The Nineteenth Century Physical Geography of the Camp Pendleton Coastline

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Abstract

The nineteenth century physical geography of the Camp Pendleton coastline can be reconstructed from a variety of sources. The region was subjected to severe extratropical cyclones, known as "southeasters," as the Little Ice Age came to a close. Episodes of both heavy rainfall and drought caused large year-to-year variations in stream discharge. Marine terraces along the coast were broken by valleys of variable size including deep, steep-sided barrancas which were "raging torrents" in the winter and dry beds in the summer. Berm damming of streams created freshwater pools along the coast. U. S. Coast Survey reports provide information on sea cliff heights and beach dimensions. Chaparral on hillslopes, scattered oaks and sycamores on valley floors, and a variety of animal life were mentioned by early travelers and surveyors.

Introduction

Providing a first step back in time in the study of the area, the nineteenth century physical geography of the Camp Pendleton coastline can be reconstructed from both natural phenomena such as tree rings as well as from historical accounts. This reconstructed physical geography sets the stage for ethnohistoric research and provides invaluable clues to help interpret the archaeological record. The natural environment was clearly less modified in the nineteenth century than it is today and therefore, more closely approximates the natural environment which prevailed during the more recent past.

For the most part, the people supplying information can be divided into three groups including (1) travelers passing through the region, (2) early settlers, and (3) later topographic surveyors. Travelers through the region include the Portolá Expedition in 1769, United States Army troops during the Mexican War, and Judge Benjamin Hayes who frequently traveled the road connecting San Diego and Los Angeles in the 1850s and 1860s. In addition, the logbooks of ships sailing along the coast yield similar types of observations. The second group of informants are the early settlers such as John Forster, owner of Rancho Santa Margarita y Las Flores, and Cave Couts, owner of nearby Rancho Guajome. Their correspondence and reminisces are especially illuminating as they were living in the area rather than simply passing through it. Forming the third group are the topographic surveyors of the 1870s and 1880s. The 1876-8 survey of Rancho Santa Margarita y Las Flores by Strobel and others provides information on channel dimensions and vegetation. The U. S. Coast Survey reports and maps of this section of coast (Fig.1 and Fig. 2) by Augustus Rodgers in the 1880s include considerable

topographic detail. Much of the information is qualitative, except for that provided by the later surveys, and is assumed to be uneven in terms of quality. Most is supplied by individuals with apparently limited scientific training; common names for plants are used in all almost all accounts, for example. Emphasis in this paper will fall on climate, landforms, and the biogeography of the region. Climate will be discussed initially as it has a profound impact on both landforms and biogeography.

Climate

The nineteenth century climate of the region was in a period of transition as the climatic interval known as the Little Ice Age was coming to a close. Several centuries in length, the Little Ice Age was a time of colder temperatures over much of the globe, glacial advances, increased meridional (north-south) atmospheric flow, and more stormy conditions in some areas, including southern California (Lamb 1977; Grove 1988; Engstrom 1994). Much climatic variability characterized southern California in the latter part of the Little Ice Age. Heightened El Niño activity at times and inferred strong meridional flow appear to be responsible for this variability.

Some fragmentary evidence for the inferred meridional flow is provided by mention of extreme or unusual temperatures in the region. With respect to high temperatures, Forster writing from Rancho Santa Margarita y Las Flores on August 23, 1868 notes the "extraordinary hot weather. Thermometer at San Diego having ranged from 102° F to 111° F according to location" (Forster 1868b). Of interest is Hubbs' (1948) analysis of fish fauna collected at San Diego by the Pacific Railroad Survey from 1853 to 1857. The fauna was clearly more tropical than that of any subsequent decade and included five specimens of the giant seahorse (*Hippocampus ingens*). San Diego air temperatures and the fish fauna led Hubbs to conclude that "the 1850 and 1860 decades appear to have been in a prolonged warm period" (Hubbs 1948:479).

Rather low temperatures also occurred in the last century. Camped north of San Diego on New Year's Eve 1846 during the Mexican War, Griffin (1942:344) experienced a night cold enough for water near the fire to freeze. Writing from Rancho Guajome in the San Luis Rey valley, Couts noted on December 21, 1862 that the weather was marked by "cloudy days and frosty nights" and a few weeks later he wrote again, remarking "we are having severe weather. Cold, windy days, clear nights & heavy frosts. Ther: at 40 and below every morning. Fires comfortable all day. Stock of all kind having a hard time" (Couts 1862, 1863). Records for San Diego summarized by Carpenter (1913) show that the lowest nineteenth century temperature ever recorded was 32 F., a value reached on several occasions between 1879 and 1894.

Nineteenth century precipitation was also highly variable. Much of the precipitation is believed to have been supplied by the winter passage of intense extratropical cyclones, known as

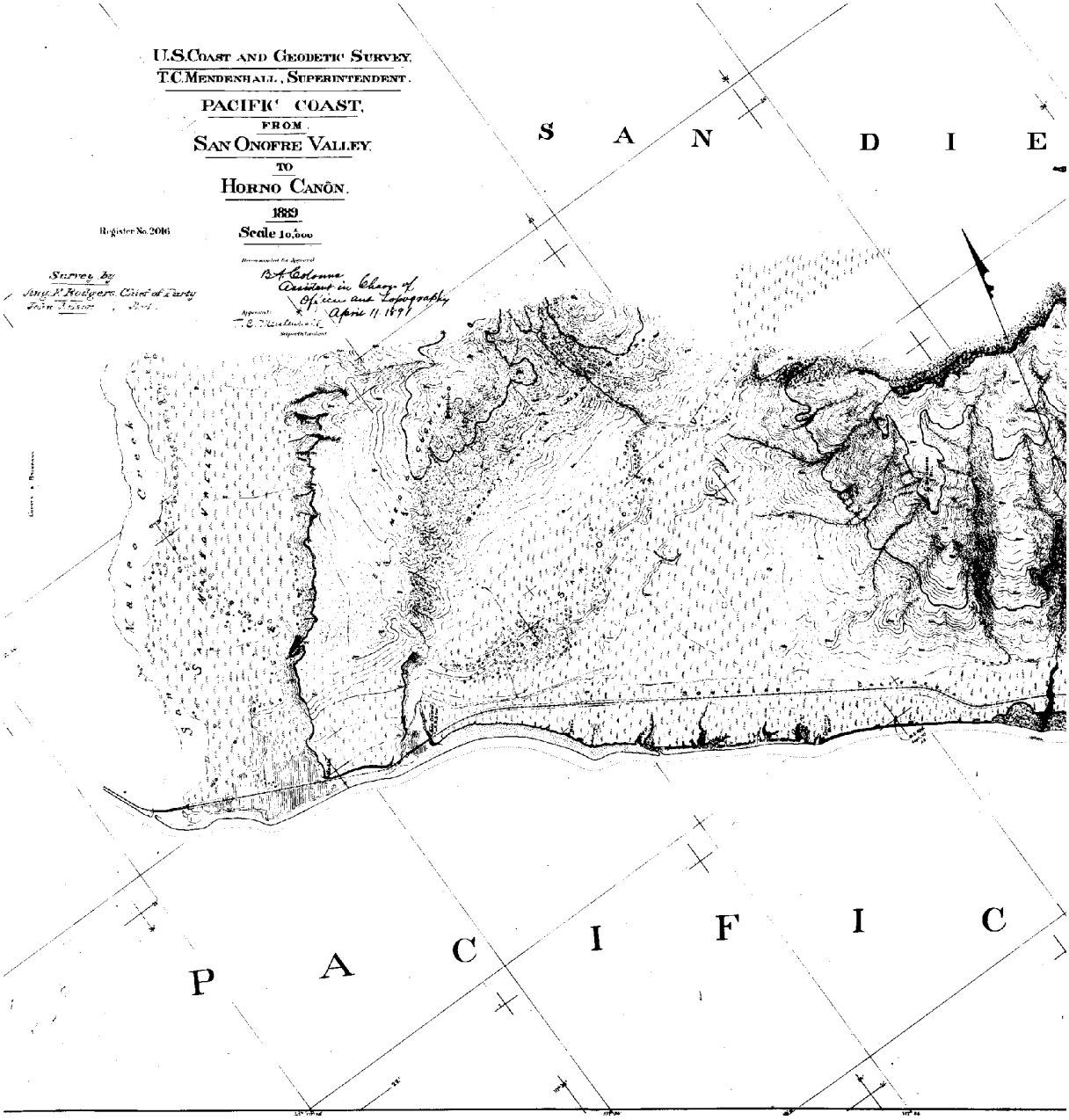

Fig. 1. U.S. Coast Survey Map, Pacific Coast from San Onofre Valley to Horno Cañon,1889.

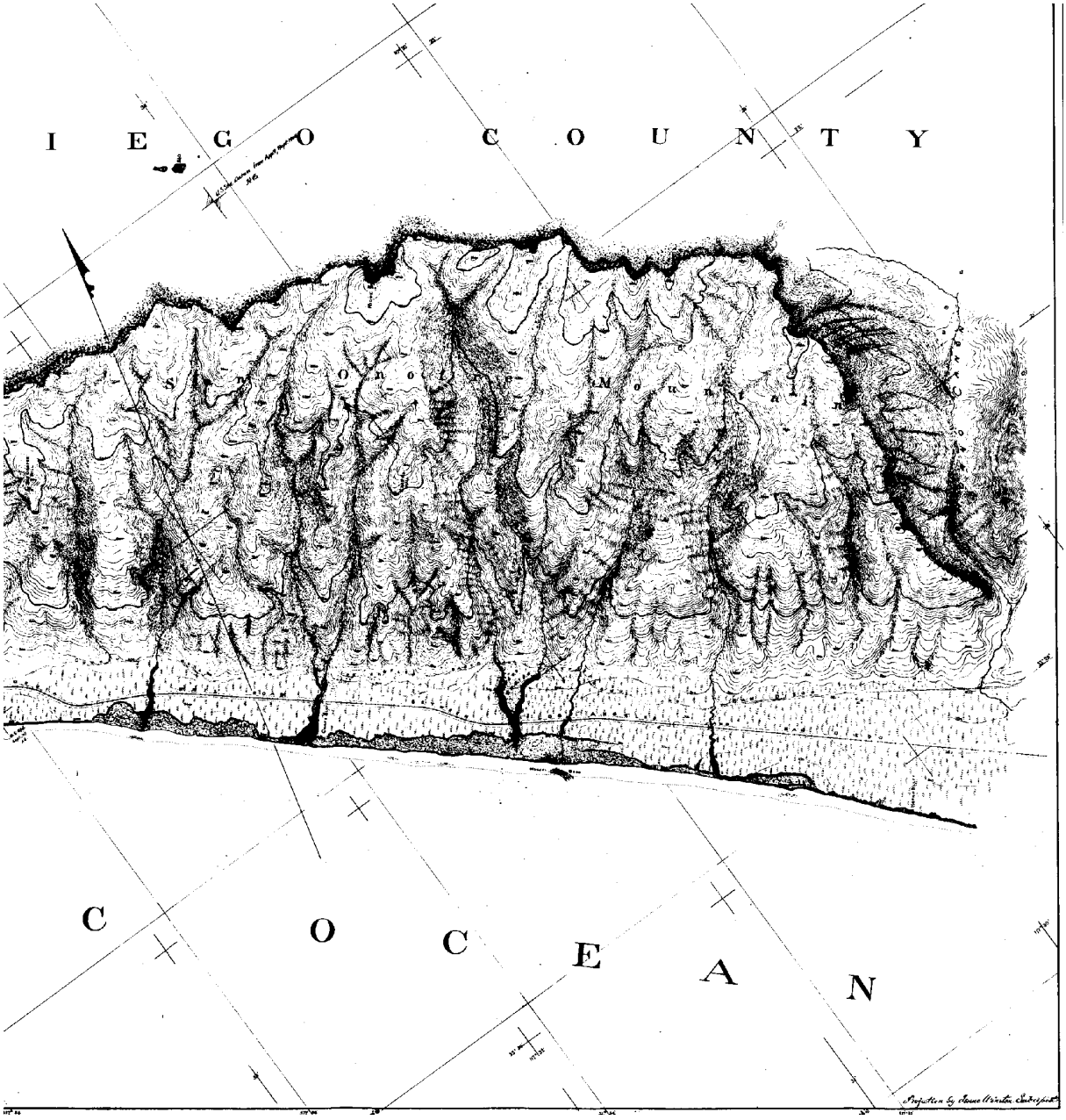

Fig. 1 (continued). U.S. Coastal Map, Pacific Coast from San Onofre Valley to Horno Cañon, 1889.

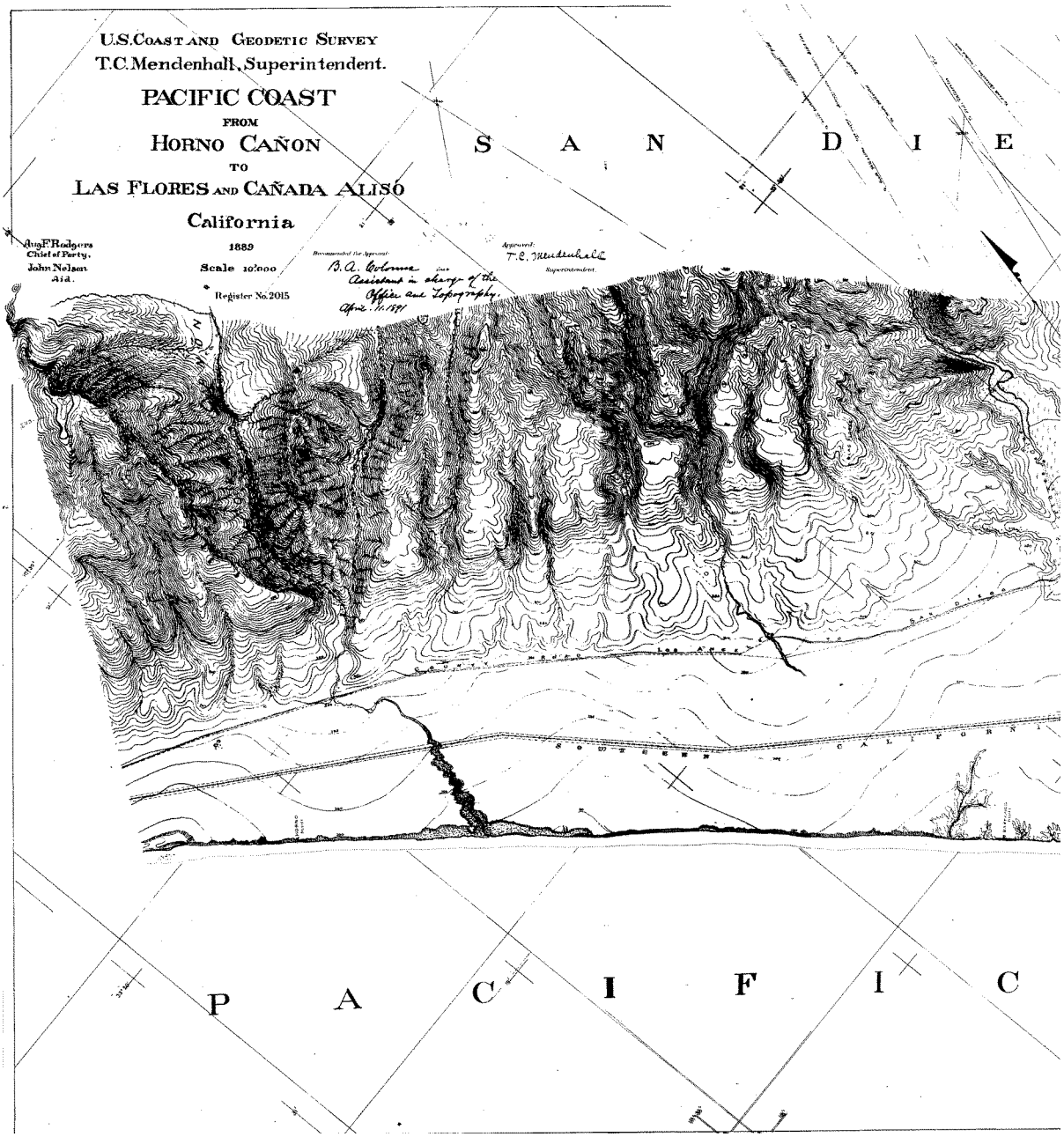

Fig. 2. U.S. Coastal Map, Pacific Coast from Horno Cañon to Las Flores and Cañada Aliso, 1889.

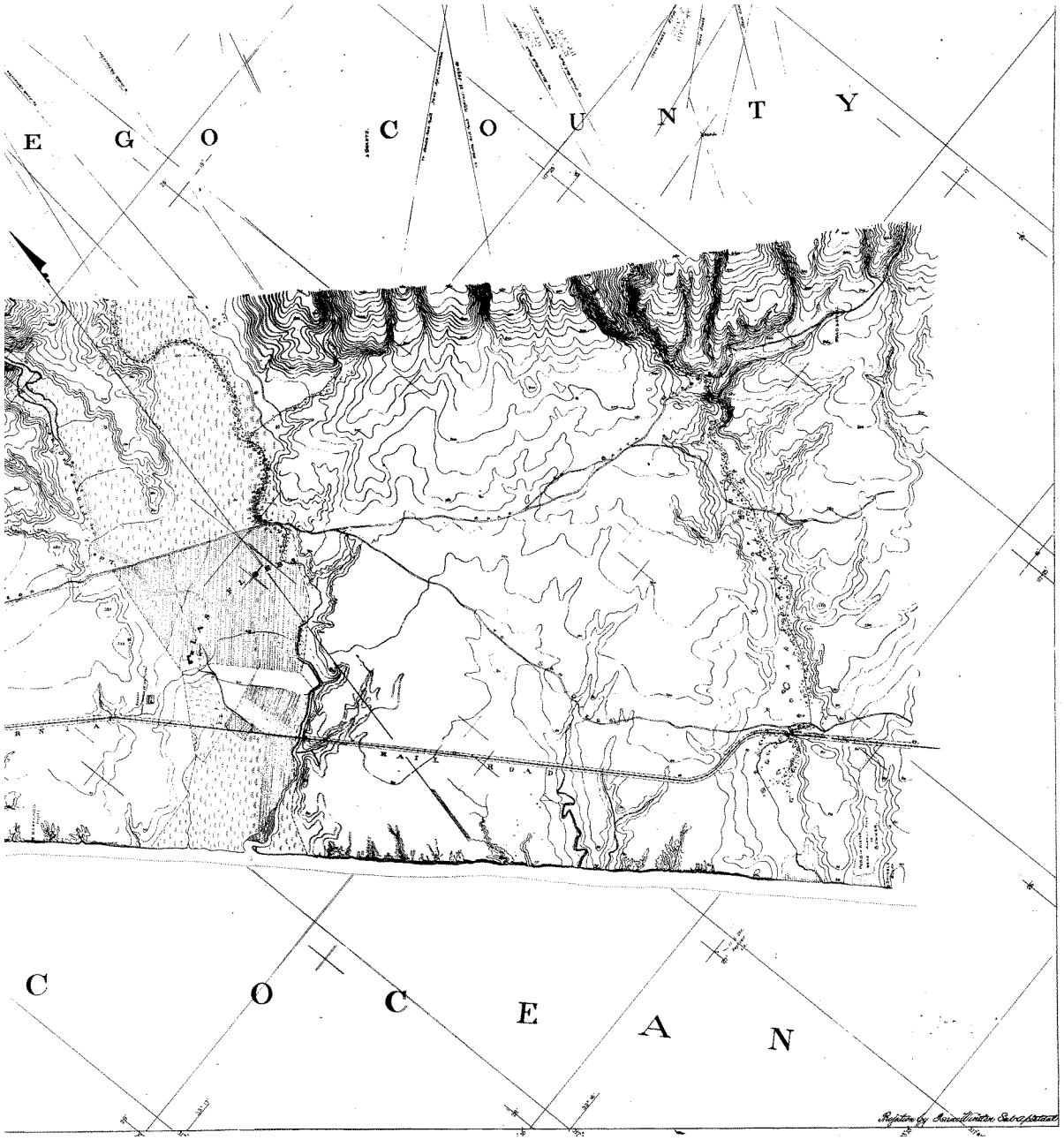

Fig. 2 (continued). U.S. Coastal Map, Pacific Coast from Horno Cañon to Las Flores and Cañada Aliso, 1889.

"southeasters," through the region. The frequency and intensity of these storms abated as the nineteenth century ended (Engstrom 1994).

References to southeasters in the region are frequent. John Hudson sailed the coast of southern California and Baja California between 30 and 35 north latitude in the winters of 1804, 1806, and 1807, encountering lightning, hail, hard squalls, and strong gales (Hudson 1804-1807). Richard Henry Dana, who sailed the California coast from San Diego northward, devoted a chapter to southeasters in his American classic *Two Years Before the Mast* (Dana 1936). In a letter written during the Mexican War on the U. S. frigate *Congress* at sea 48 km from San Diego, Commodore Robert F. Stockton (1937) comments "the South East Storms my Pilot says will soon be very heavy on the exposed coast, and the ship must if possible be taken over the Bar, or she will have to leave the coast."

Instrumental precipitation records are available from the middle of the century onward and when combined with historical accounts and tree ring data document important variations in the nineteenth century. The storms of the 1880s and early 1890s set monthly and seasonal precipitation records at Los Angeles; the wettest winter on record was in 1883-1884 when the Signal Service measured 970 mm of precipitation. Supplementing the instrumental data is the tree ring record from Torrey pines (*Pinus torreyana*) at Del Mar and bigcone spruce (*Pseudotsuga macrocarpa*) in the Santa Ana Mountains. Standardized tree-ring widths at both locations is largely a reflection of the amount of precipitation received in the winter and spring. The widest ring in the Torrey pine record is that of 1862, a consequence of the extraordinarily high rainfall of the early part of that year (Biondi et al. 1997:246, Engstrom 1996). It is also interesting to note that the 1760s were generally a time of bigcone spruce growth that was 25% to 50% above normal (Douglas 1973). This circumstance suggests that wetter than normal conditions prevailed throughout that decade and helps to explain why the Portolá Expedition in late July of 1769 encountered pools of water and a good stream in the Santa Margarita Valley and "a great deal of water" in Las Pulgas Canyon (Bolton 1927:133).

The early 1860s witnessed perhaps the greatest extremes in precipitation. The exceptional rainfall of the winter of 1861-1862 caused widespread flooding throughout California (Engstrom 1996). Immediately thereafter, however, a very severe drought began in the summer of 1862 which persisted through much of 1864. The impact on the cattle industry was disastrous as Forster lamented:

The climate was very dry. It was a most miserable drought that time. There was no moisture and our cattle died off in very great numbers. About that winter, the whole country from North to South became almost depopulated of cattle from the fact that the country had been entirely over-stocked about that time. Before the year '64 had passed away there was a perfect devastation, - such a thing was never before known in California (W. P. A. 1936:26).

Landforms

The landforms along the coastline consist of marine terraces broken by valleys of varying dimensions. Some information on both average stream discharge and stream discharge during extreme events in these valleys is available. Observations in the 1880s indicate that the average winter discharge in the Santa Margarita River is less than 17 to 23 m/sec and that a discharge of 0.06 to 0.11 m/sec is maintained all summer (Hall 1888). The flood of January 1862 was the largest in the last century on the Santa Ana River and was three times greater than the greatest flood of this century in 1938 (Engstrom 1996). Hayes noted in May of 1862 that San Mateo Creek rushed into the ocean "a full, rapid little stream" and that there was "considerable water in the Santa Margarita River, and a strong current where we enter it, still eating away the sandy bank." Even a month later he writes "the rivers of this country run full, from hill to hill" and a "good sized vessel might have gone a mile up the San Luis [Rey] River, near its mouth" (Hayes 1856-1862:103, 114).

Changes in the hydrology of the region may have been occurring in the last century. An increase in streamflow irregularity with higher high flows and lower low flows is inferred because of a decline in vegetation cover because of fires, overgrazing, and lumbering. The hot weather of August 1868 was accompanied by a fire that "affected the whole country" burning down to the ocean (Forster 1868b). Couts (1870) described the nearby mountains as having been completely burned. The grazing of cattle and sheep also contributed to the decline in vegetation cover. As noted earlier, Forster observed that the range was overstocked with cattle by 1864 and Crouch (1888), a sheepman from the San Luis Rey Valley, remarked that the area had been overrun by sheep for nearly 50 years. Local wood appears to be in short supply with people being forced to rely on wood found on the beach and scavenged from the San Luis Rey Mission (Crouch 1915; Couts 1849). The establishment of sawmills to meet this demand, especially for the burgeoning beekeeping industry (Watkins 1969), must have accelerated the loss of trees. Crouch (1915:27) complained that "thousands and thousands of trees were cut down for the sake of a handful of bees."

Seasonal variations in stream discharge were superimposed on the year-to-year fluctuations. Rodgers (1887-1888:12) writing of the Oceanside area notes that the floods between December and March "may change these motionless, sandy beds, of the dry season, into raging torrents." In the summer, the San Luis Rey and the Santa Margarita Rivers sank below the surface before reaching the ocean although the latter stream "has a narrow opening and a thin film of salt water only, running out at low tide" suggesting a small tidal exchange (Rodgers 1887-1888:6).

Descriptions of valley morphology in the nineteenth century exist. The Strobel survey encountered numerous ravines or gorges, some with perpendicular banks (Stephenson 1982). In an area north of Horno Canyon, a landscape composed of mesas "broken by a succession of deep & precipitous ravines," was known as "Los Barrancos" (Rodgers 1889b:4). The term *bar-*

ranca was defined by Hall (1888:27) as a "deep, abrupt-edged channelway through a plain or mesa–a much accentuated and large arroyo." Close to the ocean, the barrancas were up to 30 m deep (Rodgers 1889b). Elsewhere, streams such as Las Flores Creek had carved relatively large broad valleys to the coast. According to the Strobel survey, the stream channel was 87 m wide near the coast in 1876 (Stephenson 1982).

Berm damming of the mouth of Las Flores Creek to create a small lake or pool may be responsible for the rather great width of the creek as measured by the Strobel survey. Berm damming often occurs at the mouths of smaller streams as a consequence of constructive wave action during the low flow summer months. Father Peyri's report on Las Flores in 1827 mentions that "by means of water taken out of a pool near the sea, corn is raised" (Engelhardt 1921:52). Another example is provided by the persistent lake formed at the mouth of San Mateo Creek. The origin of the lake was correctly inferred by Robinson in 1829 who wrote "a small river flowed down the glen toward the sea, but the constant action of the surf upon the sand had dammed up its mouth and formed it into a lake" (Robinson 1846:18). It was also present in 1876 as the Strobel survey noted the presence of a "Tule Laguna" and a "bar" at the creek (Stephenson 1982).

The lowest marine terrace was terminated on the seaward edge by bluffs, marked by landslides at the entrance to Horno Canyon, ranging in height from 6 to 37 meters (m) which experienced new erosion during each winter storm (Rodgers 1889a, 1889b). Kuhn and Shepard (1984) have documented 180 m of bluff retreat between 1883 and 1891 along the coast nearby at Encinitas. Beneath the bluffs between Horno Canyon and Cañada Aliso a sandy beach, 80 m at low tide, existed and farther south between the Santa Margarita and San Luis Rey Rivers an apparent shingle (gravel) berm, with a crest 1.5 to 2.4 m above the ordinary high water mark, was observed resting on beach sands (Rodgers 1889a, 1887-1888). Only a single incident relating to nineteenth century waves along this stretch of coast has been identified. In October of 1821, the schooner Eagle was anchored off Las Flores for purposes of trading with San Luis Rey Mission. Efforts to send boats through the breaker zone were unsuccessful as the surf was quite high and the waves broke far from shore. Three boats were sent, the last capsizing. Light winds prevailed at this time and in previous days indicating that the waves were large swells that had been generated some distance away (Grimes 1820-1822; Ogden 1941).

Biogeography

Historic sources indicate that the vegetation of the nineteenth century was broadly similar to that of today with chaparral on hillslopes and oaks and sycamores on valley floors. Emory (1849) mentions chaparral north of Las Flores and the Strobel survey (Stephenson 1982) also notes the presence of this association on hillslopes. Rodgers (1889b:2) reported that in the San Onofre Creek - Horno Canyon area, chaparral "heavily clothed" the sides of canyons and a very dense stand of cactus was encountered. References to specific species are rare. Forster

(1873) observed “Chamisse” or “Romeria” (*Adenostoma fasciculatum* ?), however, with new growth on his rancho.

Although oaks were encountered along the base of the San Onofre Range by both the Portolá Expedition (Bolton 1927) and the Strobel survey (Stephenson 1982), oaks, sycamores, and alders appear to have been especially numerous on valley floors. Alders, for example, were frequently observed by the Portolá Expedition in valleys (Bolton 1927). Hayes described Las Flores in these words “this valley is narrow, but extends back several miles; with a little timber. On the south side is a respectable stream of running water, shaded here and there by sycamore trees” (Hayes 1856-1862:89). Large sycamores and oaks were found to be abundant in Horno Canyon and San Onofre valley by Rodgers (1889b). The greatest detail on trees is contained in the field notes of the Strobel survey who encountered along their survey line the following individual trees with diameters in cm in parentheses: sycamore (13); live oak (28, 58,97); post oak (63, 63, 84, 102, 114); water oak (56,63); white oak (28); elder (23); and wild fuchsia (8) (Stephenson 1982).

Numerous observations on the herbaceous vegetation exist. Camping at Las Flores in 1847, Griffin (1942) mentions hills green with wild oats and the presence of a variety of pea with a red bloom. The U. S. Coast Survey map of Las Flores Valley (Fig. 2) indicates that the valley floor was largely grass-covered except for a small area of salt marsh at the mouth of Las Flores Creek. Much of the herbaceous vegetation had a strong alien component. Several plants are mentioned by Rodgers (1887-1888, 1889b) including bur-clover (*Medicago polymorpha*), alfilarilla (*Erodium cicutarium*), and mustard (presumably black mustard [*Brassica nigra*]). The latter plant was particularly conspicuous in the nineteenth century as Jepson (1936:49) writes “in pioneer days *Brassica nigra* was generally of ranker growth than at present.” High soil moisture levels may have been responsible for the great stature of the plant. In the San Onofre Creek - Horno Canyon area “great fields of it attain heights of 10 feet or more & so thick that two men on horseback 50 or 75 feet apart may be hidden from each other” (Rodgers 1889b:7).

Comprising the remainder of the biogeography of the region, animals are mentioned in a number of accounts. Regarding marine life, Hudson secured many sea otter skins in the Las Flores - San Luis Rey area between 1800 and 1810 (Allen n.d.). Whales were seen off the coast by Griffin (1942) and Hayes (1856-1862) mentions the presence of porpoises off San Mateo Creek. In the late 1880s two companies were fishing out of Oceanside. Catches of 227 - 1134 kg were reported (Lewis Publishing Company 1890). Finally, Rodgers (1889b) observed a bed of mussels attached to a coastal rock outcrop.

Scattered information on animals observed on land exists. Hares and rabbits were described as being abundant by Crespi of the Portolá Expedition while traveling to the Santa Margarita valley (Bolton 1927). Griffin (1942) remarked that the Las Flores plains were “covered” with wild geese, white brants, and ducks while Rodgers (1889b) noted that deer and quail were

numerous between San Onofre Creek and Horno Canyon. Traveling along the stage road, Hayes (1929) found a "California" lion hanging from a tree. In nearby Gopher Canyon, 28 lions were killed in a two month period in 1869-1870 (Crouch 1915). Bears were reported. In August of 1868, bears were found near San Onofre, one of which had been killing cows (Forster 1868a). A grizzly weighing 635 kg was killed on the Rancho Santa Margarita y Las Flores in 1870 (Allen n. d.).

Summary

Assembled from a mix of sources, the nineteenth century physical geography of the Camp Pendleton coastline can be summarized briefly. Near the end of the Little Ice Age, the climate at that time was marked by episodes of severe weather associated with the arrival of intense extratropical cyclones accompanied by heavy precipitation and strong winds. Extreme temperatures and much variability in annual precipitation were also features of the climate. The coastal landscape was composed of marine terraces broken by valleys, including barrancas up to 30 m deep. Stream discharge was very erratic from year to year and had a distinct seasonal rhythm with raging torrents in the winter alternating with dry beds in the summer. Small lakes were formed at the mouths of streams as constructive wave activity built berms, damming the streams in the dry summer months. Stream discharge is also inferred to have been becoming increasing irregular as the nineteenth century progressed in response to a decline in the vegetation cover. The marine terraces were terminated by eroding bluffs of varying height overlooking a mostly sandy beach. Chaparral on hillslopes and valleys dotted with oaks and sycamores were typical and the herbaceous vegetation had a strong alien component. Marine life along the coast include whales, porpoises, and sea otters while the land fauna included deer, quail, rabbits, bears, and mountain lions.

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