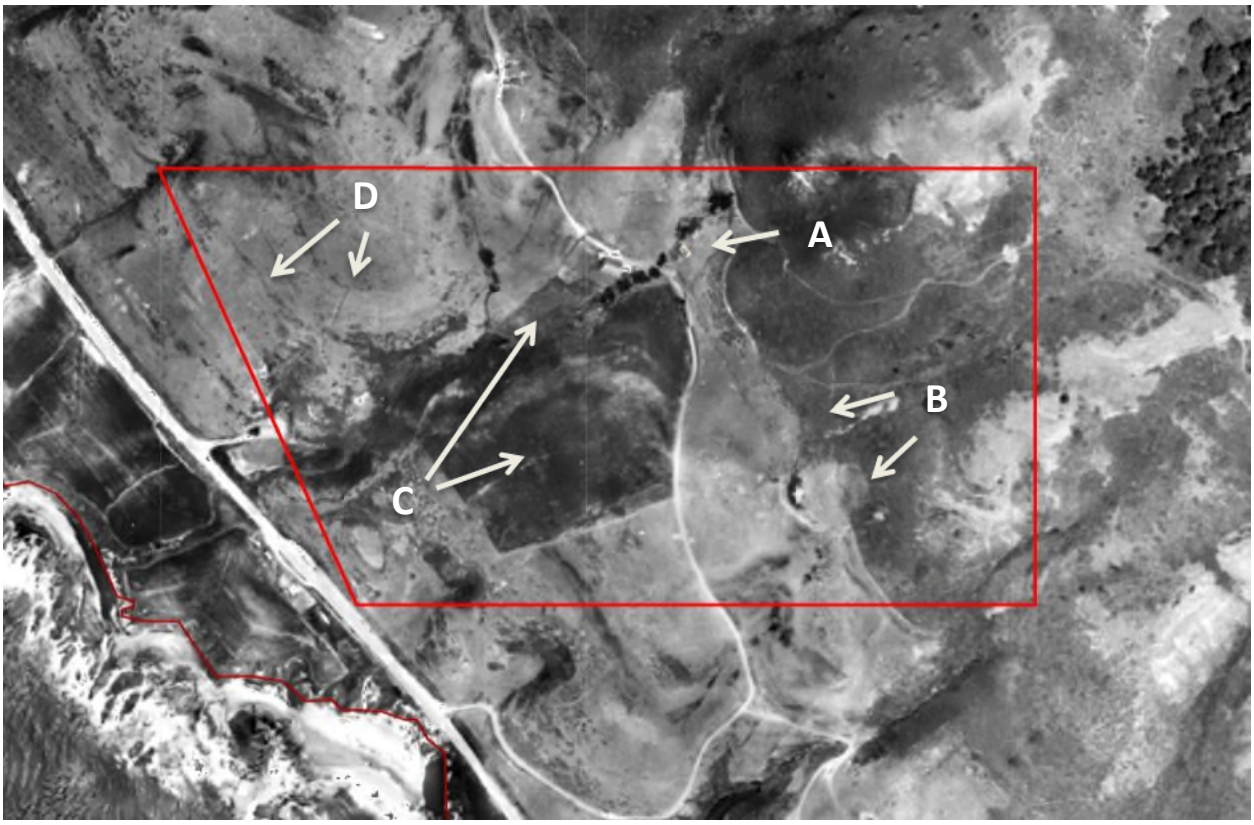

Figure 4-10. 1956 Aerial View of Study Area

A. Most of the Pini Village structures are gone, except for one or two structures, including the present-day Hay Barn.
B. Coyote Brush Shrubland vegetation and possibly small trees appear to be repopulating the base of the hill between the flume line and the dirt ranch access road.
C. A distinctively darker section of vegetation is evident in pasture and/or cultivated areas of the previous photo years. This darker area also extends to a small section north of the Cowboy Shack Gulch drainage below the dirt access road.
D. Grassland pastures north of the Gulch appear with clear demarcations of fence lines as was evident in the 1943 timeframe, and with an observable vegetation change of additional shrubland beginning to infill the pastures.

Source: University of California Santa Cruz University Library, Special Collections, http://digitalcollections.ucsc.edu/cdm/landingpage/collection/p16019coll5 and http://guides.library.ucsc.edu/maps/aerial.

It is particularly interesting that the vegetation within a managed area with these distinct boundaries on the west and south sides and east to the dirt access road appears thick with vegetation at a degree of dark shading similar to the Arroyo Willow Thickets Shrubland vegetation in the Gulch; black and white photography allows some detection of vegetation thickness and level of succession to a degree but not necessarily the types. This darkened area south of the Gulch appears to be thick with growth yet there is variation in the dark shading, that is, there are some darker spots which would support a conclusion that there were varying types of vegetation such as thicker shrubs and grasses, rather than if the area had been burned which would have a more uniform appearance in the dark shade.

It is additionally important to consider that the aerial flight for 1956 was taken in late summer (August 13th) during the non-rainy season. Potential explanations could vary considerably for this densely-vegetated area with precise boundaries, particularly given the thirteen-year span of time since the 1943 historical aerial photograph.[200] However, plausible causes may include growth of a different type of crop (grain or vegetable), irrigation of the area as opposed to non-irrigation or dry-farming, letting the pastures go fallow, or removal of livestock grazing in that area for a sufficient length of time prior to the photograph. Although the 1955-1956 rainy season was significant enough to cause major flooding on SPR as discussed earlier, the timing of this aerial photograph being in the late summer of 1956 informs the conclusion that this much darker vegetation area

[200] The County of Santa Cruz has aerial photography of the SPR area from 1948 taken for the U.S. Forest Service, however, that photography was not geo-referenced and therefore not utilized for this study.

compared with the surrounding pastureland and hill slopes would have likely been irrigated.[201]

The Pini Village structures are now mostly gone, at least they do not appear visible in this mid-1950s timeframe with the exception of one structure at the north edge of the ranch access road. As such, it could be concluded that the structures had been removed either by the landowner at the time if their condition had deteriorated sufficiently, e.g., the structures were built within a drainage area between the hills (the southeasterly arm of the Cowboy Shack Gulch) and perhaps there had been accumulated damage to them over the previous few decades, or perhaps they were no longer needed without tenants to live and work on-site. In either scenario, the loss of these structures indicates that residency of tenant farming may have ended after World War II in this portion of SPR and that crop cultivation may have diminished in the intervening period or that any crop cultivation in and immediately around this Study Area would have been conducted by off-site farmers. The effects of the post-World War II economic transformation on the agriculture industry are robustly debated by scholars. However, one trend that is generally agreed upon was the corporatization of agricultural production along with the de-population of rural areas as family farmers relocated to cities.[202] The Pini family's decision to move to Santa Cruz during the war may be consistent with this rural-to-urban trend. The absence of these ranch structures by mid-century may be due to one or more aspects related to local and national economic conditions, e.g., changes in

[201] A more complete agricultural use timeline, e.g., types of crops cultivated or periods of livestock grazing, particularly in the period after the Pinis left their leased ranch in 1940 until Cal Poly succeeded Al Smith as owner and operator, would uncover more details regarding likely factors generating the shifting levels of vegetation types over the previous two decades.

[202] On post-World War II emergence of corporate agriculture and the reduction of family farms in the mid-west see Jon Lauck, "The Corporate Farming Debate in the Post-World War II Midwest," *Great Plains Quarterly* 18, no. 2 (Spring 1998): 139-153.

land ownership in the Study Area on the Western Terrace, and/or the larger context of the shift in post-war corporatization of farming and reduction of small tenant-operated farms.

Further evidence of early ranching activities in the Study Area appear in the 1956 photograph as is also apparent in the 1943 image in the form of clear fence line demarcations in the grassland pastures north of the Cowboy Shack Gulch. A vegetation change of additional shrubland beginning to infill on the pastures is observable in a spotting effect compared to the earlier photography periods. The lower flanks of the hill southeast of the old Pini Village appears to be Shrubland alliances and or small trees repopulating between the historic redwood flume line and the dirt ranch access road (refer to Figure 4-10). Agricultural crops such as grains or vegetables do not appear to be in production in these fields at this time since the shrubs pop up sporadically, i.e., the grasslands do not appear to be plowed or tilled, further supporting the theory that crop production and grazing may have been reduced in the Study Area in the decade following the mid-1940s. In sum, the stages of the vegetation alliances indicated in this imagery from the mid-century timeframe are notably changed as described above such that alterations in land uses or reduction of land use intensity post-World War II are considered to be plausible factors.

4.5.4 Mid-1970s

By 1975, riparian vegetation found along stream courses such as Arroyo Willow Thickets (*Salix lasiolepis* Shrubland) and Coyote Brush Shrubland (*Baccharis pilularis)* are filling in the former site of the Pini Village structures in the upper reach of the Cowboy Shack Gulch drainage (see Figure 4-11). Larger shrubs or trees also appear, although the quality and scale of the photograph does not facilitate identification at the

species-level. The deep dark (interpreted as green in the black and white photography) paddock areas of the mid-1950s are no longer dark in the mid-1970s, but rather faded to nearly match the rest of the pastures/fields in the Study Area grasslands on the lower elevations. Although showing a significantly lighter tone in this late-October photograph of the SPR area, there is a faint remnant of the formerly dark vegetation in that same 16.5-acre section. In addition, there is less spotty shrub infill vegetation on the pastures on the north side of Cowboy Shack Gulch, leading to a consideration that possibly in the intervening years between 1956 and 1975 a return to grazing by livestock and tilling or plowing by farming of grain or vegetable fields contributed to removing the shrubland vegetation.

Overall the pastures and fields of the grassland (herbaceous alliance) in the lower elevations of the Study Area appear in the mid-1970s to be similar in light tone, with vegetation at a notably reduced stage of succession (growth) compared with the 1956 photograph. This observation of a generally much lighter, less vegetative condition also applies in the areas outside of the Study Area boundaries at this timeframe as shown in Figure 4-11. Paddock fence lines and the dirt ranch access road remain apparent, even more so than in the more heavily vegetated state shown in the 1956 photograph. For example, the Coyote Brush Shrubland vegetation on the lower slopes of hills to the north, south and east of the upper draw of the Cowboy Shack Gulch and the areas of Shrubland alliance and Monterey Pine Forest on the upper flanks of the hill (but not the very top portion) above the former Pini Village site are notably much lighter in color and thus likely drier soil.

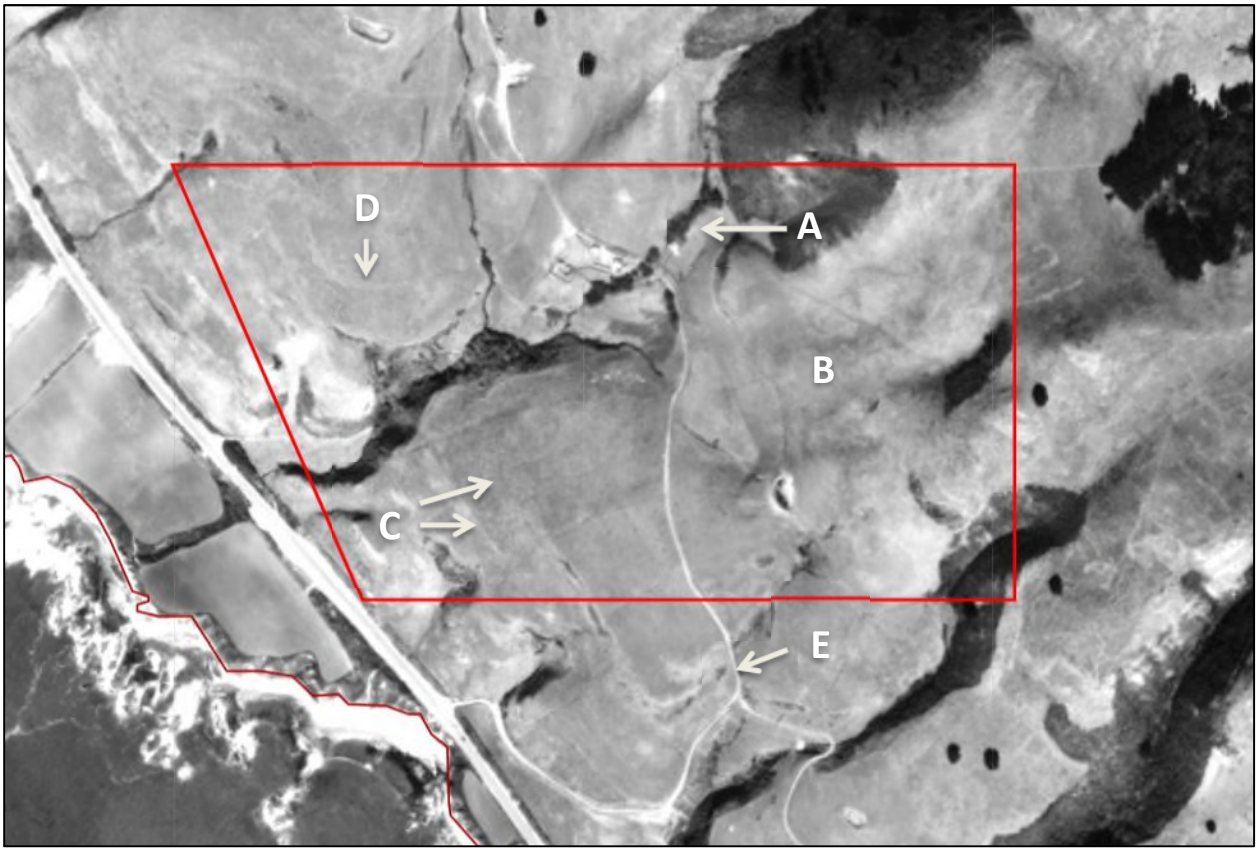

Figure 4-11. 1975 Aerial View of Study Area

A. Riparian habitat (stream course vegetation) shrubs and trees, most likely Arroyo Willow Thickets, and Coyote Brush Shrubland alliances are filling in the former site of the Pini Village.
B. The Study Area's easterly hill flanks have substantially lighter-hued vegetation growth than in the 1956 photograph (Figure 4-10).
C. Dark (interpreted as green in the black and white photography) pasture area of the mid-1950s is no longer dark, but rather faded to nearly match the rest of the pastures/fields in the grasslands on the lower elevations. Pasture fence lines are visible.
D. Less infill shrubland vegetation on the pastures on the north side of Cowboy Shack Gulch drainage. Pasture fence lines remain apparent.
E. Dirt access road is still evident.

Source: University of California Santa Cruz University Library, Special Collections, http://digitalcollections.ucsc.edu/cdm/landingpage/collection/p16019coll5 and http://guides.library.ucsc.edu/maps/aerial.

Compared to the imagery from 1956 when this area on the hill flanks had more shrubland growth, and in 1928, in which the photography shows much darker vegetation growth on these hill fully down to the apparent water flume line, the 1975 imagery depicts a much more modified condition, with significantly less dark or medium-hued vegetation growth on the Study Area's easterly hill flanks. Logging of these areas seems unlikely to have caused this change in that the previous vegetation was not heavily forested, but rather consisted of Shrubland alliance with some sparse density of Monterey Pines. Grazing of the area is a possibility and could cause the appearance of partial removal, if not clearance, of shrubland and pine forest alliances to transmute this change in vegetation coverage in the area. Outside and to the north of the Study Area the shrubland vegetation is essentially gone in many areas, with any remaining shrubland in artificial shapes (i.e., likely human-made) as shown on Figure 4-11.

Although the technological quality of more recent aerial photography is far superior in terms of sharpness for identifying specific vegetation alliances and the border patterns between vegetation types, i.e., herbaceous (grassland), shrubland, Arroyo Willow thickets and forest alliances, the dark-light contrast aspect of the older black and white photography nonetheless enables the sense of where vegetative patterns have changed or remained similar from earlier periods. Recent conditions of the Study Area and vicinity, as shown on color aerial photography from 2016 (Figure 4-12) and from ground-level photographs from the field visits for this study (for examples see Figures 3-13A, 3-13B and 3-14), show that Coyote Brush Shrubland alliances have regrown to fill in portions of the upper flanks of the hills in the easterly portion, and the Arroyo Willow

Figure 4-12. 2016 Aerial View of Study Area

A. Coyote Brush Shrubland alliance shows additional growth on hill flanks.
B. Arroyo Willow Thickets and Coyote Brush Shrubland alliances in Cowboy Shack Gulch drainage areas show additional growth since 1975.

Source: ESRI, County of Santa Cruz, USDFFSA, 2016, accessed October 8, 2018, https://calpoly.maps.arcgis.com/apps/webappviewer/index.html?id=107735f5730e4a5a9fce4c4e6068e287.

Thickets and Coyote Brush Shrubland alliances within the forks of the Cowboy Shack Gulch drainage have thickened in spatial coverage. In general, however, the overall vegetation types and patterns remain fairly consistent with conditions in 1975.

In summary, as evidenced by examination and comparison of the imagery within the four historical aerial photographs as well as present-day conditions, the types and geospatial locations of the primary vegetation alliances within the Study Area have remained essentially consistent throughout the twentieth century and through to the present day. The habitat borderlands framing the on-site vegetation alliances including Coyote Brush (*Baccharis pilularis*) Shrubland, Herbaceous/grassland, Arroyo Willow Thickets (*Salix lasiolepis*) Shrubland, and Monterey Pine Forest (*Pinus radiata*) appear not to have changed substantially since the 1920s. Agricultural land uses since the early twentieth century including vegetable crop fields and livestock grazing, as well as the attendant supportive infrastructure such as the water flume, water reservoirs, fences and dirt access road, have caused some modifications in the form of direct vegetation reduction or removal in selected locations of the range pastures, the lower hill slopes and the Cowboy Shack Gulch drainage. However, at least some of these modified areas observed in the historical photography appear to be of a temporary condition, for example, the shrubland and thickets in area of the Cowboy Shack Gulch drainage where the former ranch buildings were located has regenerated and presently contains some important native taxa.

In addition, with exception of the dirt access road graded in the 1920s and subsequently constructed ranch roads in the Study Area which have caused long-term vegetation removal along those linear stretches, there appears to have been no substantial alteration of vegetation types and coverage areas in the approximate areas of the historical artichokes and Brussels sprouts fields managed by the Pinis and other Italian immigrant farmers in the early-to mid-twentieth century, or from the ranch structures and

the supporting infrastructure. The anthropogenic activities causing vegetation modification have, for the most part, also restrained plant succession from continuing into higher stages of growth, e.g., herbaceous grasses to shrubland, and/or the latter into forest alliances. While photographic imagery of the area from earlier centuries is not available, the primary source diaries of the Spanish explorers and missionaries in the area during the late eighteenth century describe their observations of the grassland, some of which was burned, and pine vegetation, thus indicating modification of vegetation succession at least two centuries ago and likely for much longer given known habitation of the region by Native Americans. Therefore, restraining or modifying the process of vegetation alliance succession by ranching and farming activities after the beginning of the twentieth century represents a continuum of previous vegetation modification practices.

These primary source aerial images also give clues as to land use changes and perhaps economic shifts through vegetation changes over time, as in the mid-century condition where the Pini Village structures are mostly gone and more shrubland vegetation appears sporadically in the rangeland pastures which in the 1940s were kept to more uniform growth by crop cultivation and grazing. Certain historical human-made features remain throughout the study period, however, such as water reservoirs, unpaved roads and cattle trails, fence lines and paddock borders. The aerial photographs available during the twentieth century have some limitations for identification and evaluation of historical land activity and associated alterations to the environment. For example, the time increments between the aerial photography years are sufficiently long (13 to 19 years) that any variety of specific land modifications, i.e., fence placement, grading, or other vegetation clearing could have occurred in between the photo years to have

manifested the vegetation conditions observed in the historical photos. In this respect the use of these photographs leave openings for additional questions pertaining to a more complete chronology of vegetation conditions and land use activities. Further, photography from aircraft flight levels does not enable confident micro-level plant taxa identification, particularly of herbaceous alliances. Therefore, an evaluation of the proportion of native to non-native vegetation over time would require other tools such as field studies with ground sampling and belt transects. Yet these aerial photographs, in combination with the additional tools and source materials utilized herein such as the historical mapping, are adequate nonetheless to address the historical queries of this study; the photography provides sufficient visual snapshots during the study period to inform the conclusion that the botanical alliances and the gross coverage of each alliance within the Study Area have retained a relative condition of stasis despite undergoing long-term agricultural uses.

5. COMPARATIVE RESEARCH AND CONCLUSIONS

This chapter considers additional scholarship that addresses changes in vegetation over a specific period of time and the historical anthropogenic uses of the land that may inform any changes. This chapter also addresses how the conclusions of this study compare with those of other relevant scholarship in ecological history. Three studies conducted in locales within central and northern California are examined in this regard, and, as discussed in Chapter 1, Introduction, these studies were consulted for their research methods and tools, as well as their findings pertaining to vegetation change.

Through this evaluation I support my argument that the vegetation alliances in the Study Area have remained essentially static since the early twentieth century, that is, neither changing into different stages of plant succession, nor experiencing any substantial shifting of their geospatial footprint, i.e., the borderland edges that transition between habitat types in accordance with the analysis contained in Chapter 4. This thesis departs from scholarship which concludes that anthropogenic influence over the land irreversibly alters pre-contact ecological conditions and diversity of natural resources. While historians of ecological change commonly concur that nature has always been in flux, as have human cultures, an important qualification to the "no stasis" theory is as William Cronon clarifies: "the rate and scale of such change can vary enormously."[203] With regard to the latter, the historical timeframe evaluated for this study of vegetation change and anthropogenic influences on the land is distinctively shorter than those of studies that seek to assess vegetation change from pre- to post-contact; as previously discussed, the historical period evaluated herein is connected to the available primary

[203] Cronon, "The Uses of Environmental History," 14.

source information as evidence for the Study Area's degree of any modification to botanical resources. A much longer view, particularly from the arrival of European and other foreign cultures to the west coast of present-day California, often applied in environmental historiography would undoubtedly yield a much different conclusion. As a more focused query than other studies on this subject, it nonetheless contributes a snapshot of the history of the Ranch and its relation and influence upon the larger ecological and cultural contexts of California immigration and agricultural history.

5.1 Comparative Studies of Vegetation Change

The research conducted for this study finds a robust array of scholarship pertaining to Native American vegetation management practices as well as changes to botanical systems brought by European immigration, settlement and agricultural practices in California. For example, in studies of indigenous landscape management practices and land stewardship in Año Nuevo State Park north of Swanton, Rob Q. Cuthrell and colleagues find evidence substantiating that anthropogenic burning of grasslands by Native Americans kept herbaceous alliances at that stage. According to Cuthrell's studies, without disturbance or disruption to the grassland taxa, whether by fire, grazing or tillage, grasslands will convert to higher stages of succession, namely North Coast Scrub (*Baccharis pilularis* Shrubland alliance), poison oak (*Toxicodendron diversilobum*) and blackberry shrubs (*Rubus ursinus*). Cuthrell finds that conversion from grasslands to shrubland can begin within five to ten years of non-disturbance. A primary conclusion from Cuthrell's case study in Año Nuevo is that repetitive anthropogenic burning will

tend to maintain grassland alliances, in contrast to occasional natural fire events which support the further plant succession stages of shrubland and forest alliances.[204]

Scholarship prior to Cuthrell's lays the foundation of current thinking pertaining to management of natural vegetation types by Indigenous Peoples. Scholar M. Kat Anderson elucidates the ability of Native Americans to maintain a healthy diversity of vegetation types through their activities, particularly burning of vegetation that influenced the size, pattern and genetic composition, among other aspects of vegetation alliances in the ecosystems in which they lived. Per Anderson, burning clears reed-choked marshes and woody vegetation, opens up an area to more light and creates an edge effect in clearings to attract waterfowl and terrestrial wildlife.[205] This concept of burning to maintain a vegetation stage, particularly grasslands but also forests, was also analyzed in the 1950s by Omer C. Stewart, who theorized that fire used by Native Americans was the essential factor in maintaining the grassland stage, and without fire, woody growth of some type takes over. Stewart maintains that Native Americans' burning within forests destroyed underbrush which allows grasses to grow between trees, thereby maintaining balance between the forests and the pasturelands.[206] Stewart finds multiple advantages of burning vegetation for the Native Americans, from improving

[204] Robert Q. Cuthrell, Chuck Striplen, Mark Hylkema, and Kent G. Lightfoot, "A Land of Fire: Anthropogenic Burning on the Central Coast of California," in *Contemporary Issues in California Archaeology*, eds. Terry L. Jones and Jennifer E. Perry (Walnut Creek: Left Coast Press, Inc., 2012), 162, 163, 169.
[205] M. Kat Anderson, Michael G. Barbour, and Valerie Whitworth, "A World of Balance and Plenty: Land, Plants, Animals and Humans in a Pre-European California," *California History* 76, no. 2/3 (Summer-Fall 1997): 34, 35, accessed April 20, 2018, http://www.jstor.org/stable/25161661.
[206] Omar C. Stewart, *Forgotten Fires: Native Americans and the Transient Wilderness*, ed. Henry T. Lewis and M. Kat Anderson (Norman: University of Oklahoma Press, 2002), 69.

pasture for game to hunt, to increasing visibility, obtaining better access to collecting insects, and increasing yields of berries, seeds and other wild foods.[207]

Charles Thomas Carlson evaluates historical land uses and the accompanying vegetation change on the Point Reyes Peninsula, California. The Point Reyes Peninsula, which was designated as a National Seashore in 1962, is located about 35 miles north of San Francisco and encompasses about 100 square miles. Carlson's study investigates changes in land uses and land tenure through the course of human occupation, beginning with the local native Coast Miwok peoples through to the early twenty-first century, and he assesses any correlations to changes in vegetation from anthropogenic activities on the land. Carlson evaluates several case studies to test his historical queries, for example, he looks at the history of the Home Bay Ranch on the Peninsula and the changing occupants and uses of the land over time. Carlson analyzed aerial photography of the area from 1943 and 1995, combined with digitized maps of geology, soils and vegetation and measurements of vegetation alliances in the field.[208]

The historical land use practices and vegetation types in Carlson's study have similarities with those of the Swanton and greater Santa Cruz region. Carlson finds as of the beginning of the twenty-first century that the vegetation of the Point Reyes National Seashore is primarily coastal prairie with coastal sage scrub, salt marsh, conifer forests and woodlands that represent a dynamic and diverse landscape in the middle phases of succession.[209] His research of studies of grazing and fire showed that cessation of grazing

[207] Stewart, *Forgotten Fires*, 311.
[208] Charles Thomas Carlson, "Land Use History and Vegetation Change on the Point Reyes Peninsula, California," 111.
[209] Ibid., 67.

for a period of ten years in the Berkeley Hills enabled regeneration of shrub/sage scrub components, particularly *Baccharis pilularis* (Coyote Brush) and other shrubland species within the grassland. Similarly, Carlson points to a 1977 study of the Sea Ranch area in coastal Sonoma County which finds that within ten years of elimination of grazing on the coastal prairie there that an increase of perennial grass species over annuals was detectable.[210] This historiography shows that allowance of grassland to lay fallow for a decade or more enables succession of vegetation stages and an accompanying increase in diversity of vegetation taxa, e.g., native and non-native species and alliances. This is important historically if there is conclusive evidence of rest or fallow periods in a given area which could inform changes in vegetation succession stages and coverage over time. I found partial historical land use information from the early 1920s forward for the Swanton Study Area, however, and, therefore, a more complete history of livestock and crop cultivation would help uncover the vegetative conditions and stages in between the historical aerial photographs assessed in Chapter 4.[211]

Carlson's research into the effects of fire on vegetation finds that natural and human-caused fire episodes since the time of the occupation of Native Americans and introduction of domestic cattle grazing shaped the patterns and types of vegetation over time. For example, he finds a 1999 study of a Douglas fir forest in a southern portion of the Point Reyes Peninsula which determines that routine burning of brush as a management tool by native people and by ranchers kept the vegetation in the grassland

[210] Carlson, "Land Use History and Vegetation Change on the Point Reyes Peninsula, California," 4.
[211] Research into chronological land ownership and tenure information would be found in the County of Santa Cruz title and tax records. This research was not conducted for this thesis due to the intensive time requirement of that task alone and given the various other historical information topics researched herein. Ownership and tenure information for the Study Area and environs would be of significant benefit in historicizing land uses and their attendant effects on vegetation alliances.

stage of succession and that the reduction of regular burning post-contact would likely contribute to eventual progression into the forest stage.[212]

Carlson references a 1982 study that uses core samples of pollen to better understand vegetation history of the Point Reyes area.[213] The study concludes that after European settlement, there were increased amounts of *Quercus* (oaks) and *Pinus* (pines) pollen likely caused by livestock grazing. By contrast, pollen evidence from the thirteenth century (pre-contact) shows a mosaic of coastal prairie (grassland herbaceous alliances) and northern coastal scrub (*Baccharis pilularis* Shrubland), with Douglas fir forest restricted to the hills.[214] Similarly, in research for this thesis of Swanton Pacific Ranch, there is comparable scientific data from G. James West who studies the role of the Spanish settlements (missions, pueblos and presidios) in modifying rangeland vegetation.[215] West concludes the fossil records provide evidence of exotic (introduced) plant taxa in the region then referred to as Alta California brought in by European livestock and the adobe bricks the Spanish made for settlement buildings. The success of non-native taxa, according to West, brought about not only cultural changes, but ecological modifications, particularly the introduction of weedy species that have had long-term effects on native vegetation, such as significant increases in introduced

[212] Carlson, "Land Use History and Vegetation Change on the Point Reyes Peninsula, California," 4.
[213] Pollen core sampling involves scientists taking samples of sediment layers from the bottoms of lakes, ponds and oceans, and isolating the pollen spores from the soil sediment and rocks through chemical and physical means. Pollen grains have unique shapes, enabling identification of plant species that were historically growing in the area sampled. Department of Commerce, National Oceanic and Atmospheric Administration, National Centers for Environmental Information, "Picture Climate: How Pollen Tells Us About Climate," accessed April 25, 2019, https://www.ncdc.noaa.gov/new/picture-climate-how-pollen-tells-us-about-climate.
[214] Carlson, "Land Use History and Vegetation Change on the Point Reyes Peninsula, California," 5.
[215] G. James West is not the same person as botanist Jim A. West cited elsewhere in this study.

herbaceous taxa replacing native taxa, and doubling sedimentation rates in estuaries.[216] The Study Area on Swanton Pacific Ranch also demonstrates this condition, having certain areas with a higher proportion of non-native vegetation taxa to natives, and others that have mixed native and non-native taxa, primarily those areas that have undergone long-term grazing and previous cultivation as shown in Figure 3-15 in Chapter 3.

As part of Carlson's investigation he dispels the historiographical theory of "pristine myth" which espoused that vegetation was in a more natural or unaltered state prior to European settlement into the Americans, implying that Native Americans did not alter their landscape and the vegetation within it. Carlson maintains that there is considerable evidence of burning of brushlands on the Point Reyes Peninsula by the Miwok to maintain the grassland stage of succession for attraction of game animals and seed grains.[217] That finding is also consistent with William Cronon's seminal work of ecological history of New England, *Changes in the Land*, wherein Cronon argues against the notion of a "virgin" pre-contact landscape (prior to arrival of Europeans in North America). When evaluating changes in ecological landscapes, Cronon says we must ask, "Changed in relation to what?" [218] In other words, consideration must be given to what is the environmental baseline to which we assess/compare changes to natural resources such as vegetation alliances from human activities or natural events, and that baseline is ever-changing. As discussed in Chapter 2, in the vicinity of present-day Swanton Pacific Ranch we have evidence of burned vegetation as documented in the diaries of Fray Juan

[216] G. James West, "Early Historic Vegetation Change in Alta California: The Fossil Evidence," in *Columbia Consequences, Volume 1, Archaeological and Historical Perspectives on the Spanish Borderlands West*, ed. David Hurst Thomas (Washington D.C.: Smithsonian Institution Press, 1989), 342, 343.
[217] Carlson, "Land Use History and Vegetation Change on the Point Reyes Peninsula, California," 12.
[218] William Cronon, *Changes in the Land*, 10, 12, 13.

Crespí who traveled up the coast in Gaspar de Portolá's expedition in the second half of the eighteenth century.

Carlson posits that the largest influence upon landscape change in the Point Reyes Peninsula was likely from the Mexican rancheros in the nineteenth century as they constructed buildings using forest resources, and grazed thousands of head of livestock.[219] The land use pattern at Point Reyes in the early twentieth century is similar to a portion of the history of Swanton with dairy uses from the mid-nineteenth century until the mid-1940s and livestock ranching into the 1960s. Thereafter, the two areas diverge in that at Point Reyes the federal government through the National Park Service began operating Point Reyes National Seashore as a public resource, and thus, livestock grazing and other anthropogenic land modifications ceased. Carlson concludes that the reduction of livestock grazing and overall human land modifications within the National Seashore boundary has led to increased diversity of vegetation and in overall habitat patch size, benefiting wildlife that need larger patches for cover and forage.[220] Specifically, he finds the succession of vegetation alliances has resumed with the coastal scrub community (Coyote Brush Shrubland alliance) having expanded into the coastal prairie as well as taking over former cultivated fields.[221]

The Western Terrace rangeland of Swanton Pacific Ranch has been continually utilized for cattle production from at least the early twentieth century (and likely the early nineteenth century) to the present day with Cal Poly's holistic grazing program. Vegetable crop cultivation may also have been continued on or around the Study Area at

[219] Carlson, "Land Use History and Vegetation Change on the Point Reyes Peninsula, California," 4.
[220] Ibid., 86.
[221] Ibid., 111.

least until late into the twentieth century. Based on the historical information researched for the Swanton Study Area, there have been periods of rest for the grassland/herbaceous alliances on the rangeland and periods when the cultivation grounds were left fallow or abandoned, such as after the Pini and other Italian immigrant farmers left the Western Terrace in the 1940s. As discussed in Chapter 4, the additional growth observed in the vegetation conditions shown in the 1956 historical aerial photograph may indicate the potential for additional or longer periods of rest than when the vegetation is more uniformly cropped as typically seen with continuous grazing. Therefore, the Swanton Study Area differs from Carlson's subject area in that the former has not experienced a nearly complete cessation of livestock grazing as Point Reyes Peninsula has undergone after becoming a federally-protected public resource area. As such, the vegetation diversity at the Swanton Study Area over the twentieth century is mixed, with some areas rich with native plant taxa and others more predominant with non-native taxa.

Another historical examination of vegetation change and land use history is provided by Randall Steven Rossi, who seeks to address changes to native oak woodland and savanna in the Central Coast range of California and to what degree human activities may have resulted in landscape changes over the past two centuries. Rossi follows the history of human land uses in the upper Salinas Valley following Spanish contact, quantifying the cumulative effects of land clearing, agriculture, livestock grazing and other anthropogenic activities.[222] Rossi used some similar tools and methods to those utilized for this thesis to inform about historic vegetation, including land grant surveys of the mid-1800s, a diseño map of Mission San Miguel, c. 1850, and the vegetation mapping

[222] Randall Steven Rossi, "Land Use and Vegetation Change in the Oak Woodland-Savanna of Northern San Luis Obispo County," 125.

of northern San Luis Obispo County prepared by the Wieslander Veg Type Mapping project in 1936.[223] Also similar to this study of Swanton Pacific Ranch, Rossi utilized historical aerial photographs to compare conditions over time of oak woodlands in his study area. He prepared land use maps from the photographic imagery, and conducted field surveys to verify boundaries, vegetation types and other factors. He researched written documentation and conducted oral interviews to document original dates of vegetation clearing.[224]

Similar to Carlson, Rossi's dissertation researches vegetation change in his study area starting from the post-contact period. Rossi finds that grazing by European-introduced livestock contributed in multiple ways to the eventual significant reduction of oak woodland and savanna, including extended over-grazing by high densities of cattle and sheep, and introduction of Mediterranean plant taxa carried in by livestock which created competition for oak seedling success and facilitated replacement of native bunchgrasses. According to Rossi, quantities of livestock increased significantly after the missions were secularized and mission properties were taken over by private ranchos in the early nineteenth century.[225] In addition to livestock grazing of vegetation, he also concludes that clearing of native oak woodlands for creation of crop fields, orchards, as well as suburban development were also primary causes of woodland reduction.[226] Further, cattle and sheep consumed acorns as well as many seedling oaks particularly in the vicinity of the mission lands, according to Rossi. Oak seedlings were also used as

[223] Rossi, "Land Use and Vegetation Change in the Oak Woodland-Savanna of Northern San Luis Obispo County," 92, 99, 112.
[224] Ibid., 247.
[225] Ibid., 31, 32.
[226] Ibid., 37, 40, 81.

fodder for cattle and swine, sometimes in lieu of grain, as done, for example, at Mission San Antonio. [227]

Rossi also finds several other factors that caused stress and reduced oak reproduction during the nineteenth century, including cutting of Red Oak and Coast Live Oak trees for fuel and production of charcoal, and the use of chemical poisoning of ground squirrels and other crop and livestock pests which caused oak acorn and seedling mortality. He also determines that fire suppression policies of the U.S. Forest Service and local forestry agencies during the twentieth century further impacted oak woodland and savanna alliances as accumulation of plant material on woodland floors then fueled higher-intensity fires. The eventual elimination of frequent low-intensity burns that had been traditionally conducted by local Native American tribal bands enabled succession of grasslands to highly flammable chaparral/shrubland alliances and conifers, according to Rossi.[228]

Rossi's quantitative analysis concludes that these anthropogenic activities have caused ranges of several species of oak to be significantly reduced over time. Specifically, he finds the Valley Oak alliance (*Quercus lobata*) to be reduced by half in northern San Luis Obispo County and 70% in his study area (a loss of 35,000 acres), and blue oak (*Quercus douglasii*) range reduced by 30% in the northern portion of the County and 40% in his study area.[229] Rossi concludes that the loss of oak woodland alliances in northern San Luis Obispo county has affected both the human values of the benefits of oak vegetation such as aesthetic beauty, shade, real estate value, and the ecological values

[227] Rossi, "Land Use and Vegetation Change in the Oak Woodland-Savanna of Northern San Luis Obispo County," 28, 29, 40.
[228] Ibid., 28-46.
[229] Ibid., 313, 314.

which he posits are diverse and numerous.[230] Thus, Rossi considers the loss of oak woodland and savanna to human activities and land uses in this region as irreversibly fragmenting the unique character of many oak communities, and impoverishing the California rural landscape. Notably, Rossi comments that over large areas the reduction in oak woodland habitat may reduce the savannas to "simple grassland," a change from woodland to herbaceous vegetation types, or reversing succession.[231]

As Rossi seeks to delineate the specific changes to oak woodland and savanna since earliest human occupation of the northern San Luis Obispo area, he queries: "were there trees on the valley floor in its natural state?"[232] The theory of a particular environment having a "natural" state could be interpreted to mean prior to or without human interaction or influence, or that natural conditions do not change without human impact. That interpretation counters the position of numerous ecological historians. William Cronon, for example, says that forests have been transformed by disease, fire and drought, species have extinguished and landscapes have dramatically altered by climate change "without any human intervention at all."[233] Similarly, in author Jared Farmer's history of four types of trees in California, he distinguishes between historic and geologic time in terms of the Coast Redwood population statewide. Farmer posits that in the historic (post-human arrival) timeframe the Coast Redwood population is doing well

[230] At the time of publication of Rossi's dissertation in 1979, the California Environmental Quality Act (CEQA) statute (Public Resources Code 21000-21189) and the CEQA Guidelines (California Code of Regulations, Title 14, Division 6, Chapter 3, Sections 15000-15387) had been established for less than a decade. Regulatory requirements for assessment and mitigation of impacted oak woodland from planned development, infrastructure and other discretionary projects were subsequently incorporated into the statute's regulations (Public Resources Code 21083.4) for land use planning and development proposal review processes.
[231] Rossi, "Land Use and Vegetation Change in the Oak Woodland Savanna of Northern San Luis Obispo County," 318, 321.
[232] Ibid., 80.
[233] Cronon, *Changes in the Land*, 10, 11.

now with over one million acres of redwood forest land in California. However, he clarifies that the idea of "wild" and "natural," i.e., free of human influence, may yet dissipate. Farmer says that in past millennia the redwood belt always contained patches of tall growth, but the distribution of mature stands has constantly changed as flooding, fire, disease and succession changed forest composition.[234]

My investigation into vegetation change on Swanton Pacific Ranch does not attempt to answer hypotheses about the vegetative types and their changing conditions prior to or at the time of earliest human use of the land. Rather, I focus on changes in vegetation that coincide with the primary source evidence of earliest available historical aerial photography of the Study Area, beginning in the late 1920s, in order to inform and substantiate conclusions for that historical time period. Vegetation conditions during European exploration and settlement of the North Coast-Santa Cruz area are described in Chapters 2 and 3, referencing early primary source mapping and explorers' observations of the Swanton region.

Similar to Carlson and Rossi, John Lyman Vankat's dissertation on Sequoia National Park, California aims to determine in which ways and why the vegetation types in the park have changed since the arrival of European and early California settlers (what Vankat refers to as "early western man") in the area in the 1850s. Also similar to Carlson and Rossi, Vankat attributes the most critical influence on vegetation conditions over time to changes in anthropogenic land uses post-contact. Vankat historicizes three general periods of changing land uses and the attendant effects on vegetation in the Sequoia region beginning with occupation by Native Americans, followed by "early Western

[234] Jared Farmer**,** *Trees in Paradise: A California History* (New York: W.W. Norton & Co, 2013), 105.

man," and lastly, the U.S. government as the area came under the jurisdiction of the National Park Service.[235] Vankat's methods include conducting an evaluation of the present state of vegetation alliances within the park, using belt transects and stand surveys from which he estimates cover values (the geospatial area covered by specific vegetation types, e.g., forest, shrubland, herbaceous alliances). Vegetation change was assessed by making observations on more than 300 scenes from historical photographs, determining the age structure of vegetation stands by correlating class size distributions (trees selected by the quarter method of Cottam & Curtis, 1956), and age determinations by increment borers.[236]

Vankat considers the management practices of the land by the Western Mono Native American culture, specifically, their burning of the vegetation as part of his investigation into the land use history of the area. One of his sources interviewed the few remaining descendants of Native American tribes in the southern Sierra Nevada and reported that the tribes in the Sequoia National Park region used fire on a wide-scale basis to drive game into hunting areas and to maintain wild food crops. In addition, Vankat addresses scholarship on the Miwok of the central Sierra Nevada from which he interprets the roles of lightning and Indian-induced fires and the frequencies and effects of those two causes of vegetation change. He theorizes that the Native Americans living within the park region were relatively unaffected by and unconnected with the Spanish explorers of the latter eighteenth century and the subsequent western migration of

[235] John Lyman Vankat, "Vegetation Change in Sequoia National Park, California," 1, 5. Vankat's use of the term "Early Western man" is interpreted to mean European and other immigrant settlers who migrated into California during or prior to the nineteenth century.
[236] Ibid., 52, 53.

European and other early immigrant explorers and settlers into California, until around 1860 when several homesteads were established on the Kaweah River.[237]

Vankat concluded that the vegetation in Sequoia National Park changed more profoundly after European and other early California settlers came into the area in the mid-nineteenth century and began to implement different land use practices, specifically grazing of cattle and sheep beginning around 1860. Subsequently, further impacts to vegetation resulted from the transition of the area into the National Park system beginning in 1890 as policies pertaining to fire-suppression and cessation of sheep grazing were implemented. While the transition of Sequoia into public parkland is similar to the historical transitions of the Point Reyes Peninsula studied by Carlson several decades after Vankat's dissertation, a distinction lies in Carlson's conclusion of vegetation diversity; Vankat does not make that determination for the vegetation in Sequoia. Vankat determines that the Indigenous Peoples had occupied the lower and mid-level elevation areas of the region and their most significant impact on vegetation, regular vegetation burning for management of grasslands, was essentially eliminated within two decades after the arrival of European and other new settlers.[238] As a result, mature forest vegetation was subjected to an increased amount of mortality from infrequent high-intensity fire episodes.

In addition to evaluating changes in the cultural land use contexts affecting vegetation in the Sequoia region, Vankat also discusses the devastating demographic impacts to the central and southern Sierran Indigenous Peoples from exposure to foreign

[237] Vankat, "Vegetation Change in Sequoia National Park, California," 7, 8.
[238] Ibid., 94-96.

pathogens such as small pox, scarlet fever and measles from contact with European-Americans after about 1860. This biological impact reduced the populations of Native Americans which in turn reduced their practices of vegetation management such as regular burnings to maintain grasslands, while the population of new California settlers and their ranching activities expanded, according to Vankat.[239] The subject of the biological impacts upon Native Americans from European expansion into the Americas was effectively analyzed by ecological historian Alfred Crosby in his now well-recognized theme of "the Columbian Exchange" which was first published two years after Vankat's thesis.[240]

Rossi and Vankat both use the term "pristine" in reference to the state of vegetation before human intervention on the land. For example, Vankat states that land use by Indians is one of the factors that determine the "pristine state" of the vegetation.[241] I concur, however, with Cronon's overarching theory that dispels the notion of the "pristine myth," as Carlson acknowledges in his study discussed above. Perhaps the notion of a "natural" or "pristine" condition of the botanical resources as referenced by Rossi and Vankat is essentially a matter of language characterization in their dissertations prepared in the 1970s. Regardless, the Swanton Pacific Ranch Study Area has been part of the landscape of the California Central Coast region which has undergone fairly steady anthropogenic uses, from the native Ohlone/Amah Mutsun tribal band and their burning of the vegetation to maintain grasslands as observed and documented by early Spanish explorer Fray Crespí, to Spanish and Mexican livestock ranching, crop cultivation by

[239] Vankat, "Vegetation Change in Sequoia National Park, California," 10.
[240] Alfred W. Crosby, *The Columbian Exchange: Biological and Cultural Consequences of 1492*, 30th Anniversary Edition (Westport: Praeger Publishers, 2003).
[241] Vankat, "Vegetation Change in Sequoia National Park, California," 5.

immigrant farmers, and modern livestock and crop cultivation activities. As William Cronon maintains, wilderness has never existed in a pristine, i.e., unmodified state.

In summary, Carlson finds improved diversity of vegetation through expansion of geospatial coverage and succession into other vegetation stages in his study of Point Reyes National Seashore after cessation of livestock grazing and regular burning practices. Rossi and Vankat find significant fragmentation and disruption to vegetation alliances from agricultural uses including livestock grazing, clearing of vegetation for crop fields and orchards and development in their study areas. The Swanton Pacific Ranch Study Area vegetation alliances have been exposed to similar historical land uses as these referenced studies, from Native American burning to maintain grassland stages, to European and then California settler land uses of livestock grazing and farming. However, unlike the Carlson and Vankat subject areas, the Swanton Study Area is in continued use as livestock range as part of an educational property under a planned sustainable grazing program and not within a public park or open space area. In addition, the Study Area differs from these other models of vegetation change in that those areas had forest alliances that were logged, whereas in the 110-acre Study Area within SPR there are no substantive stands of mature trees that would have been harvested.

In order to conclude whether or not the vegetation in the Study Area has been irreversibly or otherwise substantially altered by the uses of the land and its resources since the early twentieth century, evidence of botanical conditions during the nineteenth century or earlier would be needed. For example, the specific proportion of native to non-native vegetation taxa utilizing and tools such as photography and quantitative data on vegetation would enable comparison with available botanical documentation of recent

conditions. This thesis presents a somewhat different historical context than the other three studies as the focus herein is on a shorter historical timeframe to correlate with specific primary source evidence of aerial photography. Further, the types of uses of the land in the Study Area during the study period examined herein have been relatively consistent with the agricultural and livestock production that began with the Spanish missionaries. As such, changes in the vegetation from anthropogenic uses of the land are more subtle at least at the macro level than studies that consider the changes resulting from the substantially different ways of using the land and its resources that occurred with European settlement.

5.2 Conclusions

As I conclude in Chapter 4, examination and comparison of the imagery within the four historical aerial photographs as well as observations of present-day conditions indicate that the vegetation alliances and their respective geospatial cover areas and habitat boundaries within the Study Area appear not to have changed substantially since the 1920s. I argue, therefore, that the primary vegetation alliances in the Study Area have remained relatively stable at the macro level since at least the early twentieth century and that this stability has persisted despite long-term agricultural activities that have modified the majority of the vegetation therein to varying degrees through grazing and cultivation, plowing and disking and construction of ranch buildings and infrastructure. There have been alterations of small portions of the Study Area over the course of the historical timeframe, e.g., portions of grassland and shrubland vegetation distinctly modified or left to grow more than other portions, particularly at mid-century. While there have been and still are a small number of individual structures and supporting infrastructure for

agricultural land uses, these conditions and elements have not demonstrably changed vegetation types or caused or influenced succession of vegetation alliances, i.e., grassland/herbaceous to shrubland, or shrubland to forest, or in reverse. A closely detailed investigation of vegetation change, i.e., at the species level, would, however, entail a different set of queries and methods to examine the proportions of native to non-native or introduced plant species in the Study Area. As such, a history of botanical change utilizing this approach, and/or examining a longer historical period could yield notably different conclusions to those of this study in concurrence with ecological scholarship discussed herein that concludes the dynamic states of environmental systems.

A relatively low level of land use intensity (including crop production, dairy and beef cattle grazing) may likely be a key factor in the vegetation types on Western Terrace area of Swanton Pacific Ranch not having been significantly changed during the particular time frame considered herein. For purposes of this analysis, a relatively intensive level of use is considered to be large scale commercial farming or livestock operations, with, for example, high animal density or large acreage under crop production with few periods of rest. The rangeland herbaceous alliances that have been grazed and continue to be grazed, and the herbaceous and shrubland areas that have undergone crop cultivation do not appear to have been under substantially intensive levels of those uses as evidenced by the presence of some native plant taxa in portions of these areas. In addition, the Italian immigrant farming activities on the Swanton Study Area were small family operations, supporting my theory of low intensity use. This condition of relative vegetation alliance stasis, then, diverges from scholarship that has concluded irreversible ecological changes generated by substantial alterations in anthropogenic uses of the land

since European contact and immigrant settlement in California, such as concluded by Vankat and Rossi, and scholar Elinor Melville. Melville, as discussed in Chapter 4, evaluated the irreversible transformation of ecological systems in the Valle del Mezquital, Mexico from overgrazing by sheep introduced there by Spanish ranchers in the sixteenth century.[242] As indicated in Chapter 3, there is recent documented evidence of successful growth of some native species in the vegetation alliances within and around the Swanton Study Area, particularly on the steeper west-facing slopes of the Cowboy Shack Gulch, and successful populations of rare and uncommon plant species in the portion of the Gulch above the Hay Barn.[243] However, without survey data or other evidence of the taxa in the Study Area prior to the twentieth century, it cannot be reasonably ascertained whether endemic species have survived through the continuous anthropogenic disturbances, thereby demonstrating a degree of resilience, or what specific factors assisted the present native taxa to persist or successfully generate in the area.

In answering my query of whether the results of this study of vegetation change on Swanton Pacific Ranch are consistent with other areas in California I find that the Swanton Study Area differs from the conditions in the areas in California that Vankat and Carlson examine, Sequoia and Point Reyes Peninsula, respectively, because for the historical period examined herein, the vegetation alliances within the Swanton Study Area have remained essentially static in type and coverage while undergoing fairly continuous agricultural uses to the present day. By contrast, Sequoia and Point Reyes Peninsula had settlement pressures subside after being transitioned into public

[242] Elinor G. K. Melville, *A Plague of Sheep*,13, 16.
[243] Jim A. West, e-mail communication to author, March 30, 2019.

preservation lands as parks. Rossi's study of oak woodland and savanna alliances in Northern San Luis Obispo County also results in a different conclusion than that for the Swanton Study Area, with significant loss of oak vegetation from incremental agricultural and suburban development since post-European settlement. Although the Swanton Study Area and these other study models of vegetation change share similar anthropogenic activities that have modified vegetation over time, such as burning of vegetation by Indigenous Peoples to modify vegetation succession, the circumstances of these study locations vary regarding land use transitions. I find that the relatively low levels of human population pressure and low-intensity agricultural usage with likely periods of rest or fallow conditions, and the transition of Swanton Pacific Ranch from private ranching uses to a permanent educational property for agricultural studies has further contributed to the stability of botanical resources and lack of succession to different stages in the Study Area since the early twentieth century.

As the Study Area is paradigmatic of the biotic diversity of the Swanton Pacific Ranch in its entirety with areas of thriving native plant taxa, this diversity is remarkable in consideration of the historical and current anthropogenic uses which the land has undergone. Swanton Pacific Ranch thus represents a collective resource warranting continued inquiries into its interwoven ecological, cultural and socioeconomic histories, not only pursuant to the goals and objectives of Cal Poly's *Swanton Pacific Ranch Management Plan*, but also as a landscape of regional and statewide importance.

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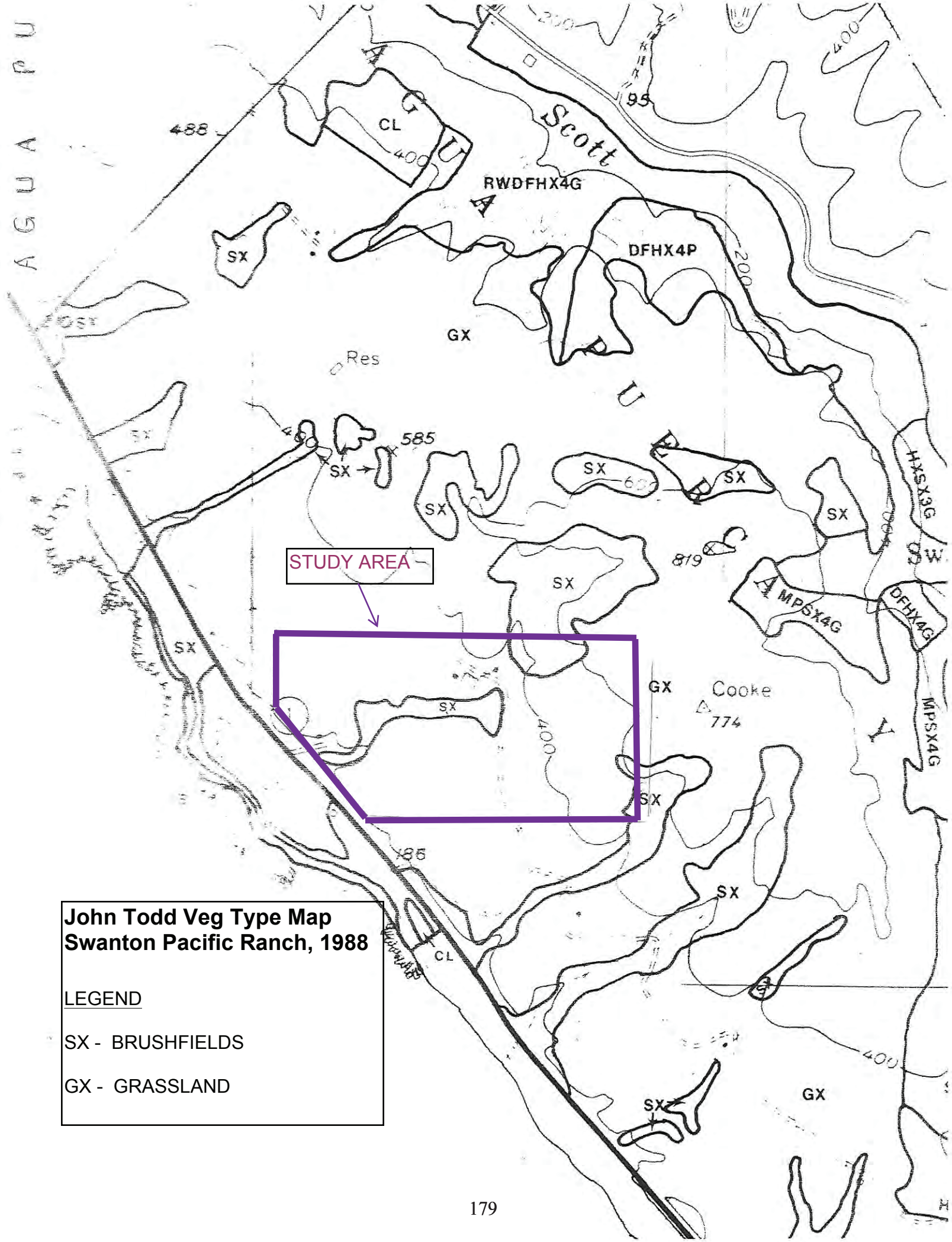
APPENDICES

APPENDIX A

VEGETATION TYPE MAPPING OF SWANTON PACIFIC RANCH, JOHN TODD (1988)



John Todd Veg Type Map
Swanton Pacific Ranch, 1988

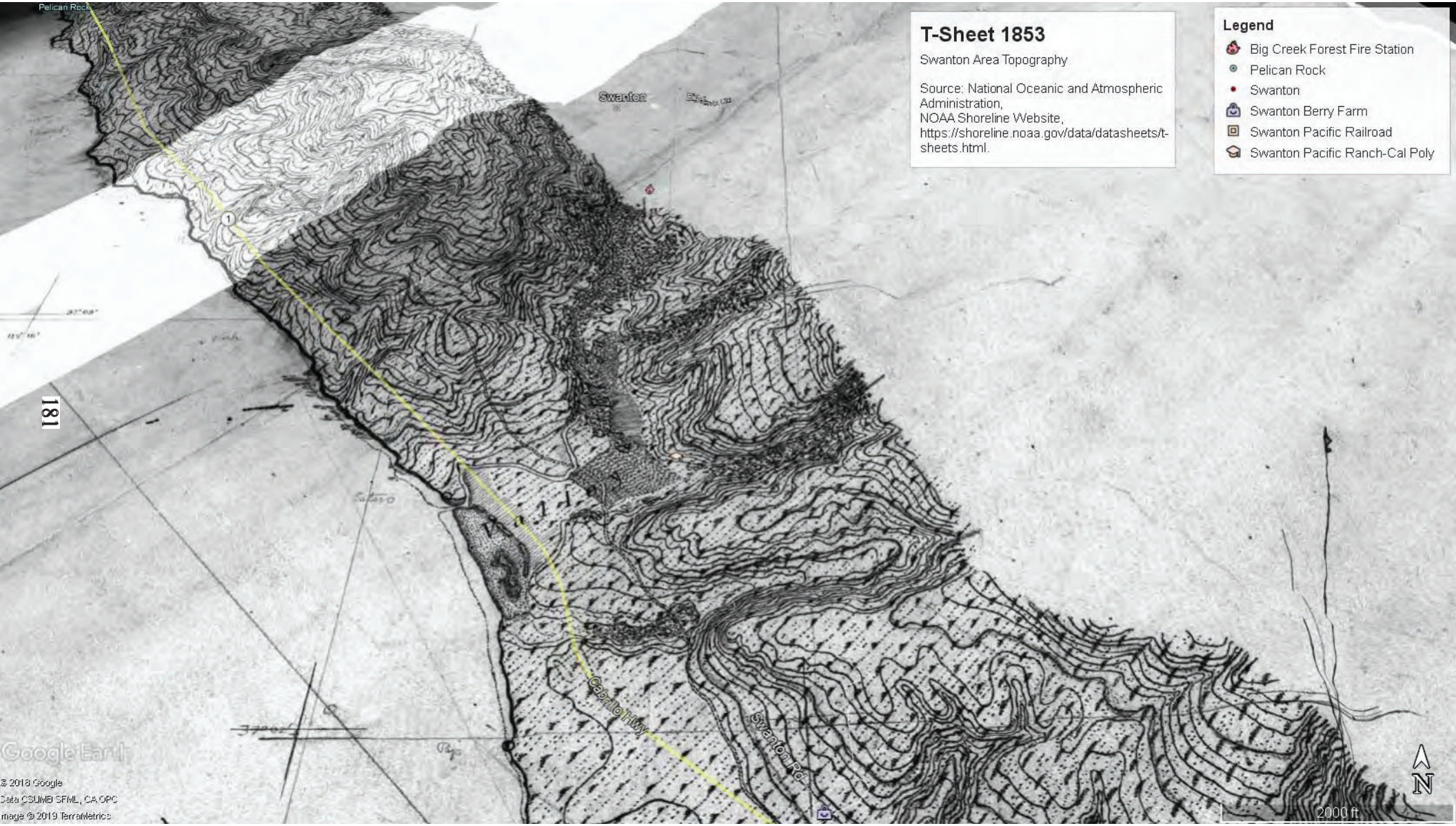
LEGEND

SX - BRUSHFIELDS

GX - GRASSLAND

APPENDIX B

T-SHEET SWANTON



T-Sheet 1853

Swanton Area Topography

Source: National Oceanic and Atmospheric Administration,
NOAA Shoreline Website,
https://shoreline.noaa.gov/data/datasheets/t-sheets.html.

Legend

- Big Creek Forest Fire Station
- Pelican Rock
- Swanton
- Swanton Berry Farm
- Swanton Pacific Railroad
- Swanton Pacific Ranch-Cal Poly

APPENDIX C

TABLE C-1: RARE PLANT TAXA ON SWANTON PACIFIC RANCH

Table C-1. Rare Plant Species within Swanton Pacific Ranch

	Common Name or General Description	In Study Area
***Agrostis blasdalei* 1B2**	Bent grass genus	Yes
Amsinckia lunaris 1B2	Fiddleneck	Yes
***Arctostaphylos glutinosa* 1B2**	Manzanita	
Berberis pinnata, subsp. pinnata	Barberry:perennial, spiny or unarmed shrubs	Yes
Bowlesia incana	slender branching annuals	Yes
Clarkia aff. davyi	annuals with slender to stoutish stems	Yes
Collinsia multicolor 1B2	annuals (multicolor sp not found)	Yes
Elymus californicus 4.3	rye grass	
Erysimum fransiscanum 4.2	Wallflower, short-lived perennials	
Hosackia gracilis 4.2	under *Lotus formossisius*, Bird's Foot Trefoil	
Liguisticum apiifolium	Lovage - erect perennials from fibrous root-crown	Yes
Micropus amphibolus 4.3	under *Stylocline,* low woolly annuals	
Microseris paludosa 1B2	annual to peren.herbs	
Perideridia gairdneri spp. Gairdneri 4.2	erect, branching herbs from a tuberous root, impt to Indians**;** Squaw Root	
Pinus radiata 1B1	Monterey Pine	Yes
Piperia michaelii 4.2	under genus Habenaria, Rein Orchid	
Plagiobothrys chorisianus var chorisianus 1B2	Herbs	
Plagiobothrys diffusus 1B1	Herbs	
Rumex occidentalis	Dock, Sorrel: annual or mostly perennial herbs with simple or branched grooved stems; numerous mostly greenish crowded flowers, whorled; marshy land, rare in California	Yes
Sanicula hoffmanii 4.3	Snakefoot genus**;** perennial, nearly naked or few-leaved stems	
***Silene verecunda ssp verecunda* 1B2**	Catchfly/Campion; herbs, annual or perennial	

Table C-1 Cont'd:	**Common Name or General Description**	**In Study Area**
***Stebinocerous decipiens* 1B2**		Yes
Thysanocarpus laciniatus	Lace Pod/Fringe Pod; slender simple or branched annuals	Yes
Trifolium wormskioldii	Perennial w/out hairs, creeping rootstocks, in wet places below 10,000 ft; cismontane and montane California	Yes
Trifolium buckwestiorum 1B1	Clover (herbs,) mostly palmately trifoliolate	

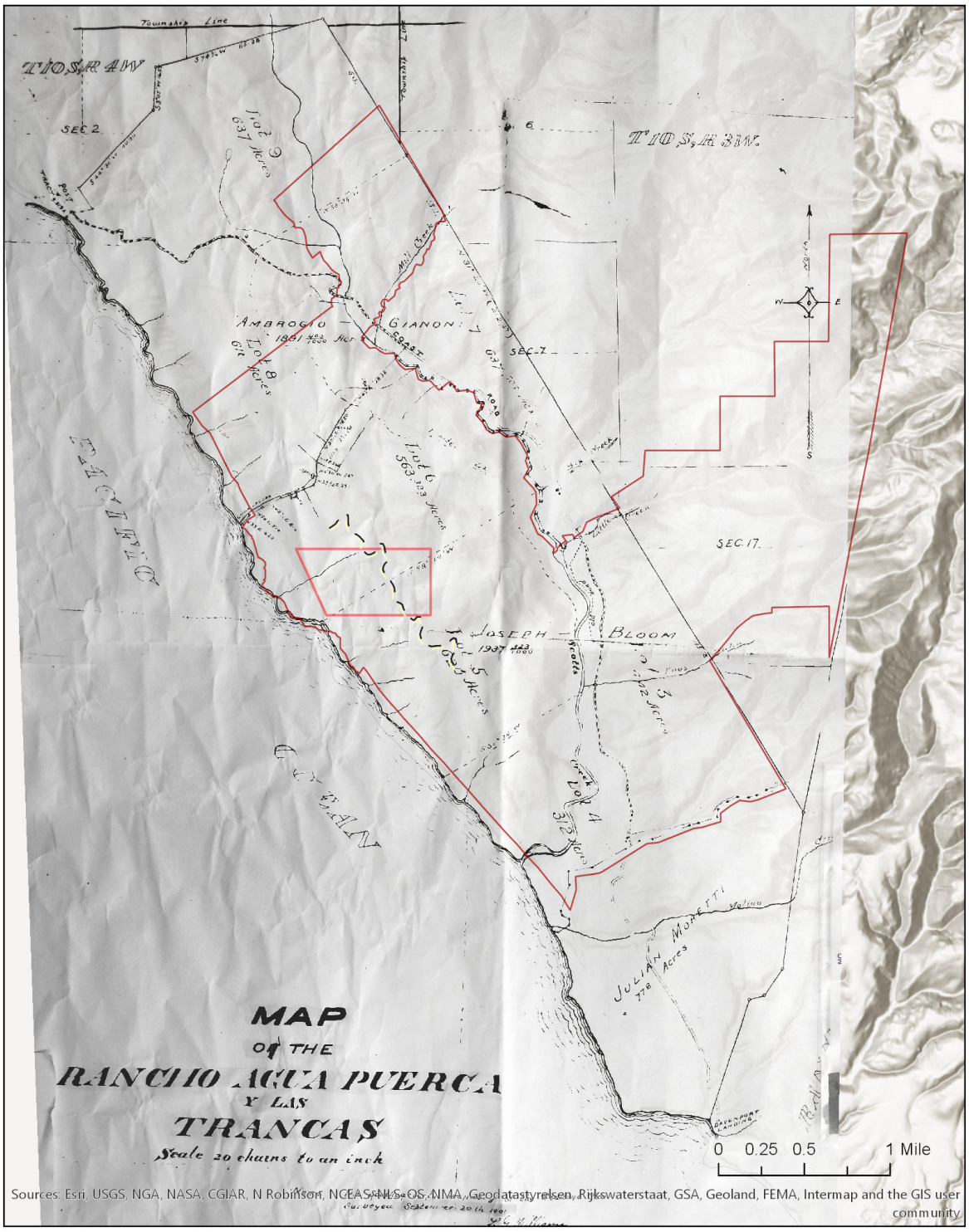
Bolded species have been mapped in the California Natural Diversity Database.

List data courtesy of Reed Kenny, Master's thesis in progress, e-mail communications with author, January 23, 29, and February 14, 2019 and Jim A. West, e-mail communication to author, January 23, 2019.

Botanical reference consulted: Philip A. Munz and David D. Keck, 1973, *A California Flora and Supplement* (Berkeley: University of California Press, 1973).

APPENDIX D

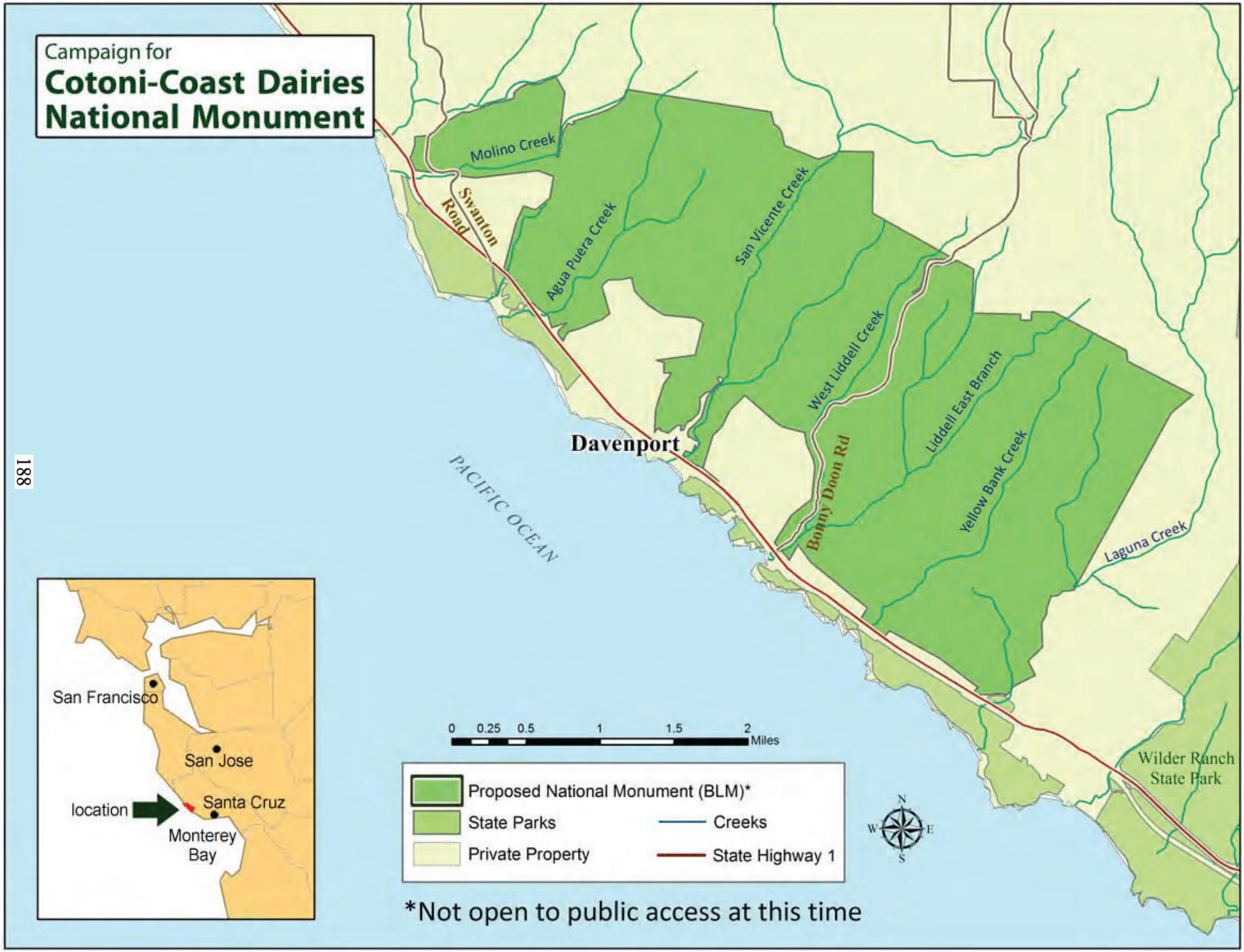
MAP OF RANCHO AGUA PUERCA Y LAS TRANCAS, ca. 1901



Appendix D: Rancho Agua Puerca y Las Trancas Map Showing Lot Ownership, ca. 1901. Enlargement of Figure 4-1 showing full Rancho boundaries.

APPENDIX E

MAP OF COTONI- COAST DAIRIES NATIONAL MONUMENT
AND STATE PARKS


Campaign for
Cotoni-Coast Dairies
National Monument
Molino Creek
Swanton Road
Agua Puera Creek
San Vicente Creek
West Liddell Creek
Liddell East Branch
Yellow Bank Creek
Laguna Creek
Bonny Doon Rd
Davenport
PACIFIC OCEAN
Wilder Ranch State Park
San Francisco
San Jose
location
Santa Cruz
Monterey Bay
0 0.25 0.5 1 1.5 2
Miles
Proposed National Monument (BLM)*
State Parks
Private Property
Creeks
State Highway 1
N
W
E
S
*Not open to public access at this time

APPENDIX F

USDA AGRICULTURAL CENSUS QUICKSTATS SELECTED DATA FOR SANTA CRUZ COUNTY, 1946, 1950, 1956, 1960, 1970, 1975, 1980, 1990, 2000

Program	Year	Period	Week Ending	Geo Level	State	State ANSI	Ag District	Ag District Code	County	County ANSI	Zip Code	Region	watershed_code	Watershed	Commodity	Data Item	Domain	Domain Category	Value	CV (%)
SURVEY	2000	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		OATS	OATS - ACRES PLANTED	TOTAL	NOT SPECIFIED	700	
SURVEY	2000	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		OATS	OATS - YIELD, MEASURED IN BU / ACRE	TOTAL	NOT SPECIFIED	0	
SURVEY	2000	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		OATS	OATS, NON-IRRIGATED - ACRES PLANTED	TOTAL	NOT SPECIFIED	700	
SURVEY	2000	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		OATS	OATS, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	NOT SPECIFIED	0	
SURVEY	1990	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		MILK	MILK - PRODUCTION, MEASURED IN LB	TOTAL	NOT SPECIFIED	10,523,000	
SURVEY	1990	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		OATS	OATS - ACRES PLANTED	TOTAL	NOT SPECIFIED	1,000	
SURVEY	1980	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		MILK	MILK - PRODUCTION, MEASURED IN LB	TOTAL	NOT SPECIFIED	8,386,000	
SURVEY	1980	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		OATS	OATS - ACRES PLANTED	TOTAL	NOT SPECIFIED	600	
SURVEY	1975	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY - ACRES HARVESTED	TOTAL	NOT SPECIFIED	100	
SURVEY	1975	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY - ACRES PLANTED	TOTAL	NOT SPECIFIED	200	
SURVEY	1975	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY - PRODUCTION, MEASURED IN BU	TOTAL	NOT SPECIFIED	4,000	
SURVEY	1975	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY - YIELD, MEASURED IN BU / ACRE	TOTAL	NOT SPECIFIED	40	
SURVEY	1975	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY - YIELD, MEASURED IN BU / NET PLANTED ACRE	TOTAL	NOT SPECIFIED	20	
SURVEY	1975	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY, NON-IRRIGATED - ACRES HARVESTED	TOTAL	NOT SPECIFIED	100	
SURVEY	1975	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY, NON-IRRIGATED - ACRES PLANTED	TOTAL	NOT SPECIFIED	200	
SURVEY	1975	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY, NON-IRRIGATED - PRODUCTION, MEASURED IN BU	TOTAL	NOT SPECIFIED	4,000	
SURVEY	1975	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	NOT SPECIFIED	40	
SURVEY	1975	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY, NON-IRRIGATED - YIELD, MEASURED IN BU / NET PLANTED ACRE	TOTAL	NOT SPECIFIED	20	
SURVEY	1975	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY, NON-IRRIGATED, CONTINUOUS CROP - ACRES HARVESTED	TOTAL	NOT SPECIFIED	100	
SURVEY	1975	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY, NON-IRRIGATED, CONTINUOUS CROP - ACRES PLANTED	TOTAL	NOT SPECIFIED	200	
SURVEY	1975	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY, NON-IRRIGATED, CONTINUOUS CROP - PRODUCTION, MEASURED IN BU	TOTAL	NOT SPECIFIED	4,000	
SURVEY	1975	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY, NON-IRRIGATED, CONTINUOUS CROP - YIELD, MEASURED IN BU / ACRE	TOTAL	NOT SPECIFIED	40	

SURVEY	1975	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY, NON-IRRIGATED, CONTINUOUS CROP - YIELD, MEASURED IN BU / NET PLANTED ACRE	TOTAL	NOT SPECIFIED	20	
SURVEY	1975	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		MILK	MILK - PRODUCTION, MEASURED IN LB	TOTAL	NOT SPECIFIED	8,252,000	
SURVEY	1975	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		OATS	OATS - ACRES PLANTED	TOTAL	NOT SPECIFIED	600	
SURVEY	1975	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		SORGHUM	SORGHUM - ACRES PLANTED	TOTAL	NOT SPECIFIED	300	
SURVEY	1975	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		SORGHUM	SORGHUM, GRAIN - ACRES HARVESTED	TOTAL	NOT SPECIFIED	200	
SURVEY	1975	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		SORGHUM	SORGHUM, GRAIN - PRODUCTION, MEASURED IN BU	TOTAL	NOT SPECIFIED	12,000	
SURVEY	1975	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		SORGHUM	SORGHUM, GRAIN - YIELD, MEASURED IN BU / ACRE	TOTAL	NOT SPECIFIED	60	
SURVEY	1970	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY - ACRES HARVESTED	TOTAL	NOT SPECIFIED	100	
SURVEY	1970	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY - ACRES PLANTED	TOTAL	NOT SPECIFIED	200	
SURVEY	1970	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY - PRODUCTION, MEASURED IN BU	TOTAL	NOT SPECIFIED	3,000	
SURVEY	1970	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY - YIELD, MEASURED IN BU / ACRE	TOTAL	NOT SPECIFIED	30	
SURVEY	1970	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		CORN	CORN - ACRES PLANTED	TOTAL	NOT SPECIFIED	100	
SURVEY	1960	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY - ACRES HARVESTED	TOTAL	NOT SPECIFIED	700	
SURVEY	1960	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY - ACRES PLANTED	TOTAL	NOT SPECIFIED	800	
SURVEY	1960	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY - PRODUCTION, MEASURED IN BU	TOTAL	NOT SPECIFIED	24,500	
SURVEY	1960	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY - YIELD, MEASURED IN BU / ACRE	TOTAL	NOT SPECIFIED	35	
SURVEY	1960	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		CORN	CORN - ACRES PLANTED	TOTAL	NOT SPECIFIED	400	
SURVEY	1956	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY - ACRES HARVESTED	TOTAL	NOT SPECIFIED	500	
SURVEY	1956	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY - ACRES PLANTED	TOTAL	NOT SPECIFIED	600	
SURVEY	1956	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY - PRODUCTION, MEASURED IN BU	TOTAL	NOT SPECIFIED	13,500	
SURVEY	1956	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY - YIELD, MEASURED IN BU / ACRE	TOTAL	NOT SPECIFIED	27	
SURVEY	1950	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY - ACRES HARVESTED	TOTAL	NOT SPECIFIED	1,000	
SURVEY	1950	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY - PRODUCTION, MEASURED IN BU	TOTAL	NOT SPECIFIED	38,000	
SURVEY	1950	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY - YIELD, MEASURED IN BU / ACRE	TOTAL	NOT SPECIFIED	38	
SURVEY	1950	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		WHEAT	WHEAT - ACRES HARVESTED	TOTAL	NOT SPECIFIED	100	
SURVEY	1950	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		WHEAT	WHEAT - ACRES PLANTED	TOTAL	NOT SPECIFIED	100	
SURVEY	1950	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		WHEAT	WHEAT - PRODUCTION, MEASURED IN BU	TOTAL	NOT SPECIFIED	2,600	
SURVEY	1950	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		WHEAT	WHEAT - YIELD, MEASURED IN BU / ACRE	TOTAL	NOT SPECIFIED	26	
SURVEY	1950	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		WHEAT	WHEAT, WINTER - ACRES HARVESTED	TOTAL	NOT SPECIFIED	100	
SURVEY	1950	YEAR		COUNTY	CALIFORNIA	06	CENTRAL	40	SANTA	087			00000000		WHEAT	WHEAT,	TOTAL	NOT	100	

							COAST		CRUZ							WINTER - ACRES PLANTED		SPECIFIED	
SURVEY	1950	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		WHEAT	WHEAT, WINTER - PRODUCTION, MEASURED IN BU	TOTAL	NOT SPECIFIED	2,600
SURVEY	1950	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		WHEAT	WHEAT, WINTER - YIELD, MEASURED IN BU / ACRE	TOTAL	NOT SPECIFIED	26
SURVEY	1946	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY - ACRES HARVESTED	TOTAL	NOT SPECIFIED	600
SURVEY	1946	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY - PRODUCTION, MEASURED IN BU	TOTAL	NOT SPECIFIED	18,000
SURVEY	1946	YEAR		COUNTY	CALIFORNIA	06	CENTRAL COAST	40	SANTA CRUZ	087			00000000		BARLEY	BARLEY - YIELD, MEASURED IN BU / ACRE	TOTAL	NOT SPECIFIED	30