Perturbing Mystery

History shaped the people we meet. To know their history is to know more about how they might respond to what we say or do. The same is true of land. If what was once a grassland has been invaded by forest, or exotics, in no way will it revert to grassland after a disturbance such as a fire; it will go on from what history had made it. The choking mess above is what much of our land *used* to look like (except that ours was worse). Like this, most of it was overgrown oak/madrone forest infested with French Broom being invaded by conifers. Yet in addition to these problems are those one *cannot* see, particularly the largely exotic seed bank. Knowing the historic uses helps one guess which weeds could be a problem. Grading history can tell us what minerals were lost from topsoil, or why the winter runoff takes the path it does. Underlying those recent changes, knowing the original native uses of the area helps one know which plant communities are likely to develop after disturbance and control measures and how successional processes might behave.

A site history informs us, both of what we see, and what to do about what we don't see.

This monoculture patch of skullcap (*Scutellaria tuberosa)* just "appeared" with well-defined edges and at this density when I did a little thinning out on a remote spur with a great view. Skullcap being medicinal, that it came up in a defined patch in arrangement with other plants having identified aboriginal uses, is indicative of the possible aboriginal purposes for growing it here.

Humans have lived on this continent for over 10,000 years. They produced profound changes in landscapes wherever they settled, particularly with fire and hunting. For reasons to be discussed, their subsistence in California was dependant more upon plants and aquatic life than big game hunting. Yet unlike elsewhere in North America, agriculture was not practiced west of the Sierra Nevada. Effectively, landscapes were gardened using fire and horticulture (including relocations), with some areas tended even for purposes of security. Over millennia, plants and therewith insects adapted genetically to the cascaded consequences of management processes with the observable human intent of maintaining safe and expedient access to a wide variety of plant resources. It wasn't easy.

February 2015 – Indication of Aboriginal Landscape Gardening

This chapter is the longest and most demanding in the book, a synthesis of archaeological, geophysical, anthropological, biological, and historic data with 29 years of observations of plant behavior in recovery. It presents many new ideas that are unfamiliar to the academic community primarily because of a fraud (discovered while researching the background history for this project) in the editing and publication of the first explorers' account. The consequences of the corrected record are published only here, due to the cost of peer review and academic publishing. It is best read in three sittings of about 25pp each (the remaining 20pp are references).

Wildergarten 6.0

This book was originally produced under the name *The Responsible Party* for which there were two revisions, 1.0 & 2.0. Major revisions are for complete rewrites. Decimal revisions are for revised chapters or navigational changes and are not archived. Back revs are viewable by the numbered links below.

Revision History 1.0 2.0 3.0 3.1 3.2 3.3 3.4 3.5 4.0 4.1 4.2 4.3 4.4 4.5 4.6 4.7 5.1 5.2 5.3 5.4 5.5 5.6 5.7 5.8 6.0

Vande Pol, Mark Edward, 1954 –

Other writings by Mark Edward Vande Pol:

Natural Process: That Environmental Laws May Serve the Laws of Nature, ©Wildergarten Press, 2001, 454pp, ISBN: 0-9711793-0-1, LOC Control #2001092201.

Shemitta: For the Land is Mine: ©Wildergarten Press, 2009. Contains: 217pp text, 980pp overall, 14 picture books, 2 tables, 963 photographs, 9 maps, 2 drawings, 2 charts, 145 footnotes, 358 citations, and 216 other source references, not including external Internet links. ISBN 978-0-9711793-1-8

Articles at Wildergarten Press: collected writings on Constitutional history and regulatory racketeering by tax-exempt "charitable" foundations

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One would think a site history should begin with 'How Things Were Before the White Man.' Yet there are errant presumptions underlying most people's beliefs about that time. One such myth is that Indians exerted little influence upon the land. It makes a nice story, but it's not even close to true. Asians invaded a late-Pleistocene Western Hemisphere in waves over at least 1,500 years, during which some 31 of the 44 prior large-bodied animal species went extinct. Whether this was precipitated or abetted by a major event (such as an comet impact), habitat modification by fire, or by hunting alone is not clear (I'm a fan of "all of the above"). The extinctions included even animals with domestic potential including a horse, a mastodon, an ox, and a camel, the loss of which was very costly to human development later on. Whatever "the" cause of those extinctions, we know that Indians were such good hunters that early white explorers such as Lewis & Clark, Fremont, Leonard, and Bidwell **all** describe the landscapes they saw, not burgeoning with wildlife, but nearly bereft of game, that is… until they came to California. All of the Spanish diaries report uniformly that California *was* crawling with large animals.

One explanation for this disparity, popular among students of archaeology and ecology, is that European diseases such as smallpox, influenza, and measles took down Indian populations so rapidly and to such an extent that their numbers were greatly depleted before European settlers arrived. The theory holds that by the time the Spanish colonized California over 200 years after Columbus, the number of game animals had recovered, and Indians to a lesser degree. Though this hypothesis at first appears reasonable, one must ask how those same disease outbreaks spread over all of North America and produced fewer large game animals than in coastal California. The theory just doesn't make sense.

The first extended European contact with California Indians was in 1542 by Juan Cabrillo in the Channel Islands off Santa Barbara. He encountered people of the Chumash nation, perhaps the largest, most powerful, and "urban" tribes in California. Large numbers in close quarters would make the Chumash highly susceptible to smallpox, measles, and influenza, which have short incubation periods followed by intense, disabling, and usually fatal fevers. Yet Cabrillo described these tribes as healthy and prosperous along the entire Santa Barbara Channel coast. Cabrillo stayed with the Chumash for three months, so it is unlikely the Spanish would not have noticed these familiar plagues suddenly inflicting the Indians, but such was never noted in the record. It is doubtful that in only 20 years after Cortez had made his conquests in central Mexico (where smallpox had been devastating), these diseases could have spread 1,800 miles north across a desert, killed off large numbers of Indians, and *then* the tribe had recovered demographically, with Cabrillo noting no smallpox scars. Three later brief visits by Iberian explorers**:** Vizcaino, Gali, and Una muno provide no believable record of Indian contact.

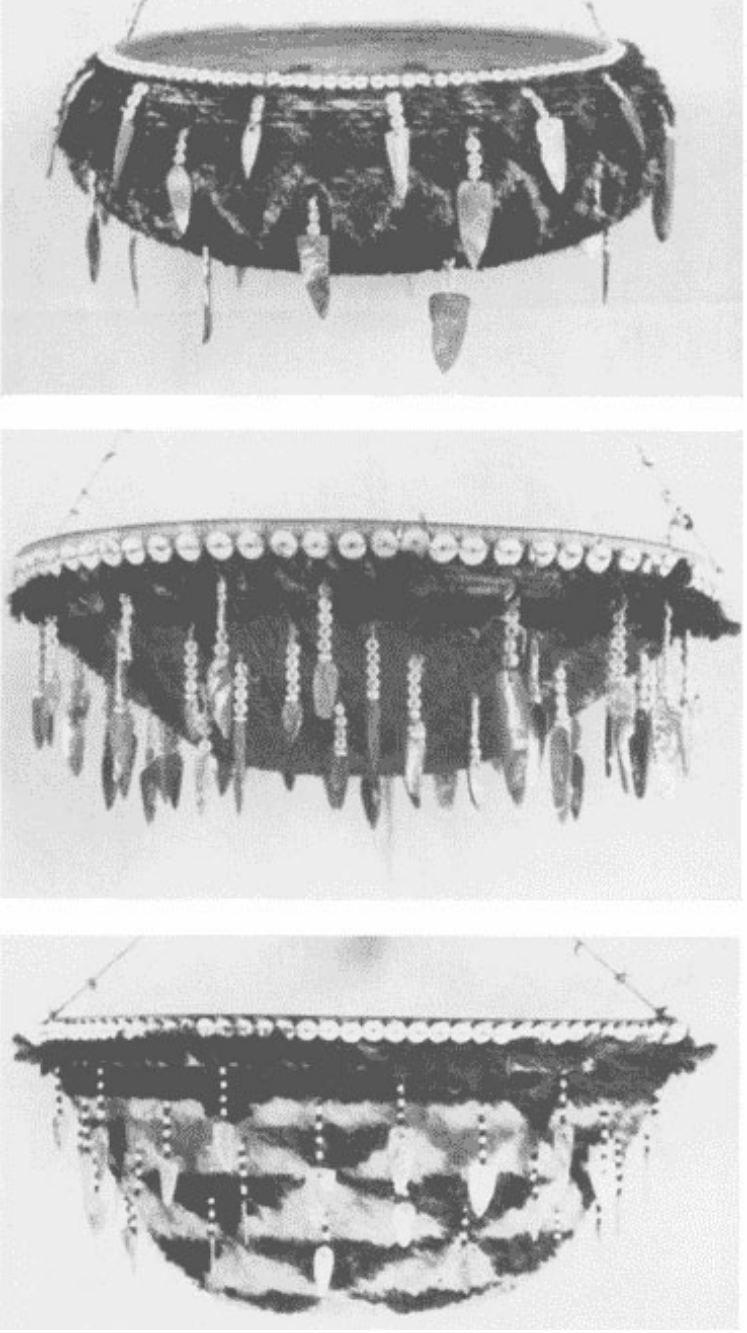
Clovis Point in Chert, 11,500-9,000 BC, Sevier County, Utah, Image by Daderot via Wikimedia Commons

Sir Francis Drake landed just north of San Francisco Bay in June 1579, 37 years after Cabrillo. He stayed with (probably) the Olemaloque Miwok tribe for about five weeks to repair storm damage to his ship. Five weeks is not enough time for a full blown plague to devastate the tribe, but is quite long enough for its beginnings to be noticeable. It is possible to infer from the log's description of Indian behavior that there *might* have been just such an incipient plague:

> *"And now, as the time of our departure was perceiued by them to draw nigh, so did the sorrowes and miseries of this people, seeme to themselues to increase vpon them; and the more certaine they were of our going away, the more doubtfull they shewed themselues, what they might doe; so that we might easily iudge that that ioy (being exceeding great) wherewith they receiued vs at our first arriuall, was cleane drowned in their excessiue sorrow for our departing: For they did not onely loose on a sudden all mirth, joy, glad countenance, pleasant speeches, agility of body, familiar reioycing one with another, and all pleasure what euer flesh and bloud might bee delighted in, but with sighes and sorrowings, with heauy hearts and grieued minds, they powred out wofull complaints and moanes, with bitter teares and wringing of their hands, tormenting themselues."* (Source link)

That's all you get. Importantly, Drake's log also notes the presence of super-abundant game: *"**infinite** was the company of very large and fat Deere* (elk)*, which there we sawe by **thousands**."* Yet when these Indians, supposedly so enthralled by the English countenance, humbly offered them food, there was **no red meat**. They gave them artifacts, fish, intricate decorated baskets, bread, and roots, but no elk meat and nothing made of elk-skin. Most of the men were naked and the women wore rushes. The Indian king's robe was made of small fur-bearing animals (possibly mink), and his seconds wore feathers. Anybody familiar with Point Reyes in June knows the fog and wind there can freeze your butt off almost all summer, now, never mind in 1579 during the depths of the Little Ice Age. If these Indians were such successful hunters with *'thousands of deere'* around, why were they not wearing elk skin as did coastal tribes farther north? Materials from such an abundant resource should have been obvious.

Only 16 years later, Sebastian Rodriguez de Cermeño landed in the same spot staying just as long for the purpose of ship repair. If the Indian diet had then shifted to meat after a pandemic, Cermeño would have noted clothing, as male nudity among California Indians was then well known. Brief Spanish encounters continued until Vizcaino's landing at Monterey in 1602 after which there was no contact with Indians until Portola's land expedition in 1769.



Pomo Indian feathered baskets with clamshell disk beads and abalone pendants. Source: Project Gutenberg eBook, *Francis Drake and the California Indians, 1579,* by Robert F. Heizer.

The first Spanish land expedition to California was that of Gaspar de Portolá, 190 years after Cabrillo, documented primarily in the diaries of Juan Crespí, Miguel Costansó, and Pedro Fages. They report the Chumash as numerous, prosperous, and more concerned with wars than subsistence. Most Indians received the Spanish gratefully (possibly as potential allies), offering them gruel and pies made from seed along with massive quantities of coastal fish.

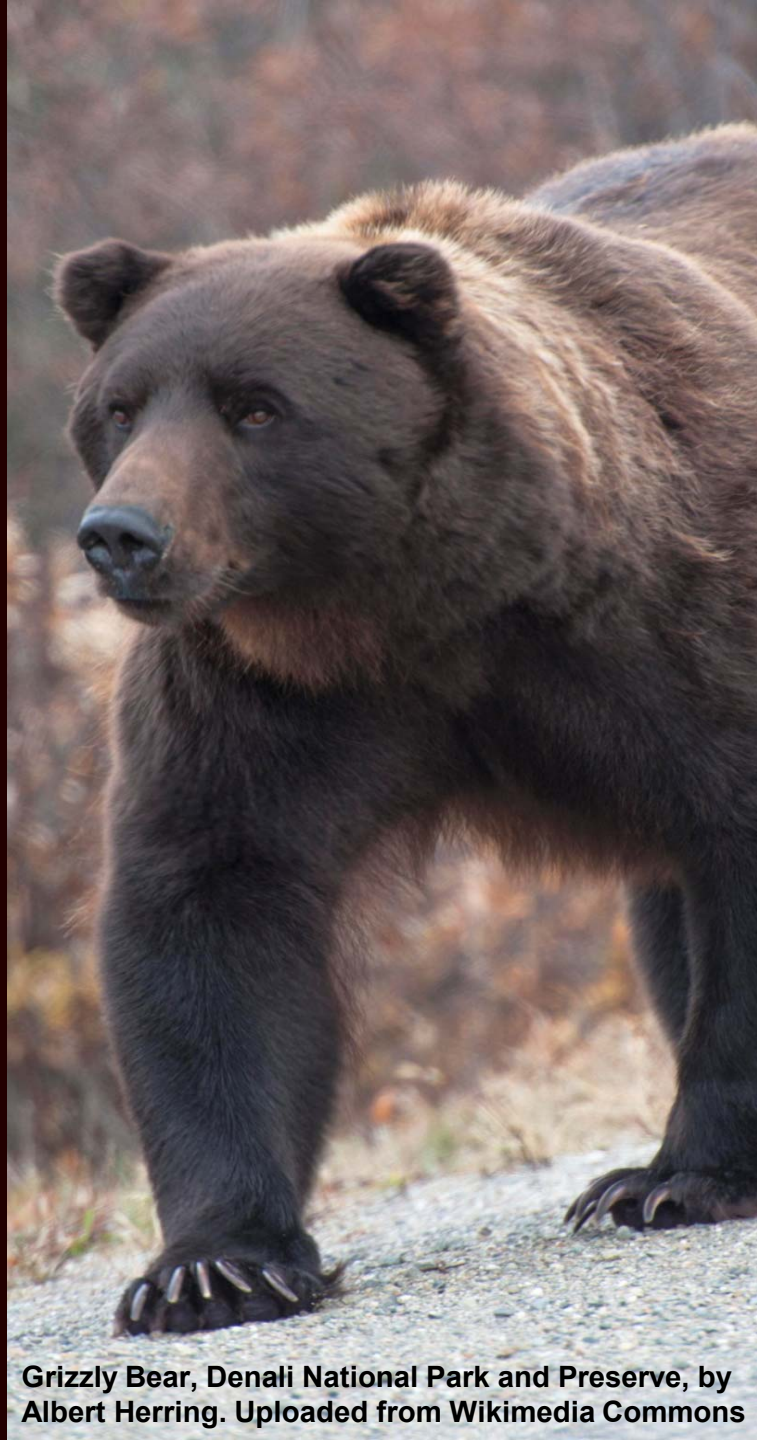
Local food resources never go unmarked in explorers' diaries, as they are *the* means of survival. The Spanish reported herds of elk, deer, and antelope, some large, all the way up the Central Coast. Yet the total lack of red meat in Indian offerings repeats in **ALL** of the Spanish-tribal first encounters but one (1) offer of red meat (deer), and that from the only chief they met who possessed regional authority. This lack of meat became so serious the Spanish were forced to slaughter mules on the return trip to survive, despite the ample game. Why?

A Spanish "escopeta" musket shoves a .69 caliber rough casting out a smooth bore with the unpredictable trajectory of a textured knuckle-ball. It has a lot of knock-down power, but it is so slow and so inaccurate that it was not much use at more than 50 yards. The Spanish were in a hurry and apparently unable to hunt the ungulates because they were sufficiently wary of people as to stay out of range. But if game was so plentiful, why weren't the Indians hunting animals down to minimal numbers, just as they were everywhere else in North America and even after significant population reductions due to Old World diseases?

California Indians were every bit as capable hunters but, unlike the rest of the continent, they faced a powerful, social, territorial, intelligent, and aggressive competitor**:** the Grizzly Bear. Yes, grizzlies once roamed over most of the US, but where winters are cold, one need only kill hibernating females to control them. Even then, it wasn't easy. The following account is from Ishi, the last survivor of the Yahi tribe in the foothills of Mount Lassen, California where winter weather was much colder than the coast during the Little Ice Age**:**

> *A grizzly bear is not game that a lone man armed with only bow and arrow seeks out. The Yahi hunted a grizzly* ***if it was hibernating*** *and* ***only*** *if there were several men together, enough to surround it with a circle of burning brush before it was fully awake… They shot into the open mouth if possible… to induce hemorrhaging. If a bear charged, a man tried to defend himself with a firebrand while his companions closed in with bows and arrows.*

It was not easy to kill even a hibernating grizzly. To take on a group of bears armed only with bows and arrows would be suicidal. BIG groups of bears.



Grizzly Bear, Denali National Park and Preserve, by Albert Herring. Uploaded from Wikimedia Commons

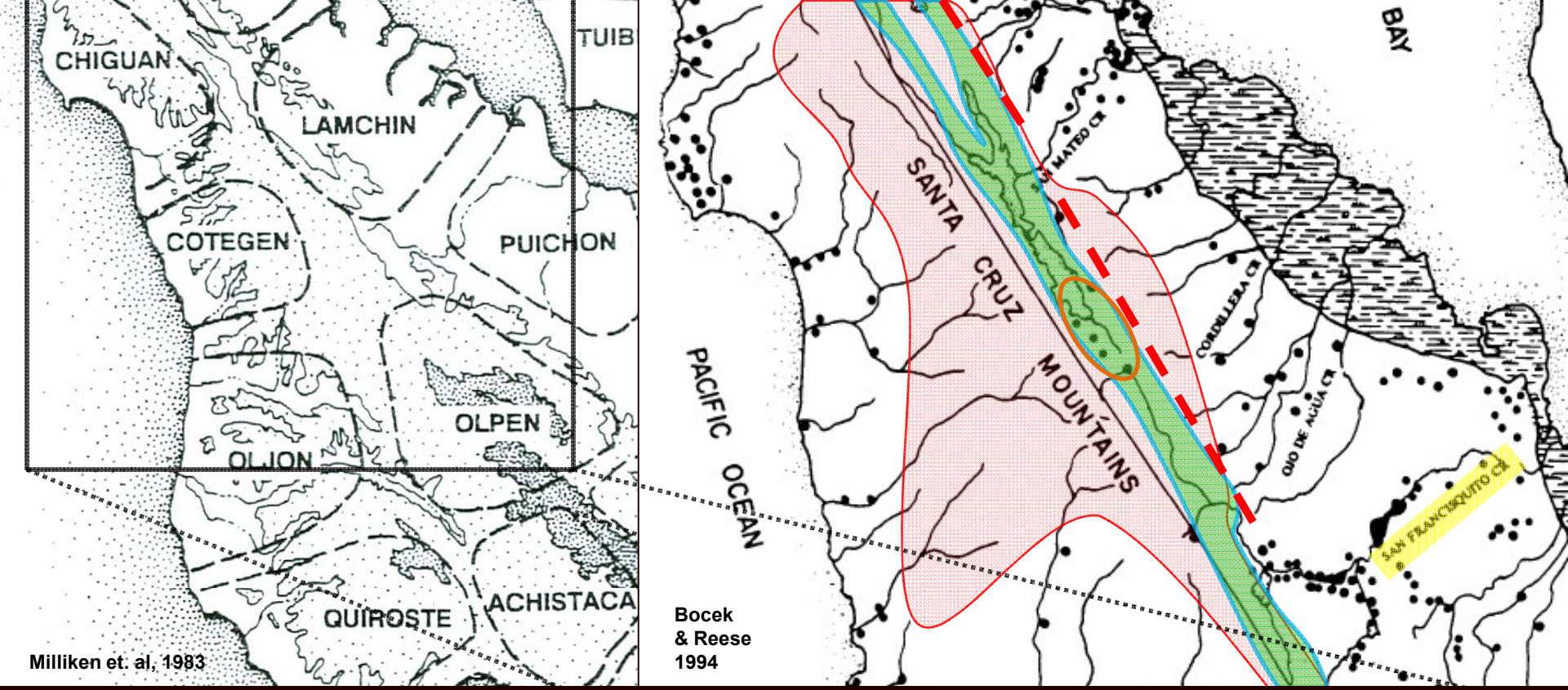
El Palo Alto, 1883
Source: Stanford ALL Image Exchange (SALLIE)

The diaries describe multiple troops of 16-100 bears, tracks all over the State, and bear scat along San Francisco Bay while camped next to the “Palo Alto” (left) along San Francisquito Creek, along which lived the highest concentration of Indian villages on the San Francisco Peninsula. Only once did the expedition encounter Indians hunting at all (a band of over 100 near Salinas) and they fled. Crespí describes the men as naked with many women wearing woven grasses or rabbit , although some did wear deerskin skirts. Paloú mentions that Indians expressed great desire for clothing. During subsequent Spanish expeditions, the lack of meat continued and borderline nudity remained the standard of Indian dress until Coastal explorers met a tribe offering meat and wearing coats (including bear) at Destruction Island off the coast of Washington, at which point nudity had ceased farther north. One has reason to suspect bears constrained a food and material economy obviously based on small game, fish, clams, and plants farther south, as is supported by a large body of archaeological evidence.

Both Spanish and Russian accounts report bears showed no fear of humans, attacked soldiers on horseback, entered a camp of 64 men and 189 mules at night more than once... then requiring ***seven or eight*** of said “lot of knock-down power” single-shot, .69 caliber musket balls at close range. You can bet news of that feat of Spanish arms traveled faster than Spanish mules (especially carrying so many men with scurvy). In *every* subsequent meeting with the tribes, the visitors were greeted with either blind fear (at Pajaro) or open arms. As it turned out, besides geese, bears were the only game upon which the Spanish believed they could rely for the return trip to San Diego. Grizzlies were easy to hunt riding a mule with gun because they showed no fear of anything.

Together, these incidents with bears weave a spatial distribution pattern**:** “Many bears” in “Bear Valley” (above San Luis Rey in San Diego County), the Santa Ana Mountains with Lake Elsinore Valley nearby, the San Gabriel Valley, along Santa Barbara beaches, the Los Osos (“the bears”) Valley, the Salinas Valley, the Coyote **Valley**, the San Andreas **VALLEY**, and from Oakland into Richmond (then a boggy depression between ranges of hills). In all of those places, there were both bears and ample big game. In the few spots with people proximate to bears, the Indians not only offered no meat but gave the Spanish decoys for shooting geese.

In Los Osos, Crespí’s diary reported a huge plain with 100 grizzlies “grazing like oxen”, tearing up the soil (probably foraging for bulbs) “as if it had been plowed” over an area of **5-7 square miles**. Where bears were that many, there were no villages. Yet there were bear sightings near the most densely populated villages on the California coast.



The map at left of the San Francisco Peninsula depicts a rough outline of tribal linguistic territories at the time the Spanish arrived. Different dialects this close together would be totally unworkable with the distances people travel today. For proximate Indian languages to be so different indicates relatively little intertribal travel for a period so long that languages from the same Costanoan parent group could drift apart to that degree. Historically, the cause has been assumed to be cultural, perhaps because the Spanish reported that most tribes had warned the Spanish of 'wicked and dangerous people,' assuming they meant other tribes. While there are certainly evidences of frequent intertribal war, there may be another reason for that warning we'll get to in a bit.

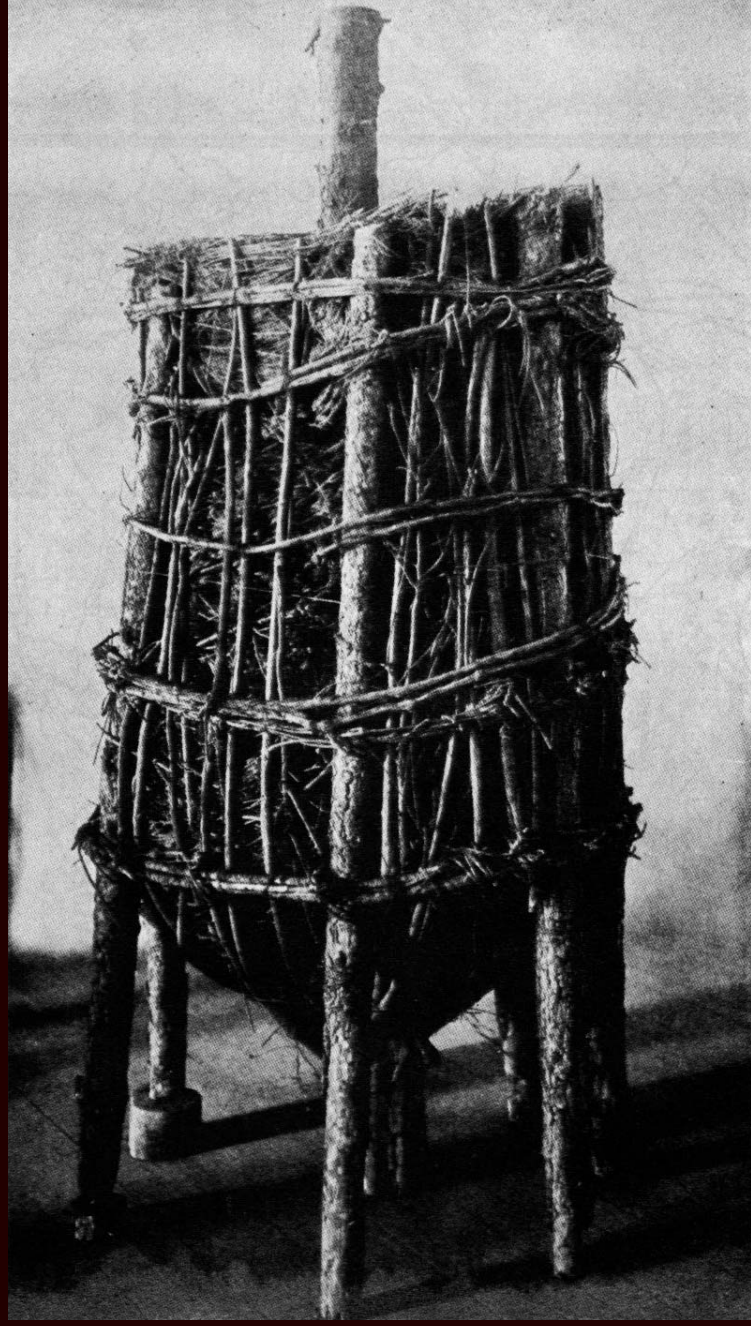
The map at right shows the distribution of archaeological sites spanning a very long period including long droughts and other climate variations. The area in **pink**, showing relatively few archaeological sites, is similar in shape to the unoccupied area at left, yet this is one of the most climatically desirable places to live in the entire world! Along San Francisquito Creek (lower right), note that dense population ends abruptly where the stream penetrates a range of hills (red dashed line) that define the eastern wall of a San Andreas Valley (along the famous fault) some of which was too wet to burn (green). From what I can tell, parts of the valley possibly constituted a seasonal "bear zone," in a sense, functioning in a manner analogous to a geophysical feature rendering the area relatively uninhabitable. The mountains above may also have been hostile to humans but for different reasons in that the grades are very steep, thus less suitable for harvesting. These mountains also yield little very water in summer and early fall. And what do you know but there were areas described with "many bears" sharing similar topography in the East Bay along the Hayward fault.

The Bay itself was a huge marine protein resource: especially clams and snails, fishing being more common along rivers and streams. For Indians of this region farther inland, acorns were the principal source of protein, with significant trade in acorns even across the Sierra Nevada. Yet to this day, virtually every hunter-gatherer tribe in the world with access to red meat prefers it for protein. With all that game available, one then wonders why there are so many archaeological indications of a borderline vegetarian diet in so many California Indians (from analysis of trace isotopes in teeth and indications of developmental rickets) .

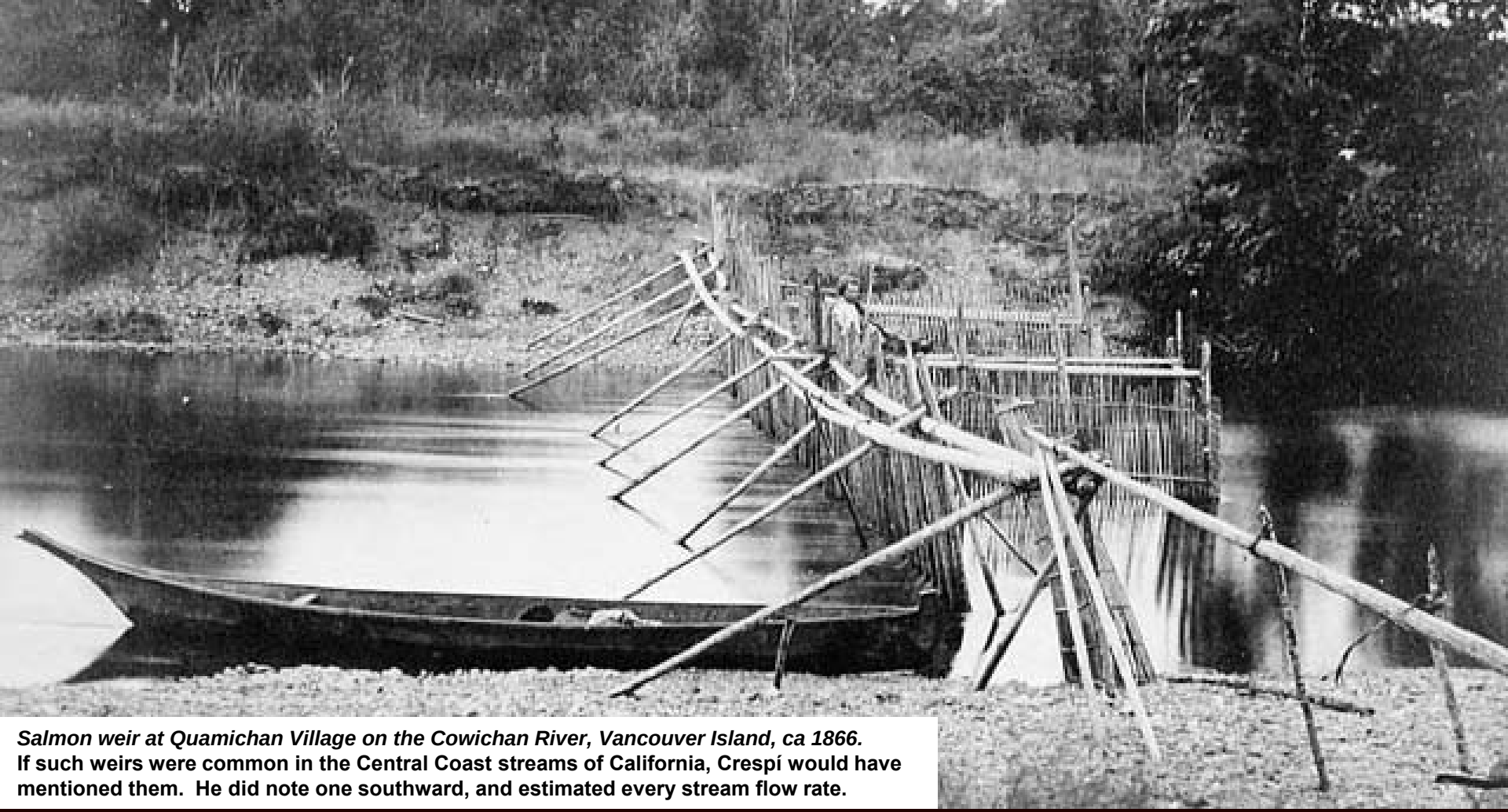
It turns out that the more meat a people eat as a fraction of their total intake, the taller they are. Plains Indians tribes such as the Pawnee or the Cheyenne consumed a steady diet of buffalo meat (after the introduction of the horse); they were taller than even Euro-Americans of that same time. Although height varied greatly among California tribes, they were on average about two inches shorter than plains Indians. Crespí's diary frequently reported his impressions of tribal health, with many comments that the Indians he encountered had wildly variable appearances, with many relatively short in stature.

Why, in a landscape abounding in meat, would people not hunt for and utilize animal materials as aggressively as elsewhere in North America *unless* there was a very serious reason not to? Hence is my conclusion that big game hunting in coastal California was usually a group event as a matter of safety, with the meat consumed immediately (not unusual among hunter-gatherer tribes) lest a troupe of bears joins the party. Other than "bonito" drying atop huts in large Chumash villages, the Spanish reported no infrastructure for drying meat. Nor is there a reliable way to detect how much of the animal materials used (skins, bone, sinew, antlers, etc.) were from carrion, which would certainly be obtainable. Much of what the Spanish records say Indians were wearing other than skirts on women were feathers or skins of small game. Moreover, my guess is that some of that meat went to dogs, a critical ally in defense against bears (and people), a way to clean up human feces, and a meat resource in themselves. Dogs can harass and distract a bear from a human with less risk to themselves. Their acute senses are also an alarm system, day or night.

Similarly, both acorns and bulbs not requiring cooking (such as blue dicks, *Brodiaea, Triteleia,* or globe lilies), would need to be grown and collected at a safe distance from the village because they are also bear food. Acorns, being seasonal, would require expensive storage (right) also subject to weevils.



Miwok Acorn Granary (no date). Acorns were the most important source of protein in the diet of many California Indians. Image from the Smithsonian Institution



Salmon weir at Quamichan Village on the Cowichan River, Vancouver Island, ca 1866.
If such weirs were common in the Central Coast streams of California, Crespí would have mentioned them. He did note one southward, and estimated every stream flow rate.

When spawning season arrived, eagles, seals, bears, and people, all wanted those fish. Yet with the exception of Drake and only in passing, mentions of seals ("sea wolves") in this area were few. With grizzlies and humans competing for food, the archaeological record indicates pinnipeds were dwindling before the Spanish arrived). The Portolá expedition passed along the Central coast from early November to late December, which would be at the start of the salmonid spawning run. Yet the Spanish diaries make little mention of a stream fishery, despite that Crespí went on at length about "bonito" in southern California. So while there certainly was hook, spear, and net fishing, there was clearly not an obvious fixed infrastructure with which to take advantage of, 'so many fish one could walk across their backs;' else Crespí would have noted it as a resource. Why did Indians not make weirs in central California? What would a band of grizzlies, some up to 1,000 pounds, do to a weir full of fish? Would you defend it at night? Crespí did make one (1) note of a fish weir on the Santa Ana River in the midst of a huge plain (Anaheim) far from any village. Why there? Simple**:** it was surrounded by miles of chia sage *(Salvia columbariae)*, an aromatic plant with small seeds inedible to bears. Miles of it.

Yes, it's a black bear, not a grizzly...
…but it's such a cool photo!
See note in the photo reference section.

So, no fixed fishing infrastructure. Similarly, and despite the wildly favorable growing conditions in a coastal Mediterranean climate, California Indians never farmed for food. Why not? Bears are sympatric *competitors* with humans; both eat the same foods**:** roots, berries, bulbs, acorns, nuts, fish, clams, and occasionally big game. Farming is fixed infrastructure. Just imagine tilling, seeding, and tending a crop for a season with your family depending upon the harvest to stay alive. A troop of bears saunters in, gorging themselves on the crop, napping… and happy to kill anything that threatens *their* food. As long as there is some other way to get by, at that point, why bother with farming? Turning the entire landscape into a food resource might keep the bears away while producing more food with less labor. How? Remember that the Indians lacked beasts of burden for plowing just as for transportation. Crespí's diary had observed grizzly bears tearing up the ground for square miles at a time "as if it had been plowed." Don't think for a minute that the benefits of such disturbance would go unnoticed by Indians. Tilled earth made digging for bulbs with sticks much easier.

This lack of farming was clearly not due to a lack of knowledge. Within the Uto-Aztecan language region, coastal Luiseños did not farm, while Paiutes 250 miles to the north clearly did. Within the Yuman language region, the coastal Tipal did not farm, but the tribes along the Colorado River 130 miles to the east also did. To the north and east, bears would have to hibernate in cold Great Basin winters, where there is physical evidence of irrigated aboriginal agriculture.

Archaeological digs of coastal Indians show no maze, no squash, and no beans. There were few tribes along coastal California that even had words for those foods, for which no satisfactory academic explanation exists. Anthropologists and archaeologists have posited that ample game and acorns made farming unnecessary, offering even laziness as the reason; none of which make any demographic sense. More food makes more and bigger people, which increases the power of the polity, and therefore its survival in war.

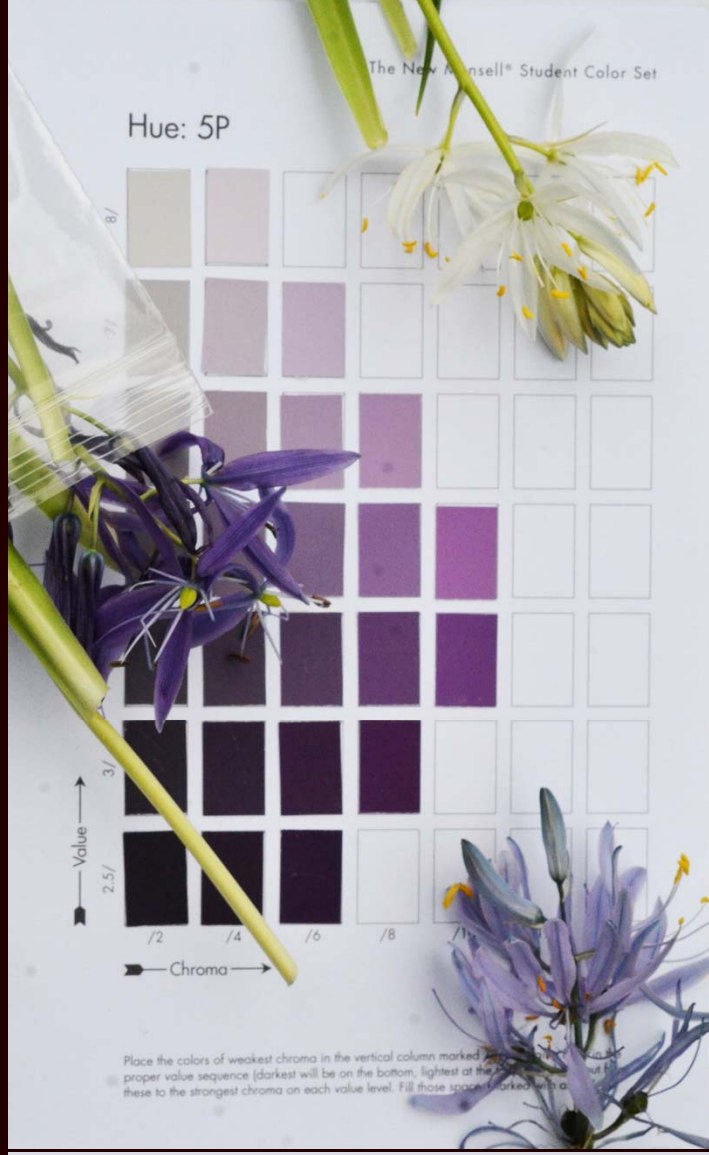
To the south Cabeza de Vaca mentions that coastal Indians had a diet very similar to California, with the same lack of agriculture extending about half way down the Mexican coast. To the north, people farmed camas bulbs on a huge scale, which need cooking to be made edible (bears don't eat camas). Hence the practice was effectively area-denial similar to Anaheim. Here in the Bay Area, growing small seeds may have performed the same function. Bears cannot eat foods requiring grinding and/or cooking.

Lack of water is not the reason for the lack of farming. This landowner dry-farms squash, pistachios, and watermelons in southwestern Utah without irrigation on 13 inches of annual precipitation.

This hypothesis of spatially-demarcated competition between two “apex predators” (humans and bears) both for prey and for plant foods offers us a model by which to posit why the vegetation was distributed as both Spanish and Russian explorers described it. Bears restricted California Indians to proto-agriculture, effectively turning the entire landscape into a food resource, some of it dedicated to defensive purposes. The explorers noted areas near villages as obviously burned at least annually just after the grass harvest and possibly again at season’s end (to harvest tarweeds). Such would foster small annual plants while precluding shrubs and trees producing fruit attractive to bears. But were small seeds the most desirable of foods? Having hand-collected grass seed for years along with gobs of clovers and other wildflowers for our restoration project, I can say with some authority that these seeds are so small that nobody could have subsisted on them alone. Yet there is a sound reason for growing them close to a village**:** Food processing technology (baskets, grinding tools, fire, etc.) rendered a field of small seeds useful to people but useless to bears. Effectively a field of wildflowers formed a defensive perimeter, burned clean so that one could see any threat attempting an undetected approach. This strategy of using vegetation without food value for bears as a form of “area-denial” is quite possibly repeated farther north, where people grew fields of camas around their villages on a huge scale (right). Inulin in camas bulbs renders them indigestible until cooked. The value of “soap root” *(Chlorogalum pomeridianum),* an Indian staple in this area, would be similar.

In boggy areas, fire was apparently less frequent, with the Spanish describing “lush plants” making it more difficult to burn bears with hunting fires (lighting their fur on fire to induce fatal infections). The Spanish repeatedly described both bears, bear tracks, and other large game being found near wetlands. These were possibly at least seasonal “bear zones”**:** wetter areas between villages and avoided by Indians unless in a larger hunting, harvesting, or trading party, both to avoid bears and intertribal conflict. These wet areas were still fairly open because of grazing, and rooting by bears, all being forms of disturbance.

Niche separation between areas controlled by people versus those controlled by grizzly bears would therefore have profound effects upon the distribution of vegetation and wildlife when Americans later encountered it (which is why you are getting this hypothesis), both because of burning patterns and the foraging and rooting disturbances by bears. Hold on for a bit, and you will start to see just how complex, subtle, and impressive the cumulative effects on vegetation may have been over those many millennia. It is our beliefs that blind us to what we see.



Camas characterized against a color standard.

Analysis of camas *(Camassia spp.)* color by location is showing there may be a correlation between colors and tribes, possibly used to indicate territorial boundaries.

Photo courtesy of Dr. Bob Zybach, Oregon Websites and Watersheds Project, Inc.

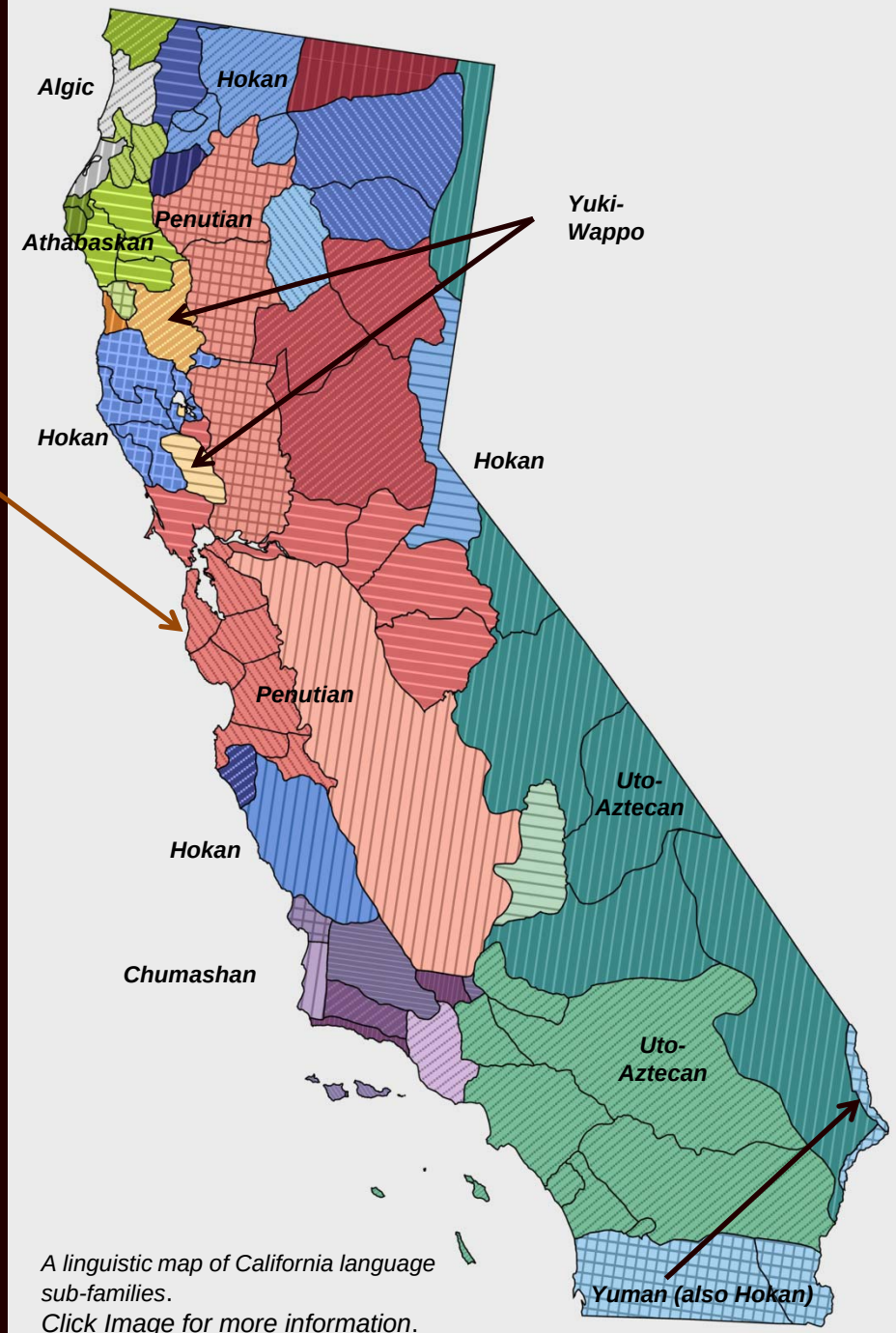
There are six linguistic super-families among North American Indians, each differing *more* than Hindi and Chinese. Of those, five were found in California, having 78 mutually unintelligible languages, one third of all native languages in North America. Inland areas with colder winters were more linguistically dynamic and homogeneous, while coastal tongues were more stable and differentiated. In the Costanoan nation alone, there were 41 separate "tribelets," many speaking mutually unintelligible dialects. No accepted explanation exists for why the density of Indian language differences along the California coast exceeded that of any other region in North America.

That spatial linguistic diversity ceases North of Cape Blanco in southern Oregon, not far from the northern limits of the range of coast redwood. Redwood cannot tolerate hard freezing.

It takes time for speech to differentiate within groups. Hence, these large and numerous differences suggest that either the tribes had remained stable for longer than elsewhere or had less interaction among them. That observation is reinforced by the diaries' reports of major differences in appearance among even adjacent tribes, some fair skinned, some darker, different hair color, stature, some with beards…

Increased isolation abets both genetic distance and linguistic drift. Two physical factors inhibit tribal interchange: (1) a full array of plentiful year-long food resources render exchange less necessary and (2) transportation hazards (grizzly bears) also inhibit exchange. Group exchanges, although safer, were less frequent because they require more preparation. Occasionally, a whole village would go for a festival which would obviously make travel safer. Intertribal wars, while frequent, could not have been genocidal, as total conquest disrupts language stability.

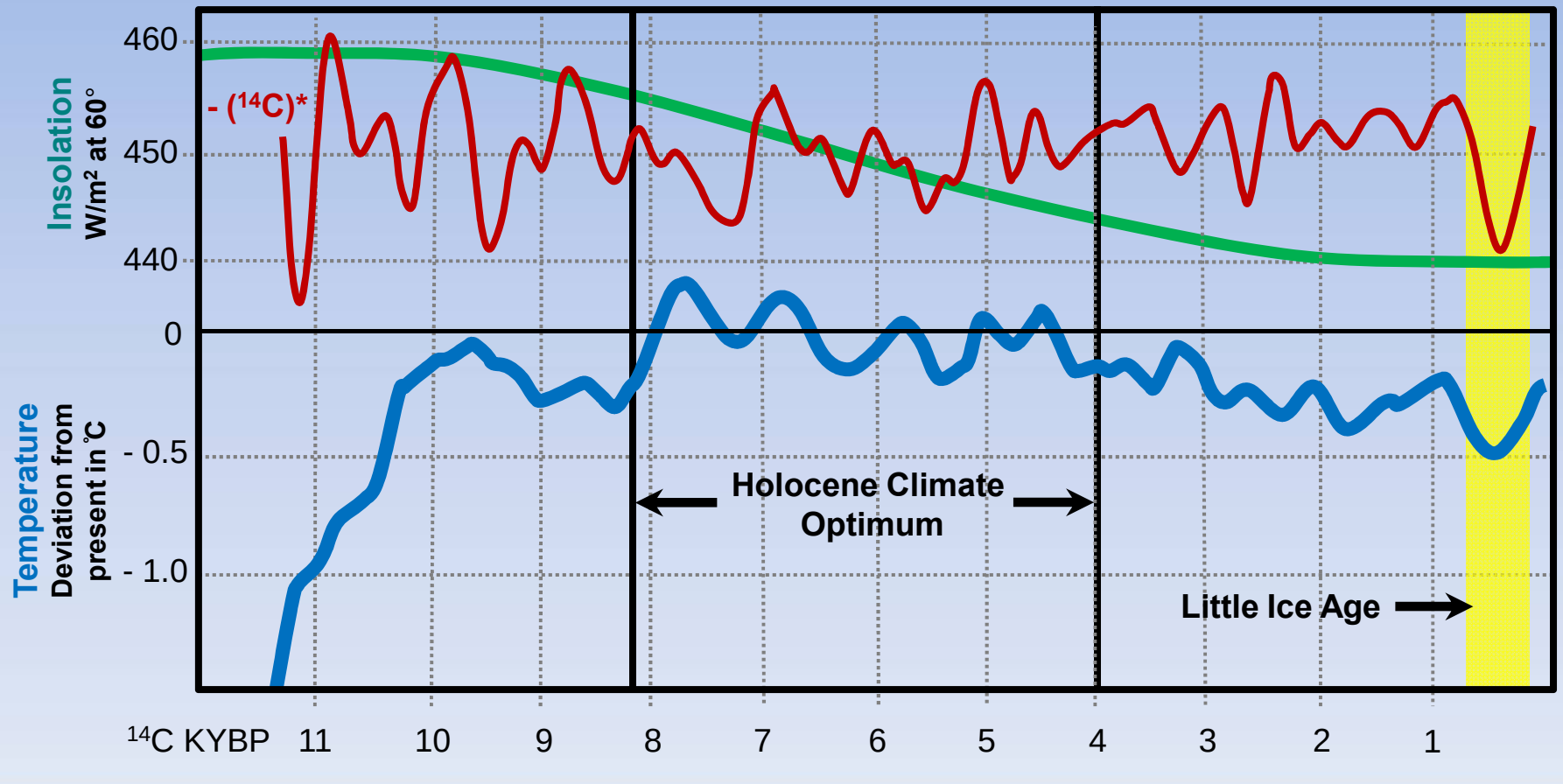
Infrequent intertribal contact could explain why in California there was so little sign of smallpox compared to elsewhere in North America. In effect, the grizzly bear may have helped save coastal California tribes from the first wave of highly contagious European crowd diseases because of less frequent contact.



A linguistic map of California language sub-families.
Click Image for more information.

Holocene Temperature Variation with Solar Insolation and ^{14}C Production*

***Production of ^{14}C** is inversely related to solar intensity, so I inverted and reversed Bond's (2001) ^{14}C graph to show the correlation between solar minima, **insolation**, and "temperatures" derived from ice cores. "**Temperature**" is an average of various proxy estimates from Wikipedia



Some archaeologists cite an increase of large game in Indian middens in the late 1,500s as indication that smallpox had wrecked havoc among California tribes. This "bear hypothesis" offers another explanation: Colder winters during the 1350-1850 Little Ice Age (yellow bar) meant that grizzlies may have hibernated over more of the region because more snow and extended hard freezing reduced the amount of available winter food. This in turn may have allowed Indians in cooler areas to the north and east and possibly in the Coastal mountains to whack hibernating bears more safely and then turn to hunting large game in relative safety.

It might be possible to discern bear hibernation boundaries over time from pollen studies, as correlated with the content of middens. So not only are there no explorers' observations of a pandemic or evidence of European diseases in analyses of archaeological digs, there is no doubt of lower winter temperatures during the pre-colonial period. But how cold was it in California?

Cabeza de Vaca survived eating shellfish in Florida in June 1528, a month in which (today) a red tide in the Gulf of Mexico would have rendered shellfish poisonous. Yet there is no record of his group suffering from neurological shellfish toxicity.

In December 1602, Sebastian Vizcaino's voyage landed at Monterey noting snow on the hills above and ice in a pond frozen a hand palm thick only a few hundred yards from the Pacific Ocean (although Vizcaino's reports were of marginal reliability).

Juan Crespí, the highly reliable diarist of the Portolá Expedition, 24 September, 1769 in Jolon, San Antonio Valley, 25 miles northwest of Paso Robles, elevation 800 feet, behind two ridges of coastal mountains inland from Santa Barbara**:**

> *It is a very cold spot, with snow and heavy frosts* [in September?]. *Through the heathens belonging to this spot, we understand that in some years the snow falls a quarter, a half, or three quarters of a yard deep.*

From the Diary of Gaspar de Portolá amid the Santa Lucia Mountains**:**

> Dec. 19 *…we travelled for three hours, passing the most difficult part of the range on which there was not a little snow [snip]*
>
> *The 17th* [January] *we proceeded for about five hours, making [the same distance as] two marches on the previous journey, and came out on the Llano de la Puente, opposite the great sierra of snow-covered* [San Gabriel] *mountains…*

From the 1769 account of the Portolá Expedition Engineer, Miguel Costansó**:**

> *Thursday, December 7 …in view of the few provisions that remained, the excessive cold, and, above all, the snow that was beginning to cover the mountain range - our commander himself resolved upon the return, believing that if the passage over the mountains became impossible we should all perish.*

They were planning to cross mountains in coastal Southern California. Why were they afraid of snow? The Diary notes that the packet *San Carlos* had supplied the expedition. From the ship's log of Vicente Vila the prior spring, April 26 to May 1, 1769**:**

> *At sunrise, I was between four islands [in the Santa Barbara Channel] and the mainland the country high and mountainous with several high ridges extending northwest to southeast, all of them covered with snow, like the Sierras Nevadas* [meaning Snowy Mountains] *of Granada on the coast between Motril and Salobreña near the Mediterranean. Following the notes of the sea pilot, Cabrera Bueno, I decided that they might be the ridges which the Philippine sailors call Sierras de Santa Lucia above Cape Conceptión* [those along the channel are the Santa Ynez Mountains].
>
> [snip]… *Turning toward the mainland, I noted the extremity of it visible furthest to the westward, bearing WNW. The shore turned toward the southeast, high and broken by several high, snow-covered ridges [probably the Santa Ana Mountains; the entry also notes San Clemente Island]. The country inland, as I have said above, runs southeast.*

These "snow covered ridges" (1,200–2,500 feet in elevation) extended all the way to San Diego Bay as visible from the ocean (deep water sailors were not fond of hugging the coast) **at the end of April**… in Southern California? It takes a lot of snow to cover ridges above Southern California beaches for over a week, where sea breezes should have kept temperatures warm, or rain should have melted it immediately. Yet this was mid-spring. Things were colder in California during the Little Ice Age.

Another indicator of this “grizzly hypothesis” is spiritual. Among many, if not most tribes, eating bear meat was forbidden. This taboo showed up across extended “national” language boundaries (such as Uto-Aztecan, to Hokan, to Algic...) despite stark differences among religious narratives between even adjacent “tribelets” (such as among Luiseños). One grizzly could have fed a small village for a week and made a dandy blanket to boot (it was certainly cold enough). Simultaneously, it was a privilege to wear bear claws around the neck all over the State, so this is clearly not a prohibition against *killing* bears or using their body parts, but against taking their spiritual substance *into* one’s body. Many Indians considered eating bear meat akin to cannibalism.

Concurrently, many tribes believed in an afterlife. For good Indians, there was an Indian paradise**:** beautiful weather, plentiful meat (and also meat that’s sweet)… *Bad* Indians became demons! REALLY bad people returned to this world embodied as… grizzly bears. Readings of tribal ethnographies and discussions with both a distinguished Indian linguist and various archaeologists report that Indians feared leaving their villages for three reasons**:** “bad people,” demons, and grizzly bears (in that order).

Also among many tribes spanning linguistic boundaries there was a special class of shamans known as “bear doctors.” These men secretly dressed in bear suits in which to kill unsuspecting Indians who had not paid for “protection.” Those were “bad people” too.

Could it be that grizzly bears embodied all three? Essentially, the proscription against bear meat may have been a way of avoiding taking the evil spirits of REALLY bad people into one’s body, perhaps to avoid becoming one. Might bears also have been those ‘wicked and dangerous people’ of ‘that other tribe’?

POMO BEAR DOCTOR’S SUIT MODEL IN PEABODY MUSEUM
from *Pomo Bear Doctors,* by S.A. Barrett, Plate 7, p443.

John Peabody Harrington was a genius, astonishingly-dedicated, yet also clearly paranoid. He published little; instead he hid his notes from his peers. Yet unlike other anthropologists of his day, Harrington not only archived over 150 languages, but replicated subsistence crafts from boatbuilding to botany, from fishing to religion. Scholars are still digging through his massive trove of over a million pages of notes, photographs, and recordings, most of which remained undiscovered until his recent death. Photo courtesy of the Smithsonian Institution.

Indians might well have unified all three bear embodiments as wrapped in mysticism, perhaps a way of offsetting fear of being eaten alive with the more tolerable idea of murder. In the case of grizzlies, this potential conflation of idiomatic terms would represent a very reasonable coping mechanism in a tough situation. Similar treatments and taboos existed for rattlesnakes and mountain lions.

Late 19th to early 20th Century linguists of aboriginal languages were in a great hurry to find the last few "speakers" of their dying tongues before they were lost forever. Unfortunately, as an academic fad, this emphasis upon language was at the expense of the more tragic loss of what Indians knew about managing the land they loved. The academics of that time were trained to capture pronunciations and translate word-for-word what they were told. Few ever got as deep as to fathom idiom. They were academics, not hunters, gardeners, or shamans.

For Indians struggling to survive day-to-day, such risks were part of life. It is very hard to appreciate today what it would be like to compete with grizzlies for food, in part because modern weapons and agriculture have changed bear behavior. Grizzlies no longer see humans as competitors for food and fear us where we hunt.

In all my research, I never read about weaponry with the power to kill a grizzly easily in California, neither nets nor strong snares, and few signs of either spears or atlatls. Nor would anything less than a fatal blow deter one. The effective range of a sinew bow or atlatl was no more than the 50 yards a grizzly can cover in 3 seconds. Even if the shot was lucky enough to penetrate the heart (and it's a long way in past very sturdy ribs), the bear still has 20 seconds to live. Unless the warriors could distract the animal sufficiently that it would die before reaching the attacker, said "brave" would earn his title. Yes, they used dogs and fire to distract bears, but it is still an awful risk. It is undisputed that California Indians did kill bears, but the combined evidences indicate that the lack of hibernation made managing grizzlies much more difficult than elsewhere in North America.

Another correlation with this idea of bear refugia for herbivorous animals is found in the attributes of California plants, many of which exhibit features making them unpalatable to or tolerant of grazing animals**:** toxicity, mechanical deterrents (such as spines), or concentrated smells in late season. For example, the needle grass above *(Stipa lepida)* shows itself as adapted to grazing in that its seed is very sharp and it recovers strongly when mowed to the ground after seeding in late May (unlike its analogue in the Great Basin). We have skunkweeds, spine-flowers, vinegar weed, scads of mints and sages, water hemlock, and lots of cacti. All yucky.

In sum, this hypothesis suggests that coastal California had a bifurcated landscape:

(1) Areas where humans burned annually were reported as unbroken grasslands. Burning around village sites for thousands of years would exclude leafy perennials except along streams because fire kills seedlings.

(2) Areas of less frequent visitation with more woody vegetation due primarily to less frequent fire. In the latter, the Spanish saw lakes, aquatic birds, fruit-bearing shrubs, and game, with signs of human travel but rarely Indians.

Fire-scars on conifers corroborate that burning in forests was less frequent than around villages. There were also areas under either dominion on seasonal bases (such as hazelnut or oak stands) when Indians and/or bears went in groups to gather. Brush for fuel wood would be similar.

It's a model, reality surely being more complex. If bears did provide ungulates refuge from Indians, it would explain why Indian meat consumption was usually small game despite large animals nearby grouped in herds (a behavior indicative of predatory pressure). Apparently ungulates preferred to take their chances with bears and mountain lions rather than people, which fits with the lack of game elsewhere on the continent where Indians were uncontested apex predators.

Crespí also reported higher coastal stream flows at the end of the dry season than what we see today, even in areas with virtually no human use (right). Particularly important is that this was during a near century-long drought during the Little Ice Age. Today, without Indian burning or grazing, vegetative competition for moisture renders most of those streams dry in late season. Burning ironically reduces vegetative water competition such that late season riparian vegetation might well be "lush" as described. These would be areas that could function as animal refugia from Indian hunting fires, places that would not burn in all but unusually dry conditions and only with sufficient fuel loads (hence redwood forests).

OK, that prior page might have seemed needlessly complicated, but you may want to review it. Here you are seeing a few of the manifestations of the underlying biological principles that description reveals. Vegetation here at the Wildergarten shows that it *is* possible to grow "lush" annual plants into October. In this late September image are lush vinegar weed *(*"blue curls" *Trichostema lanceolatum)* and pink cudweed *(Pseudognaphalium ramosissumum)* (the dry ground-cover is *Verbena lasiostachys*). Neither has received any water in five months, and this was a drought year. The blue curls are 1-2 feet high, while the cudweed reaches over four feet. My conclusions are that fungi and disturbance make this all possible. Neither species germinates well among grasses.

To summarize the early emphasis upon bears in this background history, we have both Russian and Spanish evidences:

Locations with evidence of bears become predictable with topography; no sign of fear of people, either huge amounts of game or a near total dearth varying by topography but not by linguistic family or managing tribe, indications of predatory pressure in grazing animal behavior, large amounts of unconsumed plants within inhabited areas with seeds edible by people but not bears, variations in vegetation by area otherwise inexplicable by weather or soil, areas burned or not with frequency indicated by types of vegetation observed, Indian celebration of a successful Spanish bear hunt, the Spanish were treated with either celebration or (rarely) abject fear, type of food offerings with only one instance of red meat during the entire Portolá Expedition, diet, lack of clothing despite frequent snow, latitudes at which people began to be fully clothed, Indians expressing great desire for clothing, dearth of fish weirs, drying racks, or skin processing equipment, warnings about “bad people” offered by multiple tribes up the entire coast, wide variation in Indian physical appearance, no recorded smallpox scars, number and types of weapons, no individual deer hunting observed until 1815 (Russian account), with only one large hunting party seen by Crespí .

Scientifically Measurable Data:

Indications of the severity of the Little Ice Age in north coast hard freezing curtailing the range of redwood. Spatial distribution of pollen as indicator of aboriginal burning and climate change. No genetic evidence of specifically European diseases (yet), multiple demographic indications of the lack of a pre-colonial onset of smallpox. Genetic adaptations in plants to intensive herbivory, and skeletal stature and analytical data on bone composition indicating Indian diets consumed relatively little red meat. Relatively low amounts of large bodied animal bone in middens especially pre-1500, spatial distribution of agriculture v. its lack in coastal areas, spatial distribution and scale of vegetable food processing and storage technology. Fire scars, tree rings, and ash strata indicate locally variable point and composite frequencies of fire events. Grizzly bear diet does not include soap root, blue camas, or small seeds which were most common around village sites and trade routes.

Ethnographic Data:

Distribution, number, spatial and stability of language families, divergence of linguistic sub groups. Material technology largely dependent upon vegetation when animal products were superior. Multiple Indian religions holding both bears and demons as reincarnated “bad people.” A common racket selling protection against bears, rattlesnakes, and mountain lions. Common taboo against eating bear meat as cannibalism. Ubiquitous nakedness where the weather is uniformly cool or cold. First-hand tribal accounts of bear interactions. Few spears, commonality of hunting practices, and many weapons too small for big game.

Together, these indicators form cohesive, multidisciplinary, and orthogonal data sets **all** supporting the hypothesis that niche separation between people and grizzly bears determined much of how and why California vegetation adapted to human and animal inputs over time. The records and measurements correlate with local climate and soil conditions as determines whether the vegetation in a particular area would burn intensely or not, usually varying with topography. If it was wet enough or the ground was so torn up that would not burn, bears had refuge from death by fire and subsequent skin infections. Similarly, conditions supporting large amounts of edible bulbs could be a place that bears would dig up such that it would not burn. If it was cold enough to force bears to hibernate, people would kill them, access big game, and the vegetation would change accordingly. These distributions of people, bears, and vegetation have yet to be mapped with respect to changing climate, but it may be doable.

So, how did the academic community miss grizzly bears being such a big factor in coastal Indian life for so long? In the early 1900s, the University of California sponsored a major project to translate the accounts of early Spanish explorers. The obvious first target was the four-volume Memoir of Francisco Palóu which contained a diary of the Portolá Expedition. For nearly a century, Bolton's translation of Palou's Memoir was the only account of first contact until Alan Brown's discovery and masterful translation of Juan Crespí's two original manuscripts, published in 2001. With Brown's at $60 and Palóu's at $600, which one I bought first was an easy choice.

Because of my interest in original vegetative conditions, I was curious about Brown's translation of *sacates* and *empastadas* both as "grasses" as opposed to the latter being generic "pasture." So I obtained Palóu. It wasn't until reading the two, side-by-side, that I noticed the many differences.

Unfortunately, unlike the faithful and diligent Crespí, Palóu was a bureaucrat. The Spanish were having difficulty inducing ranchers in Mexico to relocate to California. With all the forage up here, one wonders why, but for the likely rumors of nine-foot tall bears weighing over half a ton! Palóu had carefully redacted all but one mention of bears from Fr. Crespís diary, California's first documented case of real estate fraud. Effectively, I am the first hands-on multidisciplinary ecologist to have studied both sources. That is why it was missed.

Invasions

November 2016 – Laguna Del Sargento, with grasses already green from early rains that fall

Google Earth

Our property adjoins what was a trade route from *Chalotaca/Sayante* “tribelet” lands (to the south near what is now the City of Scotts Valley) north through *Matalan* lands into what is now Santa Clara Valley. It follows a steep, hot, dry, and erosive ridge of very poor sandy soil, making even transitory survival a demanding physical challenge for aboriginal traders lacking pack animals. Above is a key link in that journey near a pass across the mountains**:** a spring-fed pond at the high-point of the trail, the *Laguna Del Sargento*.

In 1791, the Spanish Franciscans at Mission Santa Clara conscripted 500 Indians to improve the trail into a road with which to build and supply the new Mission Santa Cruz (red outline). That August, they brought oxen, sheep, horses, and cattle over the trail. The first invasive exotics came in with those animals, and haven't stopped coming in ever since.

One PhD biologist, expert in local native plants, who has visited *Wildergarten* twice, told me years later that the reason for the success of our project is that it is in a relatively remote and undisturbed location. Nothing could be farther from the truth. This place had been continuously impacted by civilization for 200 years. For the first 100, it adjoined the principal transportation corridor between the Santa Clara Valley and Santa Cruz. Every weed in the region came by this spot with drayage animals and herds, dropping seed when they paused to graze (above). Over the next 100 years it was logged, burned, graded for a half mile of roads, and then terraced for an orchard. It was forested with exotics like eucalyptus for erosion control and acacia for firewood. There were multiple structures. Automobile parts and other junk were dumped down the hill to slow gully erosion. Used steel tanks were filled for retaining walls. And then, it was abandoned during the Great Depression, occasionally grazed or bulldozed to deal with invading brush, native and exotic.

Mission Santa Cruz, 1876, by Léon Trousset, oil on canvas (cropped). This is not considered an exact rendition. It was painted 14 years after the mission had collapsed in an earthquake.
Image courtesy Sr. Betty Pedrazzi, Holy Cross Church, Santa Cruz, CA.

According to the Franciscans, they *enticed* the Indians with food and clothing in return for labor to build Mission Santa Cruz (by other accounts 'enticement' was at the end of a rope). The Indians were housed in close quarters, the women occasionally "interacting" with the dregs of soldiers from the nearby Presidio at Branciforte. Mission escapees carried European diseases back to their families: flu, syphilis, measles, and tuberculosis. In 1793, the Spanish banned Indian burning in order to maintain more dry season forage for cattle. Between the burn ban and the diseases, tribal land management ceased completely in only a few years. As a consequence, the pre-colonial Indian food and material economy based upon post-disturbance plants was displaced by weeds at an almost unimaginable rate. We know by marine pollen records that exotic filaree *(Erodium spp.)* had invaded Chumash territory before the Portola expedition arrived in 1769! Fremont reported that the Livermore Valley was covered with bur clover *(Medicago californica)* in 1841. The necessary result of rapid invasion and ending regular burning would be rapid depletion of native food and materials. The missionaries introduced and eventually learned how to grow more productive crop plants, especially once they had channeled irrigation water, but cattle hides were the main cash export. Spanish stock animals wandered wherever they wanted, sowing their "wild oats" wherever they went, overgrazing coastal and riparian grasslands. Horses especially wandered wherever they wished and bred to the point that the Spanish were running herds miles long over cliffs to save the range. By the time Americans arrived 80 years later, weeds, grazing, and fire exclusion had changed the landscape around the mission and the trail completely, transforming the soil in the process, and spread from there. With disturbance by bears, horses, and cattle, exotics would be distributed widely.

Nobody knew what was going to happen, as transoceanic ships had made the rapid introduction of alien plant species a relatively new thing in the world. An itinerant preacher, Reverend T. Starr King, recorded his impressions of the Bay Area in 1859. They are quoted here in full so that you can get a sense of a landscape under transformation, how much it has changed since, and what that portends for the future. After this quote, I will discuss some technical conclusions from Reverend King's observations and then get back to pictures covering what has since transpired. I wish I could offer a photo to show you how things might have looked like back then, but sadly, I know of no place where this is possible. His words, I think, are adequate:

"AROUND THE BAY" IN THE SEASON OF FLOWERS (source link)

In the early part of May, a week after my arrival in California, I was invited by a very intelligent gentleman in San Francisco, to take a seat in his carriage for a "drive around the bay." This means around the Bay of San Francisco, which extends southerly about fifty miles from the Golden Gate, where the tides of the Pacific force their way inland. The bay is, therefore, a large salt-water lake, about eight miles broad and six times as long. It is dotted with islands, and lies placid in the embrace of some of the richest lands of California. In making the tour around it, we drive down along the narrow county of San Mateo, whose hills divide the dreamy bay from the billows of the Pacific, then across the county of Santa Clara, and up, on the eastern side, through Alameda county to Oakland, where the ferry-boat returns us to the metropolis of wind and fog, whoso climate in summer is exhaustively stated in the phrase, "gust and dust" [before modern times, much of what now comprises San Francisco was open sand dunes – ed.].

Early in May is the true time to make this excursion, for then the country is at the height of its brief bloom. California has often been compared with Palestine and Syria for scenery. The passages in the Psalms and the New Testament which describe the fleeting beauty of the flowers and the grass, are certainly applicable here. "For the sun is no sooner risen with a burning heat, than it withereth the grass, and the flower thereof falleth, and the grace of the fashion of it perisheth" [James 1:10-11]. Indeed, there is no grass, properly speaking, native to the landscape. The green of early May on the uncultivated plains and slopes is mostly that of the wild oats. As the summer sun rises, and the rains cease, they ripen into a golden tinge, which, at a distance, is the hue of sand, and their seed drops into the parched and crackling ground for new crops when the rain returns. By the middle of June all the wild fields that are destitute of trees, look sandy with this harvest of indigenous and self-sowed grain [this is how much of California looks to this day, indicating how early, rapid, and complete was the change wrought by the early Spanish introduction of exotic wild oats]*; and it is only in May that the plains and hill-sides which the plowshare has not broken are clad in their vesture of embroidered green.*

But the beauty is as captivating as it is evanescent. Some travelers have written of the marvelous effect of the air of California on the spirits. Bayard Taylor tells us that, on this very drive, he felt in breathing the air like Julius Caesar, Milo of Crotona and General Jackson rolled into one. I cannot honestly say that the vivifying quality was any greater than I have experienced in the Pinkham woods, or the forests of Mount Adams, or on the heights of Randolph. Oxygen is oxygen, and will General Jacksonize a man as quickly in Coos county, New Hampshire, as when it blows over the coast range of

California, fresh from the Pacific. But there was a great exhilaration in the first acquaintance with the scenery of a strange land, especially when made in a luxurious carriage and with the accompaniment of pleasant companions and a very spirited team.

The first thing that arrested attention after leaving the sandy shores of San Francisco was the flowers. Early in May, in New England, people hunt for flowers. A bunch of violets, or a sprig or two of brilliant color, intermixed with green, is a sufficient trophy of a tramp that chills you, damps your feet, and possibly leaves the seed of consumption. Here they have flowers in May, not shy, but rampant, as if nothing else had the right to be; flowers by the acre, flowers by the square mile, flowers as the visible carpet of an immense mountain wall. You can gather them in clumps, a dozen varieties at one pull. You can fill a bushel-basket in five minutes. You can reap them into mounds. And the colors are as charming as the numbers are profuse. Yellow, purple, violet, pink and pied, are spread around you, now in separate level masses, now two or three combined in a swelling knoll, now intermixed in gorgeous confusion. Imagine yourself looking across a hundred acres of wild meadow, stretching to the base of hills nearly two thousand feet high the whole expanse swarming with little straw-colored wild sun-flowers, orange poppies, squadrons of purple beauties, battalions of pink and then the mountain, unbroken by a tree or a rock, glowing with the investiture of all these hues, softened and kneaded by distance. This is what I saw on the road to San Mateo.

The orange and purple seemed to predominate in the mountain robe. But on the lower slopes, and reaching midway its height, was a strange sprinkling of blue, gathered here and there into intenser stripes, and running now and then into sharp points, as if over the general basis of purple, orange and yellow, there had fallen a violet snow, which lay tenderly around the base, but in a few places on the side had been blown into drifts and points.

The wild poppy of California, in May, is the most fascinating of all the flowers. It does not have a striped or spotty leaf, but is stained with a color which is a compromise between a tea-rose and an orange, and is as delicately flushed and graduated in hue as a perfect rose. I never tire in studying their color, in masses or singly. While driving to San Mateo, we came upon little clumps of them, springing out of the rocks on the edge of the road that overhangs the bay, and their vivid orange, upheld on graceful stems, and contrasted with the grey stones and the blue of the bay, gave me a joy which comes up as fresh while I write as when I saw it first. Another piece of cheer intrudes itself between my eyes and the paper, and insists that a pote shall be made of it. I mean a California blackbird, perched on a mustard stalk ten feet high. The wild mustard [also introduced] *grows luxuriantly on the lands at the foot of the bay. It is a great trouble to the farmers, for if the cows eat even a little of it and they seem to like it for seasoning it gives a pungent flavor to the milk and makes the butter bite. But a field of it in brilliant yellow is decidedly a pleasing condiment to the general feast of colors. And when a blackbird with a large spot of scarlet on each wing flutters over a tall spear of it and then alights with a cheery twitter, one has a picture before him which gives two-fold delight by making him repeat the couplet of Holmes:*

The crack-brained bobolink courts his crazy mate,
Poised on a bulrush tipsy with his weight.

If I quote wrongly, may the genial and always accurate Professor forgive me. I repeat from memory, and must wait till the Mameluke arrives from Boston with my books, before I can verify a dozen passages of his, which the Californian scenery sets to music again in my brain.

And yet the old Californians, "forty-niners," sigh when you speak in praise of the May-luxuriance around the bay. They say that the glory is over now. "Ichabod" is written on the landscape. They rode over the same districts when there were no roads, or ranches, or fences, between San Francisco and San Jose, and when the horses wallowed and galloped through an ocean of floral splendor [already covered in oat grasses as described above]. *The visitor cannot help noticing, when he leaves the base of the mountains, and comes to the farms, how civilization has tamed the land. The barley and wheat, and bearded sweeps of simple green, look cool and unromantic in contrast with the natural coat of many colors which the unploughed districts wear. The brindled leopard has taken the hue of the cat. It is only when, here and there, we come upon a garden, and see the blaze of roses which bloom the year through, that we see how superior art is to nature.*

OK, anyone familiar with the current appearance of northern California should be seriously circumspect, in that the lands "our" open space districts, parks, and conservancies are currently "protecting" bear no botanical resemblance whatsoever to what was "Natural" when white explorers first beheld the Bay Area. So if this was May and these were seed crops, the "sunflowers" were probably tarweeds *(Madia spp.)* and mule's ears *(Wyethia spp.)*, the purple and blue maybe *Gilia*, lupine, or bulbs such as *Brodiaea elegans*, *Tritelaea laxa*, and *Dichelostemma capitatum.* The pink and white might be peas *(Lathyrus spp.)…*

King's account of these plants suggests that the populated area around the Bay had long been burned at least annually, similar to what Crespí and the other Spanish diarists had noted. Accordingly, this was NOT a "Natural" landscape, but a relict wild garden, once regularly and heavily impacted by between 15,000 to 30,000 Indians, people who depended upon select plants for food, materials, and craft goods. Most of these plants produce very small seed. Hence, the burned flatlands and low hills had to be dominated by flowering plants harvested for seed to make a usable amount of food for people, but not bears. My experience here suggests that without fire, native perennial grasses (which are very poor as grain) would have taken over wildflowers even if the oats had not been introduced. So why it was still in flowers when King saw it 60 years after the Spanish burn ban is a mystery. Perhaps it was simply a lack of seed where it had been burned for so long. Many of those hills are very steep for cows.

We cannot go back to what it was. We cannot burn the landscape annually. We do not harvest tiny seeds as staples. We do not dig bulbs for food. Yet we still have a responsibility to keep the genetic constituents of this system reproducing; else they will go extinct; and we will then lack genetic means to reintroduce those plants and insects should that become economically and/or technically achievable or desired. *Wildergarten* is the first project, **ever**, to achieve a substantial fraction of that initial goal, proving that restoring a native plant landscape, one with meadows including large numbers of native annuals but still dominated by grasses, is at least technically possible. We are maintaining reproducing cohorts of post-disturbance annual plant systems and we are cleansing the seed bank such that, the plants come up native in many locations after a burn. We do not have all the plants that once grew here, nor are they distributed as they probably once were. So now that we have proven that restoration is at least possible at small scale, the goal is to make the process affordable while playing with the system to learn how it works.

Characteristically, King could not see “art” in “nature,” because he suffered from the same acculturated disease we do today, thinking that “Nature” got the way it was without human agency. Remnants of what he described can still be found, although degraded from their original magnitude and variety. Like regular Indian burning around San Francisco Bay, this landscape in Tejon Ranch in southern California is maintained in an early successional condition by regular disturbance**:** periodic cattle grazing. Hopefully, a way can be found to maintain these unbroken views despite the financial pressure to seek more profitable land uses; namely residential development. Either way, the weeds will win unless somebody cares for it.

June 2014 – About 150 feet from our property line.

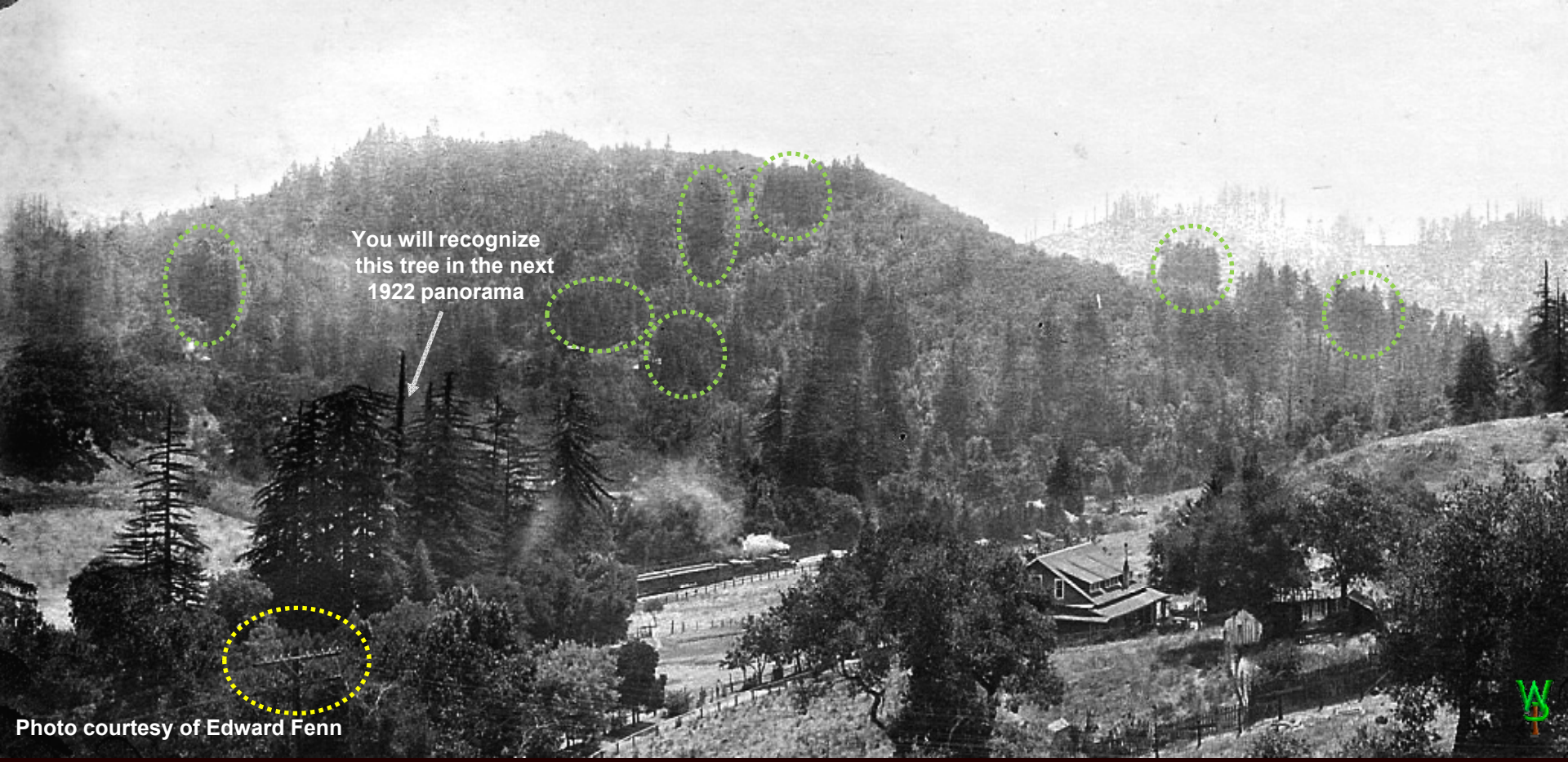
"As the summer sun rises, and the rains cease, they [oats] *ripen into a golden tinge, which, at a distance, is the hue of sand, and their seed drops into the parched and crackling ground."* This is what a "wild oat" *(Avena barbata)* invasion looks like today when grazing is has been abandoned for but 20 years. There are now an estimated 27 million acres of oats in California, an area the size of Ohio. The Journal of Zenas Leonard's 1833 trip to California (only 64 years after the Portolá expedition) reports that "oats" (what a Euro American would recognize as such, as the native *Danthonia* oat is much different) were dominant in the east San Joaquin Valley. The journal of James Clyman reported wild oats in patches, covering whole landscapes from Red Bluff to Sonoma in 1846, with Farnham claiming that coverage extended over the bulk of the San Joaquin during his travels in the early 1840s. The reason oats were there so early is that the Spanish managed horses as a commons. Horse herds multiplied so fast and spread so far because the Spanish made no effort to affix responsibility for what they did. Indians from the Sierra foothills were stealing them from the Spanish for food. With Spanish oats and overgrazing, the land quickly changed, much of it beyond recognition. Then came the Americans.

This cabin is falling into ruin at Charley McKiernan's Ranch. It is a sad thing to watch.

With the construction of the Spanish trail in 1791, 12-15,000 years of anthropogenic stability had ended. Since then, the ridge where we live and upon which it ran has endured a tumultuous botanical history.

Charles McKiernan accelerated that rate of change in 1850 (left) when he blasted and graded the trail into a road suitable for heavy wagons. James Brewer (of the 1861 US Geological Survey of California) rhapsodized about the road in his diary ***Up and Down California*** as "the most picturesque road we have yet driven." He went on at some length about the immediate area, which was quite different than what we see today.

Development sprang up alongside the road to facilitate transportation and to take advantage of it. There were ranches, orchards, and vineyards. People even tried their hand at potato farming. Our place saw harness repair, milling redwood moldings, and eventually an apple orchard (the eroded terraces and trashed equipment are still visible). There are also signs of sand quarrying. The place was logged and burned in stages between 1880-1900, and then things really got going.



In 1853, Charlie Martin had homesteaded this valley east of the road and founded what became the **TOWN** of Glenwood (emphasis for the benefit of those thinking development in these mountains is 'invading an undisturbed Natural landscape'). By 1879, there was a train station (there is a train in the picture), a rail yard with over a half mile of track at the head of a 1.1-mile tunnel to the nearby town of Laurel. By 1880 there were three hotels, a lumber mill, a winery, a general store, a dance hall, a post office, stables, a campground, and over 20 cabins to house visitors. This photo was taken in 1922. By then there had been labor camps for the Chinese workers who built the railroad tunnels through the adjacent ridges along with animal handlers, craftsmen, cleaning women, cooks, and other workers that lived here. There was also electrical power and telephone service (pole in the left foreground). I have enhanced the sharpness and contrast of this image to show individual trees. The pointed tops of the redwoods in the background, indicate that they are growing rapidly and are therefore younger than the old growth trees along the creek at the bottom of the valley in the left mid-ground. The relatively few **clumps** with pointed tops in the background had probably sprouted from logged stumps. Individual young trees were likely from seed, either in burned slash or had escaped their former range because of the Spanish burn ban (more on that later). Redwoods grow over 60 feet tall in 30 years. This photo shows that, although they did log up the draws, both Charlies, Martin and McKiernan, had retained their finest specimens for their customers to enjoy. Their advertising says so.

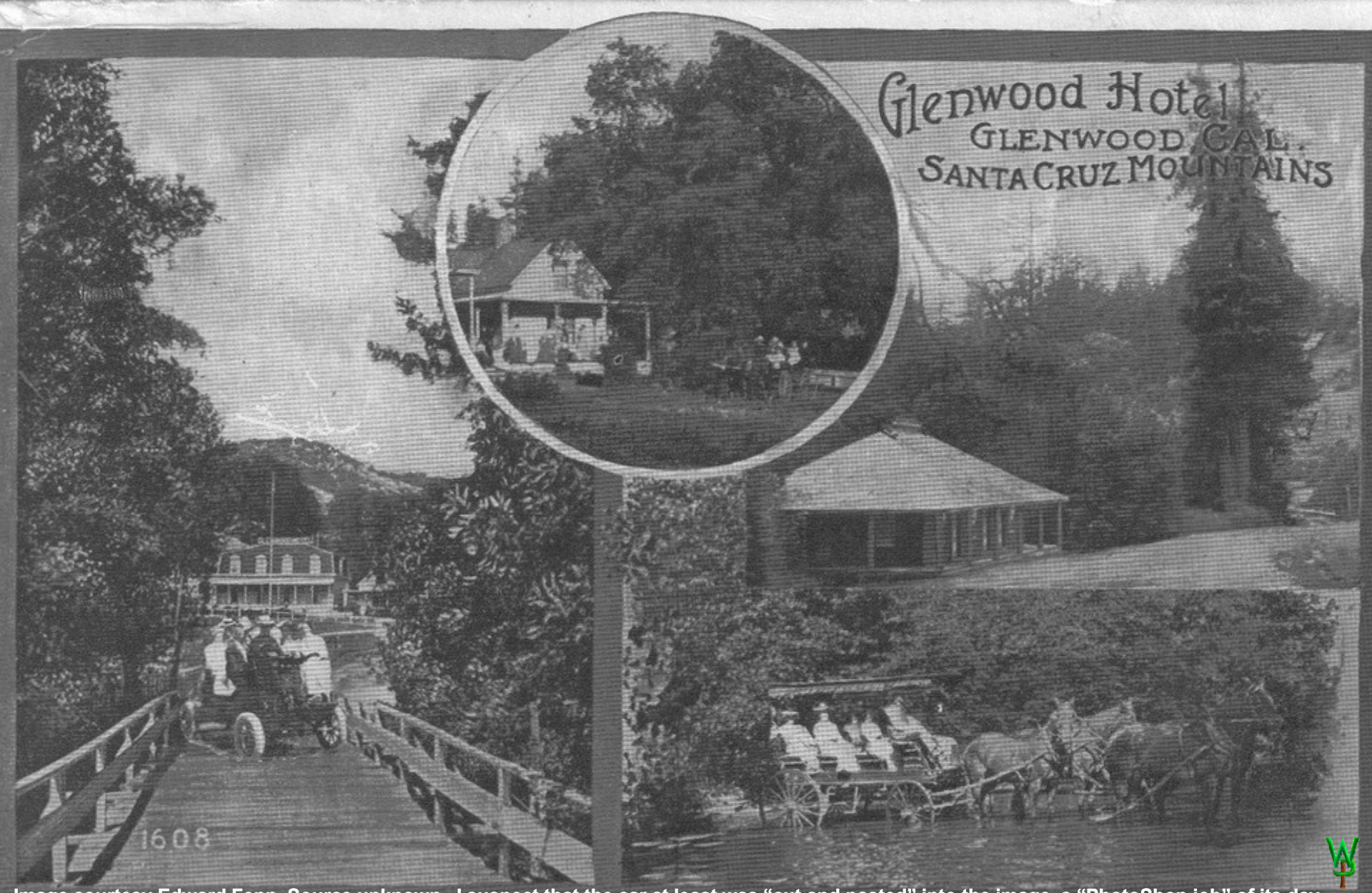


Image courtesy Edward Fenn, Source unknown. I suspect that the car at least was "cut and pasted" into the image, a "PhotoShop job" of its day.

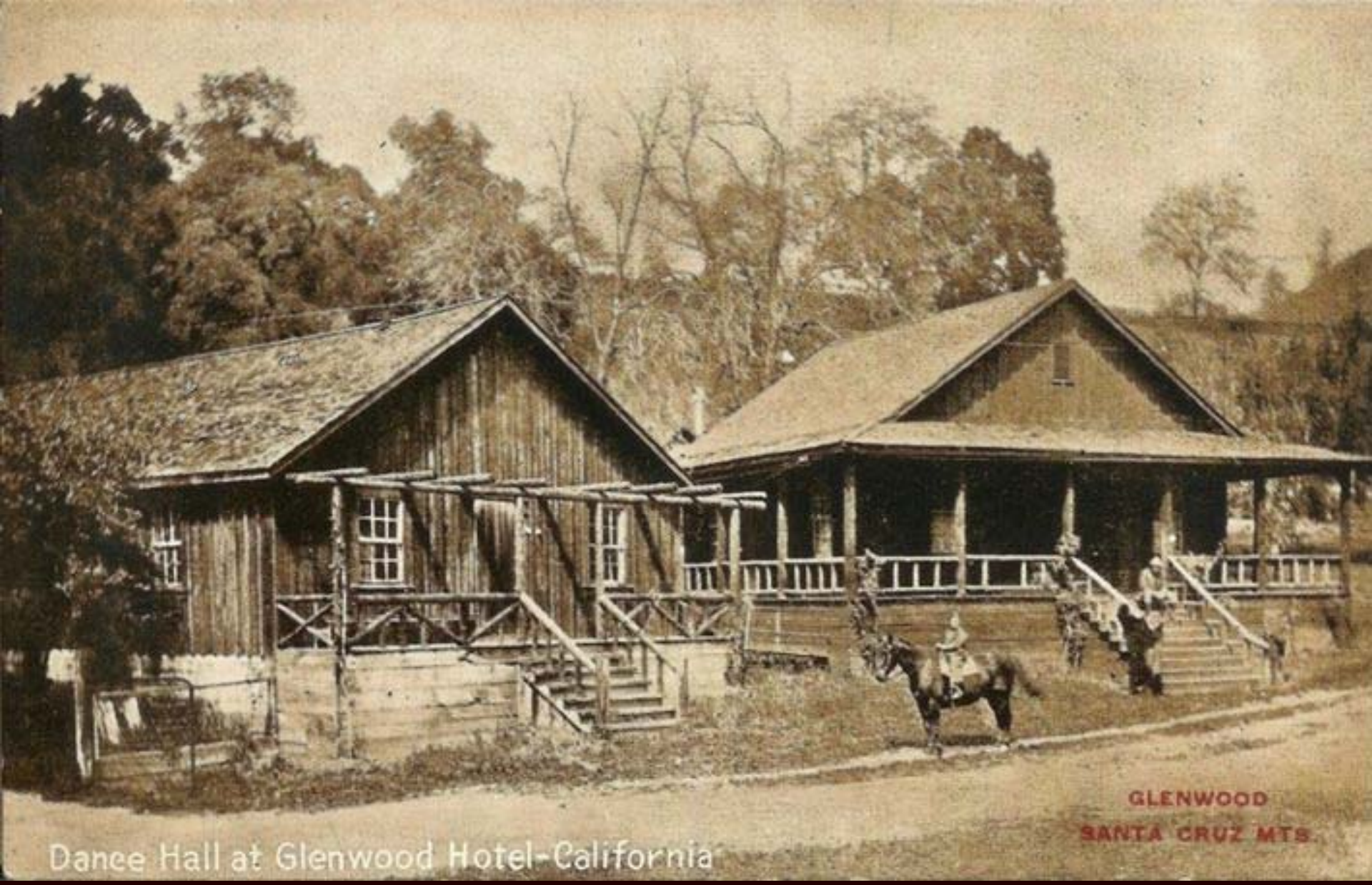
An ad in the San Francisco Call, July 1909 read, *"GLENWOOD HOTEL, Among the redwoods of Santa Cruz Mts. On the new short line, 2 hours from S. F. Write for circular. WM. MARTIN, Glenwood. Santa Cruz county, Cal."* Built in 1884, this was Charlie Martin's idea of a private "park." It was quite the attraction. Another resort near the hotel (Glenwood Magnetic Springs) hosted a campground, cabins, picnic facilities, and a swimming pool. The key to making it all happen was the train.

Photo taken ca1890s just south of the Glenwood Train Station, from santacruztrains.com

It was called, “The Picnic Line.” On weekends in the early 1890s, hundreds of people **per day** debarked the train to escape the city and enjoy the landscape. They had their choice of resorts**:** Glenwood Magnetic Springs, Summer Home Farm, or Villa Fontanay. Note how many fewer redwoods on the hillsides in the background there are than in the prior panoramic photo taken 30 years later. Was it because of logging? No, the spacing is too open and the young trees are distinct. The likely reason is much more interesting.

Image courtesy Derek Whaley, Source unknown but probably the Margaret Koch Collection of the Santa Cruz Museum of Art & History

This was the Glenwood train station. Effectively, this was eco-tourism by privately-funded rail mass-transit **long** before there was a decent road to the town! The two hours to get here from San Francisco is about how long it takes now by car (except during commute hours or on weekends). Note the bare patches of sand on the hillsides above. These soils are *very* poor. Because access was easy and because it was so well known, Glenwood was an early target for botanical surveys from the University of California that become important to the observations discussed in the next chapter about local extinctions of early successional plants. Even in the 1890s, this spot was noted for its biodiversity and unique combinations of grassland, riparian, and sand-hill species.



By the turn of the century, 5,000 picnickers transiting that rail line **per day** was not considered unusual. To catch their share of customers, the town of Glenwood added a dance hall, a bowling alley, a billiard room, a smoking room, and a conference center capable of serving 250 guests, and yes, there was even electric lighting! This was a busy community built around the Glenwood Hotel which soon had a pair of competitors. The permanent population of Glenwood reached 500 residents.

This was a product of grand ambition, vision, love of place, and an enormous amount of hard work.

GLENWOOD HOTEL—GLENWOOD, SANTA CRUZ COUNTY, CALIFORNIA

Nice place to visit, no? This was not a low-class or rustic operation. Yet only 30 years later, it was all gone.

Postcard: Glenwood Highway, 1920, Courtesy of Gil Pennington

Before the train, the only way to get to Glenwood was via Charles McKiernan's tortuous toll road on the ridge above. The State proposed to build a highway through the Santa Cruz Mountains for which Mr. Martin offered a "free survey" suggesting that the "best" possible route went right through Glenwood! The Highway opened in 1916. Three years later it was paved with 5" of steel-reinforced concrete (left), paid for out of the US military budget!

In came the cars. Alas, the gravy train for Glenwood was not to last. A federally subsidized concrete highway and falling prices of mass-produced automobiles and gasoline lured passengers away from train travel. With fewer rail passengers, ticket prices rose and customers chose. Drivers passed through Glenwood on their way to bigger resorts at the socialized beaches in Santa Cruz where it is cooler in summer and replete with amenities.

In 1934, the State of California opened State Highway 17 from Los Gatos to Santa Cruz. This new "best" route bypassed Glenwood by about half a mile. Charlie Martin's gas station and store closed the same year. The hotel closed 5 years later. To this day, people brave a weekly traffic jam on Highway 17 crawling to the beach on weekends. The Picnic Train ran for the last time in 1940. Much of the route near Los Gatos lies under a reservoir today.

After the War, the State opened Henry Cowell Redwoods State Park not far down State Highway 9 from the end of State Highway 17. The option offered use of public campgrounds effectively for "Free!" The State pays nothing for liability insurance with unlimited legal resources. The days of large private land entertainment resorts, like Glenwood, were doomed.

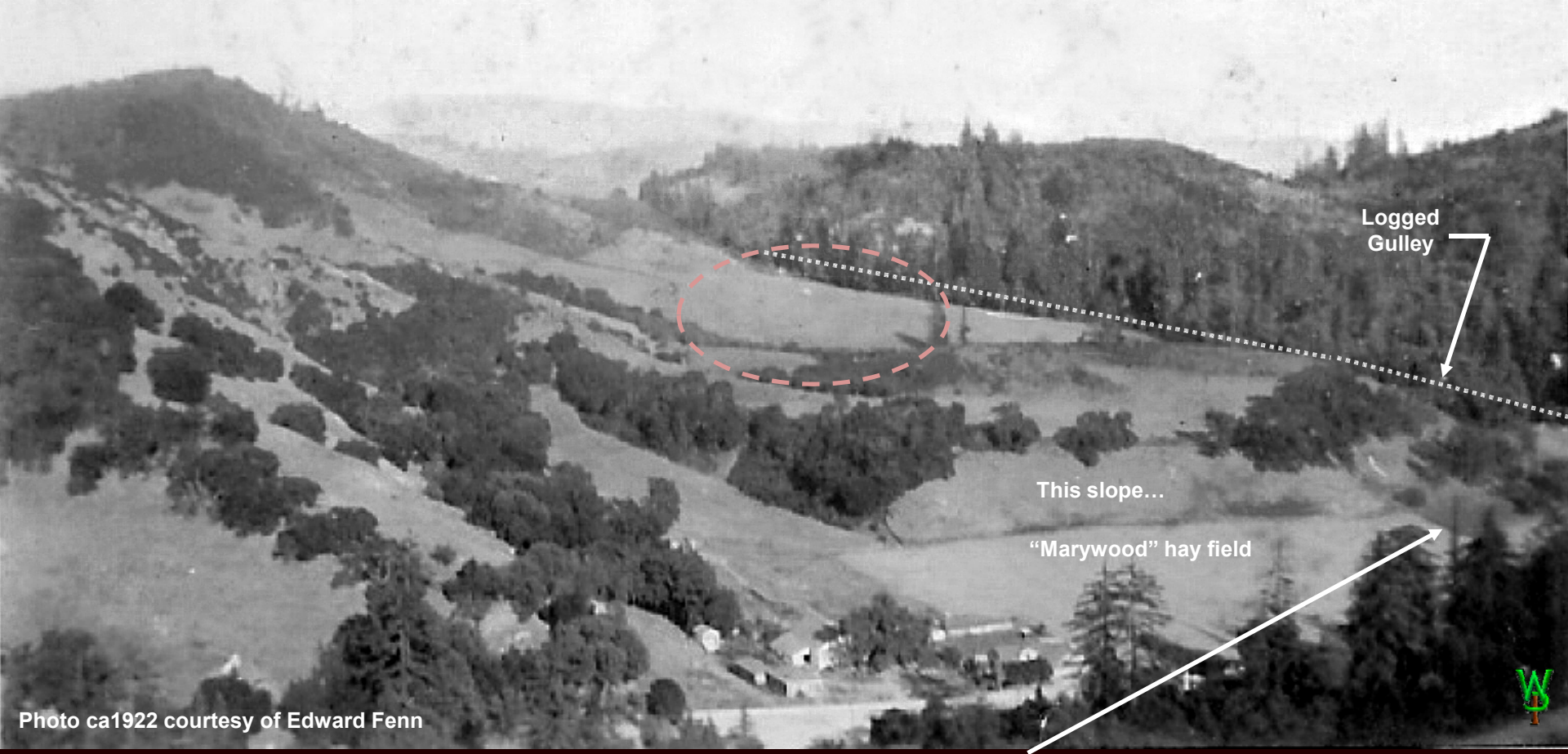
Within 15 years Glenwood had gone from boom to bust; 20th Century socialized roads and recreational land use had killed late 19th Century private roads and ecotourism by rail. Political influence on land use had played a role just as critical in the end of Glenwood as the Homestead Act had played in its beginning.

The hotel was torn down in 1970 and the land donated to the only organization at the time that could afford to keep it undeveloped.

June 2014

The Catholic Church doesn't pay property taxes but it does know to hold land for investment. Glenwood became "Marywood," never to become the retreat for wayward boys the deed required it to be. Instead, it remains a vacation spot for nuns to this day. Local residents like it that way (including me), but the grassland has no productive use; it feeds no animals; it no longer makes hay. Instead, it is mowed to reduce the fire hazard. Unfortunately, the punch line for that story will have wait.

Look at all the conifers in the background! The bottom of the slope with the dotted line is the "Logged gully" in the next photo.



This photo, also of Glenwood, was taken the same day as the previous panoramic image but from above and to the north. It shows the farms and outbuildings supporting the town. Obviously the area is still primarily a grassland, with relatively little brush (it was grazed at the time). The hay field is the same as in the prior photo at the lower right. From the slopes, it appears somebody got really energetic grading off the hillside to flatten the hayfield for mowing, bailing, and hauling, but hopefully by now you recognize that this does not represent a 'landscape denuded by the white man.' In fact, there were once far fewer trees and brush due to the Indian preference for frequent burning. Again, note the spacing and shape of the redwoods on the slope of the gully on the upper right as compared to the inarguably old growth trees in the foreground along the creek. The gulley had been logged about 30 years prior. The pointed tops there indicate the rapid growth of young trees compared to those in the right foreground. After 30 years they would have crown-sprouted, grown to about 40-60' feet, and are therefore observable in this image. Hence the stand density in the gulley probably consists of crown sprouts and young trees from seed, and is therefore a much higher stand density than before it was logged. In other words, there simply were not many redwoods here before the area was settled by Charlie Martin and there were probably significantly fewer when the Sayante were in charge. My thanks to Mr. Edward Fenn (the former owner of our property), for his contribution of most of these old photographs. In 2011, he was 102 years old. Now, note the meadow in the pink ellipse.

November 1989 – About 400 yards to the south of where the prior photos were taken
An exact repeat is impossible; there is an abandoned Christmas tree farm up there now with fir and pine trees 100' tall

This is 67 years later, when we first saw our property. What was a grassy hillside in the pink ellipse now shows little grassland at all, nor has there been for many years. The process you are witnessing here is primary succession run amok. There are many more redwood trees in the gulley and elsewhere than there have ever been. The little grass you do see at the lower right was that hayfield which is still mowed annually. Now, look what happens to the conifers in the ellipse in only 23 more years.

This is only 23 years later (although this repeat was taken lower down because our house is now in the way). Scroll back and forth with the previous two images. This is how fast things change, and **IT'S NOT GOING TO STOP.** How much less forage for wildlife is there here compared to those previous? Do you have any questions now about why there used to be more wildlife in this area when people were ranching, farming, hunting, and pruning? Yet even now, all we hear is how we must set aside more land to save wildlife? There won't be any food for animals unless they burn it, and if they burn it, all they'll get is weeds. If they don't burn…

November 1989

…all they'll get eventually is redwood. This stand (photo taken when we bought the property), is a good example of what happens when succession increases redwood density to the point of "stem exclusion." There is no groundcover here. Note how these trees grow singly and not in clusters. Redwood needs bare mineral soils to germinate. This area was burned after an initial logging of very few smaller trees about 125-135 years ago (1880-1900). It burned again in 1941. In the early 1990s, I thinned about 25% of the standing volume. In the process, I also cut most of the few "old growth" stumps to the ground. As a result of that job, I learned something amazing.

Now, I've alluded to what I'm about to say a few times, but it is going to be very hard for people who believe the lore about "man despoiling Nature" to absorb, much less to accept. Yet ecologically this is very important**: NONE** of those "old growth" stumps in this stand was larger than 24" across when they were first logged, meaning that **NONE** of those trees was over 50 years old. **There were NO redwoods on this slope when the Spanish first arrived in 1791.** This is how fast succession progresses in these mountains. There are simply a great many wildly errant presumptions made about the pre-colonial prevalence of redwood here.

Why would redwoods have invaded this upland so rapidly during the Spanish colonial period? Simple**:** Spanish Governor José Joaquín de Arrillaga banned Indian burning in 1793 in order to increase summer forage for cattle. As a direct result, this landscape, far from those ranchos, went from grassland to a redwood monoculture in less than 200 years. That is how fast a system can change when regular anthropogenic disturbance is removed. Here, after 100 years of "recovery" from logging, there are no shrubs making berries, no forbs for animals, no seed for rodents that feed the owls. There is minimal habitat for insect life. It's even too dense for birds to fly in to build a nest.

But hey, it is "Natural"!!! But is it healthy or productive?

Our survey of the above stand identified some 26 old stumps, but none larger than this one. Almost all are still alive and have built a significant callus. Almost all are totally rotten inside, which with redwood takes many years. THIS IS “OLD GROWTH,” here. Sadly, it would be very difficult to get an age off the callus, as the ring structure inside is rather missing. At the time it was cut, my guess is that it was originally at most 16” in diameter at breast height. The tree behind this stump, that now dwarfs it, wasn’t there.

These are the biggest trees on our property today (at the bottom of the next draw to the north). These are 205 feet tall and over 4' in diameter. They started from four of the largest "old growth" stumps on the property, probably logged and burned by Charlie Martin. **Yet not one of those four original stumps is bigger than these second growth trees here today**. This evidence suggests that if there were any pre-colonial redwoods on our land, they were but a very few. I estimate that the original stumps were no more than 120 years old when they were logged, probably less, as with fewer trees there was less water competition then than there is now, while on the other hand, the weather was cooler, thus inducing slower growth rates.

The “King of the Forest” and my princess, June 2014
It would be very interesting to core drill the stump of its nearby counterpart to analyze burn scars.

Not far from our home is the King of the Forest, at 18 feet in diameter. Mr. McKiernan learned from a similar specimen nearby how difficult it is to handle a log this big and decided to leave this one for posterity. THIS is inarguably an “old growth” tree. The few like it standing here before Europeans came were along the perennial creek where young redwoods with thinner bark were less likely to burn. After all, Indians were burning for millennia before this tree ever sprouted. Regular burning changes everything because it kills seedlings. Our supposedly “old growth” redwoods and most of the trees around this one probably started after the Spanish burn ban.

So, what the heck happened? How would a redwood forest suddenly expand its range? This hypothesis on how the vegetation was distributed when Americans encountered it is a synthesis of Indian behavior, fire, disease, grizzly bears, and climate change. Indian tribes in California did conduct extensive trade. If grizzly bears were a significant hazard, then tribal trading parties had to be larger for mutual defense. Trading would be therefore less frequent and tribes more insular, an idea reinforced by differences among California Indian tribal dialects and genetics.

As temperatures fell into the Little Ice Age, more bears would hibernate and people would hunt more productively for big game. This inference is reflected in the archaeological record, which shows increased consumption of higher ranked animals during this “pre-colonial period” between Columbus and Portolá. As the climate warmed out of the Little Ice Age, the bears would be more active and game numbers rebound, which is what I believe the Spanish land parties encountered and then Americans to a greater degree 80 years later.

Smallpox, measles, and influenza, all highly contagious and with short incubation periods, were devastating to Indians unaccustomed to crowd diseases. If these epidemics did hit California before the Spanish expeditions, I suspect they moved through any one village within a month or so killing virtually everyone but a few stragglers, with the likelihood of a trading party visiting or leaving during that time being relatively small. The diseases would flash into the area and probably quit, moving from village to village much like a mosaic burn in a forest with irregular fuel loads. Some tribes might have lost whole villages but perhaps not the entire tribe while others were likely not infected at all. Larger villages or groups of settlements in close proximity would be hit harder etc. If the first waves of disease had a scattered spatial impact, the tribes would then consolidate. Their aggregated territories would probably remain unchanged. This is why I believe that syphilis and tuberculosis were more devastating to the California Indian during the colonial period and after**:** The incubation period for both diseases is longer than flu or smallpox; they spread quickly but are not debilitating for months. Such would allow these later diseases to spread virtually everywhere before anybody realized their seriousness much less the causes of contagion. The population would then crash almost completely, which it did.

Regular grazing produces a bifurcation in vegetative distributions analogous in many respects to regular burning inhibited by wetter riparian areas.

This poison oak vine was once well over 125' tall. It died recently, probably of drought stress. We loved this plant, if only because it was amazing, without a single leaf for 100 feet. It was probably as old as the redwood it was climbing, starting when there was still other poison oak in this stand on the ground. There is none today.

It may be possible to reconstruct an understanding of the pre-colonial and possibly the pre-Columbian distribution of redwood by a discontinuous age class distribution of trees and stumps in more remote places (in settled areas old stumps were removed with dynamite long ago). Genetics may also yield some information in that trees started from seed are probably less likely to be root clones than old growth trees. A sudden break in regular fire scars among older trees should be compared to the age classes of intermediate growth stands. The ring structure showing the early growth of old stumps can also suggest the degree of canopy present when those trees started.

Once the distribution of pre-Columbian redwood is estimated, spacing might then suggest its understory composition. Compare that to the archaeological data on the distribution of tribal settlements, along with the Spanish accounts, and local hydrology, and one might then be able to define the scope of "bear zones" versus areas that burned more frequently.

I do not have the time or resources to pursue this hypothesis, but I do think it would make for several very useful master's theses. The study would best be a multidisciplinary team effort incorporating archaeology, botany, palynology, genetics, forestry, and soil analysis compared spatially to a detailed study of the Spanish diaries and possibly a reconstruction of regional temperatures.

Also at issue is the question of whether the landscape was dominated by grasses or forbs. Archaeological remains from cooking fire pits show predominately fire-parched grass seeds, yet seed from forbs would be ground without need for burning off the chaff. What the Indians offered the Spanish was usually "pinole," (a sort of gruel or porridge) or doughy patties which could contain either grass or forb seeds. Spanish visual descriptions contain variants on the word "pasto" translated as "grass." A better word would be "pasture" which would then include forbs coinciding with King's scene of dominant leafy forbs where there were no oats. With more disturbance, forbs are dominant over grasses. Unfortunately, the degree to which the landscape had been burned was obscured by the perfidy of Palou's redaction of Crespi's accounts of blackened landscapes. Analyses of the "straw" found in mission bricks show more forbs, despite the desirability of grasses in brick manufacturing. Hence, the answer re original conditions would would depend on the frequency of burning. On the other hand, what might or "should" be done with it from a systematic perspective is another matter. Both are necessary as primary food resources for insects, birds, and mammals.

Sleepy Dog, Snow Plant, and me.
Calaveras Big Trees State Park, June 1959

This study has been a revelation to me, resolving observations that had bugged me for decades. Yet I have no intention of mowing down my forests to "make it like it was" (although I have become a little braver in the distribution of successional stages). I have loved redwood and sequoia forests since I was a child, pestering my parents to "go see the big trees" and weeping in the back of the car on the way home. So this is nothing other than the simple desire to understand and heal forests not just the trees, but in relation to groundcovers, grasslands, and chaparral systems. I want to learn how to manage crown sprouting and get an understory going free from the popular stupidity that makes cutting a few trees far more expensive than it should be. I want a forest with birds, berries, and wildlife. I would like to be able to sell a few logs to finance that work, as there are more that need to be removed than I can use, much less afford to deal with.

There are likely more redwood trees in California now than at any time since the early Holocene. In most places, there are now too many for the good of the forest. Go to Redwood National Park and look. No, not the Lady Bird Johnson Grove, go to "the back 40" of the Park along Highway 101 where it was logged back in the '60s. There, a young, vigorous, and overstocked second growth forest is competing for water with the few ancient trees the loggers left behind. In my opinion, if you want to save those ancient living things, if you want those young trees to get big, with native groundcovers thereabout, in other words, if you want to restore that "primeval forest," then, we must thin some of those second growth trees, learn how to control the crown sprouts, and let the logging pay for it. If we choose to wait for the forest to "thin itself" by attrition, then we stand a good chance of losing those surviving ancients to water competition when they would have otherwise been with us centuries longer, to inspire our children and theirs.

I don't think anybody wants them to die prematurely. Please, we should at least learn *how* to do it should we finally learn that it is necessary. Should I live that long and find a way to afford it, this I will do, right here. This is the *Wildergarten*. My hope is that in reading this, you will be inspired to tend one of your own.

Abandonment

This is near The Nature Conservancy Niobrara Valley Preserve in the northwest Nebraska Sandhills. When Indians lit frequent fires, there is NO WAY you would have seen this invasion of junipers (Eastern red cedar). Managing fire in a modern landscape with fixed infrastructure is all about dealing with competing risks.

July 2010

Since European conquest, concentration of industrial production and the development of synthetic materials have caused economic abandonment of resource production landscapes worldwide. There is little intention of, much less money for managing them in detail; the excuse being that “nature takes care of itself.” Yet the plants thereon remain genetically adapted to high-disturbance aboriginal management processes, whether frequent burning, harvesting, or animal disturbance. Over more recent decades, science is starting to recognize the ensuing consequences of resulting decadence, succession, and invasion: degraded habitat for the original plant, animal, and insect inhabitants of those regions, often to the point of mass-extinctions.

Photo 1922 courtesy of Edward Fenn

For 60 years, until the construction of the Glenwood Highway, Mr. McKiernan's road was the only surface road from the town of Los Gatos over the mountains to Scotts Valley. Every horse, ox, wagon, and work crew passing through deposited their contributions of seed from the valleys below, native or not. Meanwhile, Mr. Martin's dream of a Glenwood resort deep in an isolated valley needed supplies with which to feed his customers. Mr. Martin blew in a road up to Mr. McKiernan's road on the ridge to the west on which to haul supplies to Glenwood. In the 1920s Edward Fenn purchased a tract along Mr. McKiernan's road astride the junction of the road from Glenwood. Ed terraced this hillside with a tractor and planted apples he was only too happy to sell to in Glenwood. We will discuss Martin's road in detail in the chapter on roads. Today, much of it is an impassable ditch.

November 1989, at which time this land was still grazed.
Charlie Martin's great grand-daughter still lived in this home.

When we moved here, the heirs of Charlie Martin lived in what was once his second home (above), all that remained of his original homestead. This property adjoins ours today. You will see more of what that means to our land later in the book, as the influence of this history is not minor. The "wild oat" infestation from which we protect ourselves today, was once the grazed forage you see here.

One can still see the terraces of Ed Fenn's apple orchard on the north-facing slopes of our property. The outside edges of five or six are visible in the photo in red at right. Orchards are usually tilled annually and seeded with exotic annual cover crops, in this case vetches I get to weed. Vetch seed, is a legume, capable of remaining viable in soil for 100 years... at least. One can only imagine how much topsoil was lost on a 25-50% slope receiving 40 inches of rain in five months, not to mention how much seed was buried!

With the annual disturbance of disking the orchard, seeds brought in from the road found this tilled and fertilized soil to be a wonderful medium in which to establish. For decades, those weeds just kept right on multiplying and spreading.

Agricultural mechanization, truck transportation, and electrified irrigation in Santa Clara Valley ended widespread farming in these rugged mountains. The orchard was abandoned in the 1930s soon after the demise of the Glenwood Hotel. The orchard became overgrown.

In 1941, the property burned in a forest fire. Then brush started to take over. The heirs of Charlie Martin agreed to graze it to keep the brush down until a dispute arose. Because the land had been effectively tilled and fertilized, *everything* took off all at once.

November 1989 The berm at the bottom was pushed up by ditch grading along the County road.

You are looking downward toward one of those terraces when we first bought the place. After the orchard was abandoned, the dominant brush species that invaded were native Ceanothus and manzanita. Fire-suppression allowed succession to progress uninterrupted for decades. Oak and madrone trees sprang through the brush, but in a density only appropriate to an open area with small trees. They all bolted for light, many only a few feet apart, spindly and weak, leaning for light with included bark crotches.

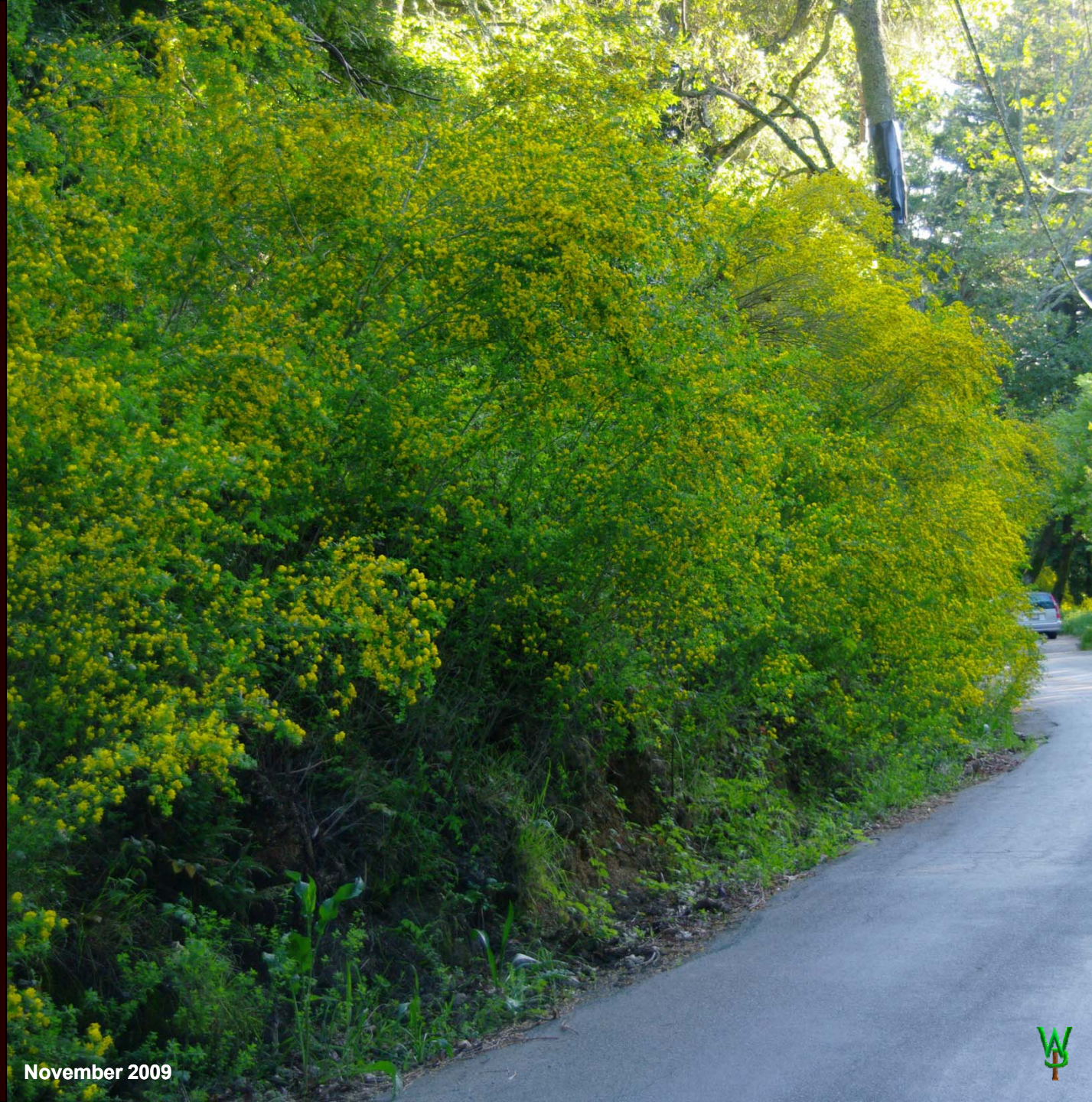
October 2014 - We had worse than this, but you get the idea.

In classic primary succession, Douglas fir arrived in 1931, retaining massive resinous dying branches all the way to the ground, and spread from there. It was a fire-bomb, land that did not know how to be the way that it already was. Lacking a profitable use, the owners wanted to sell it. From time to time they cleared a “house site” on the top of the hill but without any takers ("the view" had a power pole in the middle of it). Some time around 1960, a bulldozer with French broom seed on it *(Genista monspessulana)* was brought in to clear it. The broom took off at once and (with the exception of the redwood stands) spread throughout the property.

This is French broom, 12-14 feet tall, introduced by County road-side mowing 15 years prior. This represents less than 2 years' growth after mowing. Imagine ten acres of it. Try to imagine forcing your body through it for hundreds of yards (I had to crawl). Without a bulldozer, it takes a chainsaw or brush cutter to get through for any distance.

I wish I could take a photograph of what it is like to be inside a French broom infestation, but I cannot. A camera lens cannot capture sufficient depth-of-field to focus on all the twigs. So I tell people to go find a dense bush and climb inside (if they can). "What would you see?"

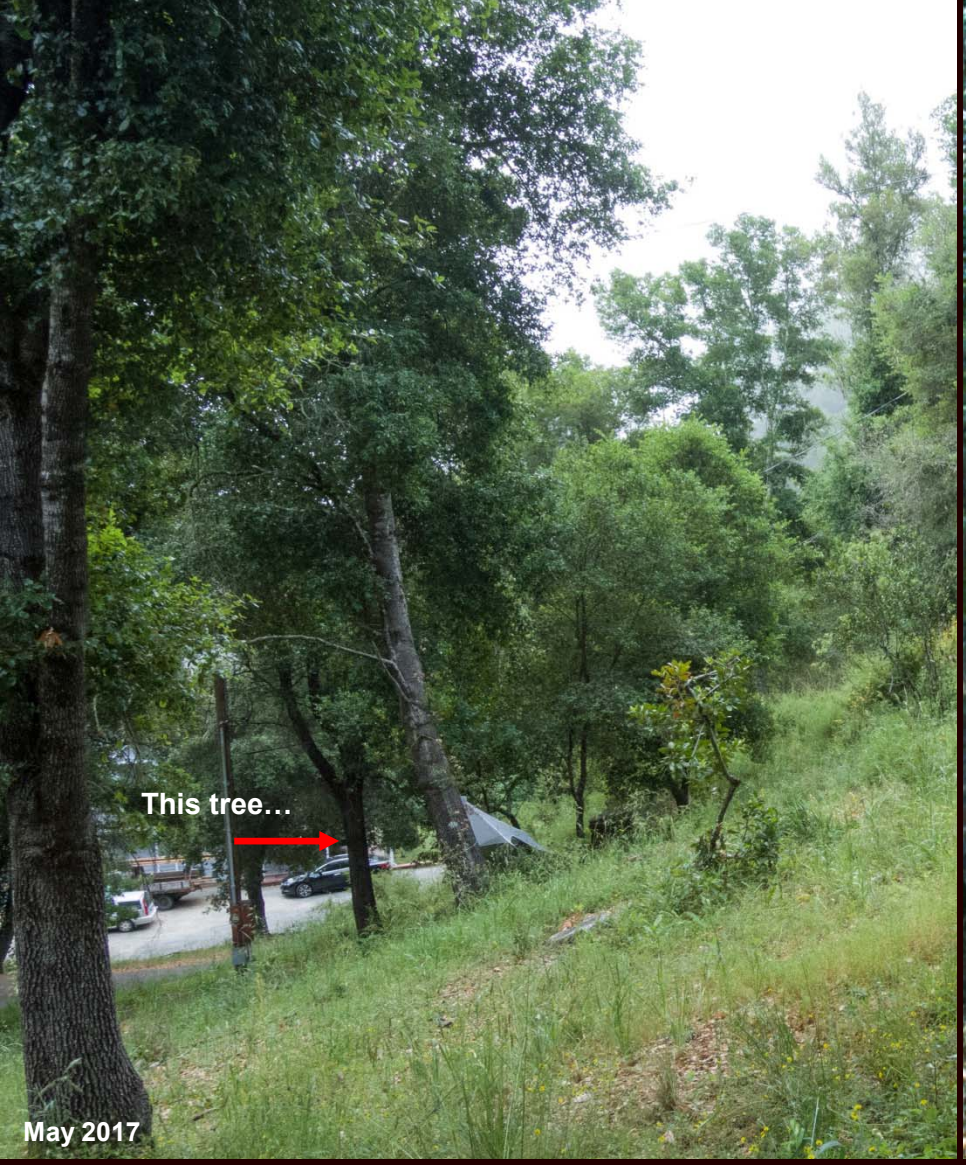
Each flower produces about eight seeds that can last 100 years in soil. The seed is carried by mud, cars, boots, water, birds, rabbits, and heavy equipment. It grows so fast that it can reach 27ft in four years. Then it goes twiggy and decadent. After every cycle of disturbance it gets more dense. By 1989, what was to become the Wildergarten was a choking mess of broom, accelerated erosion, broom, dead native brush, broom, dying trees, broom, and no groundcover. And then there was the broom.



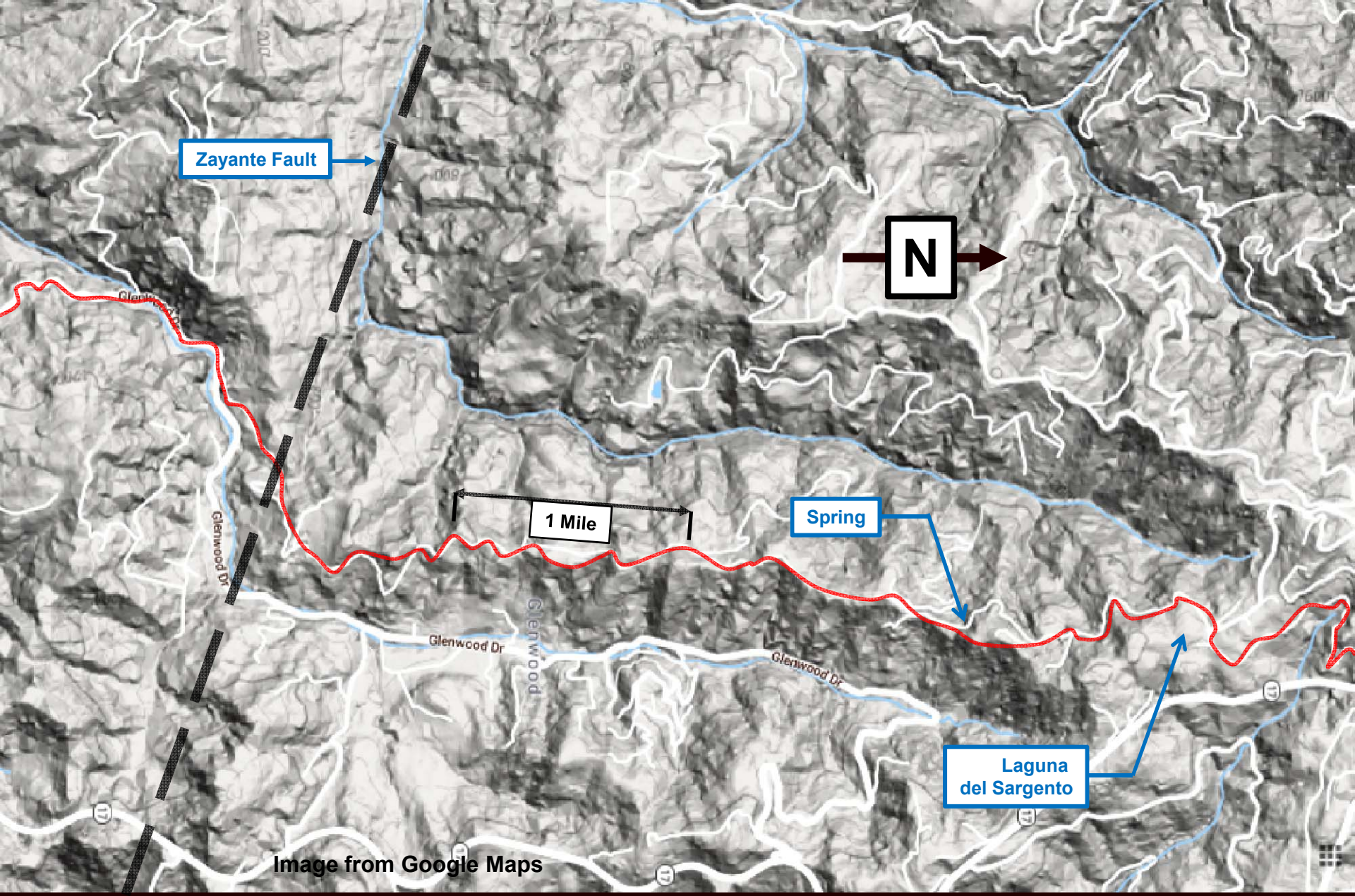
November 2009

History Emerges Beneath Our Feet

Above is part of a Mural in the UC Santa Cruz Ethnic Studies Building (Courtesy of Anne Thierman). It depicts the Quiroste village as described by Juan Crespí in his diary entry from the 23rd of October, 1769 (click anywhere for a pdf of the full image). There are all sorts of similar speculations about what California's landscape looked like at the time of the first encounter. It is widely acknowledged that there was far more grassland and less forest cover, but the agreement ends there. In reality, we know even less in detail about aboriginal management than we do about original conditions. The final discussion in this chapter suggests means to develop that knowledge from active management and restoration such as we have done.

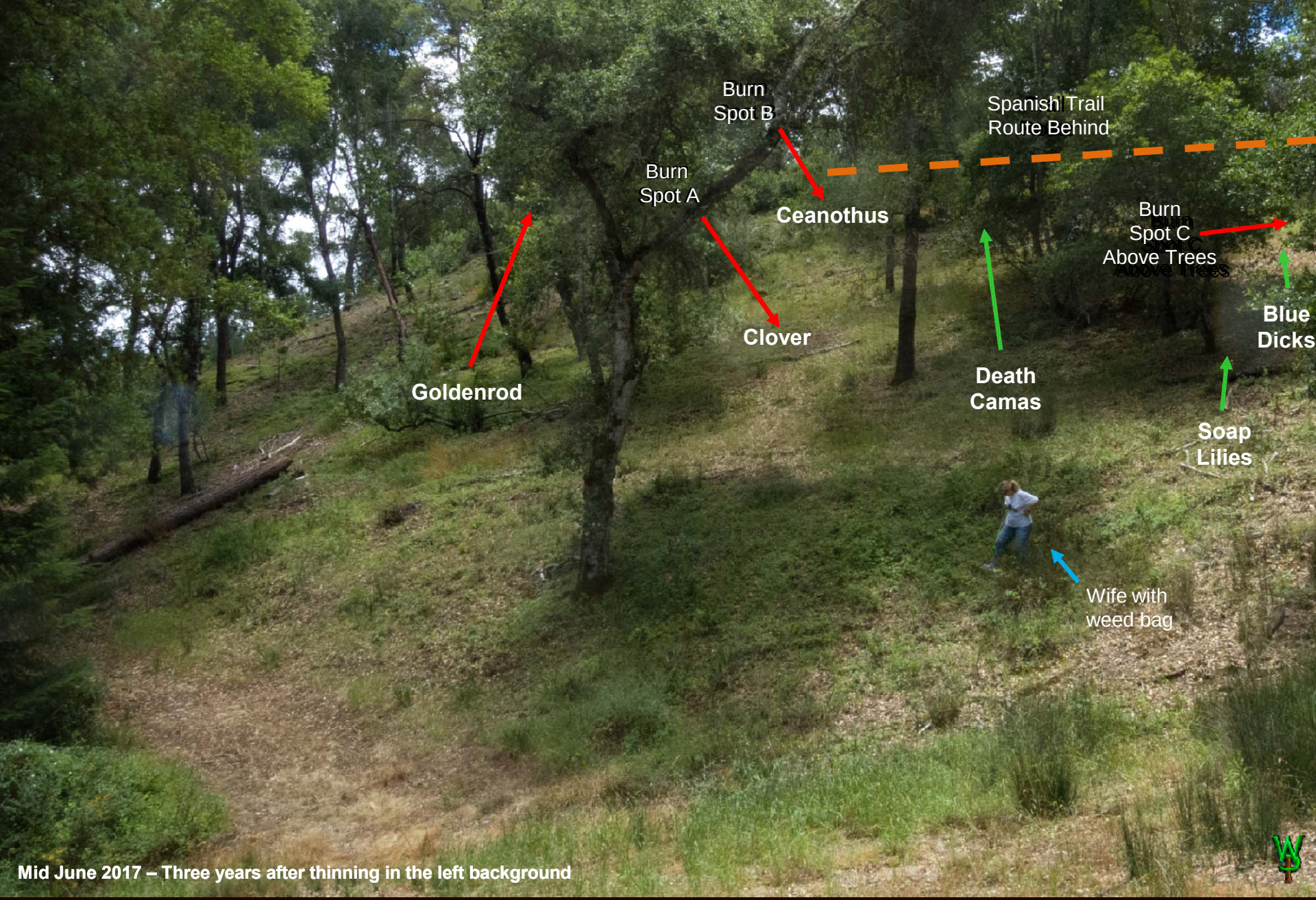


This book is about 3 decades of undoing the neglect that led to the mess for which we paid so dearly. So from here, this site history chapter discusses history learned from the process of restoration. Effectively, this is a sort of botanical archaeology upon which much of the rest of this book will build, but not as ancient evidence, as much living evidences of ancient processes. Yet given that this was once an early successional system, to learn any of that, first one must get rid of the weeds and get a handle on succession. The work then turns to a succession of very small weeds. Then the natives start to come back, suggesting patterns. At that point, gathering background information became critical, beginning the literature search that founded this chapter. Only then did I start to see what is going on underfoot. The key to understanding the pre-colonial history of this property is that it adjoined that Sayante family trail.



The Sayante didn't live here. For 12,000 years, this ridge was one of their trade routes. They had no pack animals beyond smallish dogs. Hence, to increase payload, the Sayante needed reliable and expedient sources of food and water along the trail. Why then didn't the trail follow the stream? They had plants as renewable sources of food and a safer form of stored moisture. The trick then is to figure out what they grew and why.

Indians burned frequently, which gives one more control over *what* burns. Frequent burning over milleninia also forces plants to adapt to the treatment. This is an aerial image of part of our property where the observations to come were first developed. They suggest that the slope above once supported at least six Indian crop patches. There is **clover** at "Burn Spot A." I have used "Burn Spot A" two to three times and it has only come up in clover (few at first). There is **Ceanothus** is at Burn spot B less than fifty feet from Spot A (behind trees in this image). Here, up came "tick bush" *(Ceanothus papillosus*). At Burn spot C up came **blue dicks** *(Dichelostemma capitatum*) and just below them are **soap lilies** *(Chlorogalum pomeridianum*). Above the clover, we have **death camas** (*Toxicoscordion fremontii;* was *Zigadenus fremontii)*. Finally, at the end of the ridge, there is goldenrod *(Solidago velutina)*.



This is the same area from ground level, the image taken from the “photo point” indicated on the prior slide. I have long used burn spots (red arrows) to diagnose what they may have grown in each spot, applicable only to those areas of our property (above) that were *not* grazed or graded. Bulldozers do move things around).

This is the **clover** on Burn Spot A, almost all of which is *Trifolium microdon.* What is indicative of cultivation here is that there is very little lotus (either *Acmispon americanus* or *A. parviflorus*), which is unusual on this property, as the lotus is the more dominant groundcover. Clover is more palatable than lotus and is a high-protein forage plant that was an important source of green vegetable matter in the Sayante diet. Of late, the area is being invaded by *T. bifidum v. descipiens*. This points out an important consideration: These plants have not expressed in a very long time, perhaps over 200 years; they were effectively "paved over" by weeds and vegetative succession, processes which may have inadvertently preserved their pre-colonial arrangement! There is no guarantee that once I induce them to express, they will retain their arrangement without managing them in a manner similar to how the Indians once did. I am not allowed to do that by any number of laws. Hence, discovery of such an arrangement may be a "one shot deal" to be approached with a degree of caution. I have seen these patches invaded by other native species. I will be doing experiments to see if this trend can be reversed and the initial plant distribution preserved. I suspect the results will vary with the species in question.

October 2013 – The dark area in the background was thinned in March 2014

At Burn Spot B is a dense stand of ***Ceanothus papillosus*** shrubs. Ceanothus is twiggy, dense, oily, and burns long and wonderfully hot, an important source of cooking fuel for the local tribes. It is a nitrogen fixer and thus grows fast, but it is hard to confine to patches. It is an attractive forage for deer and antelope but would provide cover for lurking mountain lions and bears (the kind of thing one would want to confine along a trail used as a trade route). Ceanothus is a fire follower and its seed can remain viable for many years. That it has *never* shown itself at any of the other burn spots on this slope is significant. It suggests that the other locations on this slope which did *not* have a Ceanothus response had a stable vegetative configuration with no succession from forbs to chaparral for many years, possibly indicating a history of regular disturbance. So, If this was for fuel, where was the camp? I suspect it was on the end of the ridge above. It has a great view and would be advantageous for a small party to defend, as you will see.

This is at Burn Spot C. In this location, once we removed the weeds again up came clover. Then, a few years later, up came scads of "**blue dicks**," with their starchy edible bulbs. This was the first instance in which I recognized possible evidence of aboriginal proto-agriculture. Here, there has *never* been a sprout from any shrub, soap lily, or death camas in 10 years since we got rid of the weeds, suggesting that only blue dicks grew here for a very long time. Nor are there blue dicks elsewhere on this ridge. Above are four-year-old sprouts that have yet to mature sufficiently to flower. In this soil, it took two more years and warm rains to bloom in 2015.

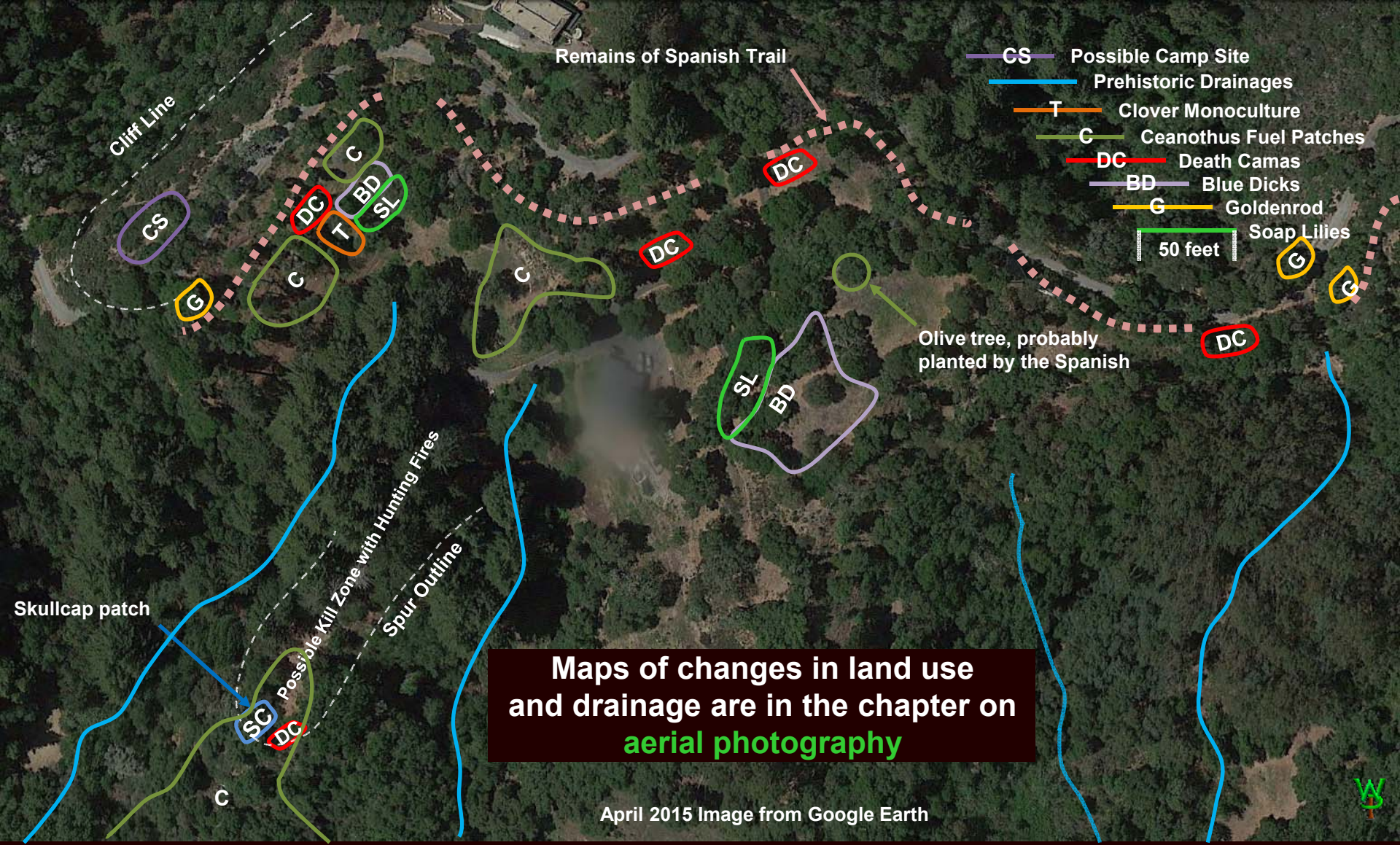
The Indian trail follows a ridge that is very hot and dry in summertime. The nearest stream is about a half mile down a steep hill (and then back up) but in the summer it is only a sluggish dribble, hardly what one would expect to be safe drinking water with animals using it too. Importantly, besides starch, blue dicks produce a “contractile root,” effectively a crunchy bag of fresh and safe water. No wonder early American explorers disparagingly called the Indians “diggers,” probably while suffering diarrhea after drinking from streams.

Just below the blue dicks at Burn Spot C are **soap lilies**. This plant was a staple of the Sayante diet, albeit the bulbs required roasting for some 18 hours to be edible. Hence, one wonders why they would be grown along a trade route where people normally would not wish to tarry for cooking, while regular burning would render adequate fuel wood a scarce commodity. So, why grow “soap root” here if there’s no immediate use for them? They just might keep you from making a fatal mistake.

A clue to the ‘soap lilies with blue dicks’ riddle is above and between Burn Spots B&C where we have “death camas,” also in a tight patch that just stops on the left with no residual signs of native brush (although at one time there was a ton of Ceanothus nearby). I have scoped this region well beyond our property and with but one exception, the only places where death camas is commonly found are in patches along the old trail. So if these patches were to supply a trade route, why would Indians grow a plant so poisonous that it kills herbivores tougher than we are in serum concentrations of 5 parts per million of body weight? Predator control. This route was not used frequently. Grizzly bears, coyotes, wolves, and mountain lions would all be found in this area. Archaeologists inform me that the local tribes did not use poisoned arrows and this toxin is too slow-acting to be useful for that anyway. Most carnivores (except the bears) cannot digest vegetable matter efficiently, so they get that part of their diet digested for them by eating the guts of their prey. Hence, one way to deal with the threat of being eaten would be simply to load the guts of a kill with the mashed pulp of these poisonous bulbs. Effectively, I think death camas was used in baits the way American ranchers once used strychnine. Poison baits have long been known to be the most effective means of predator control.

We have other patches of death camas along the trail, among which one also finds no blue dicks or soap lilies. Other than the clover, which is found among the blue dicks, NONE of these patches intermix. No Indian in his or her right mind would want to mistake death camas bulbs for blue dicks, and in all but the flowering season it can be easy to do. One must keep them separate. As confirming indication, nowhere on the Santa Barbara Channel Islands are there any large predators, and there are also very few death camas. With no reason to grow it, there is no way an Indian would want these plants where they gather food.

This is a lower corner of the prior death camas patch. Note that despite the disturbance of having been run through with a bulldozer when the orchard was terraced there are no outliers anywhere else in this draw. None of these plants spread any farther in 100 years. They cannot be invasive and for good reason. If one was growing death camas anywhere near food crops, one would not want the death camas to propagate efficiently by seed, as it might invade the food crop and contaminate it with a deadly poison. Hence, the Indians had to be aware of the principle of selecting and cultivating plants that did not spread by themselves. Indeed, such plants would be preferable for low input proto-agriculture simply because they would require less labor to manage them.



We have other areas on the property with soap lilies immediately below blue dicks, also with little intermixing, but the total scope of this arrangement is not evident yet. The pattern appears too repeatable to be anything but a human design. If so, what would be the purpose? Bulbs of blue dicks and death camas are very similar and their drying leaves do not last long into the summer. People might need to dig up bulbs of blue dicks for food or moisture at times when the leaves are long gone. At that point, a deadly mistake would be easy to make. Soap lilies have very distinctive curly leaves visible almost all year. To stay safe, one would dig up ONLY the bulbs that grow next to the soap lilies and you won't die from eating death camas by mistake! Interestingly, this may not be the only way soap lilies may have been used to demark where it is safe to dig and not. Note the skullcap patch at the lower left of this image.

At the end of the spur on the map overlooking the valley below I had cleared *Ceanothus cuneatis* in 1991, after which I had to weed it for fifteen years. So I had considerable experience with both the weeds in the seed bank in that area and the natives as well. In December 2015, I took out another 30 feet of that (75 year old) *Ceanothus* patch to widen the fuel reduction buffer along the property line. In one well-defined spot, up came a patch of skullcap *(Scuttelaria tuberosa),* a native medicinal plant that makes tubers. It was so dense that it wouldn't allow weeds at all. Yet despite the density of that cover, there isn't another single skullcap plant anywhere on that spur ridge. Just opposite the skullcap, is… death camas, with what may become a line of soap lilies in between, possibly indicating a boundary between the two in summer time when neither death camas nor skullcap would be visible (in a sunny spot like this skullcap does go "drought dormant" during summer). Here again, we see yet another plant with aboriginal uses that does well, but it seems to be absolutely non-invasive, yet again indicating aboriginal introduction of plants with that specific property.

June 2014 – Valley Oaks *(Q. lobata)* at the Jasper Ridge Biological Preserve

Consider these valley oaks (*Q. lobata*) near the Stanford campus. To this day, scientists wonder why they reproduce so few seedlings and are being invaded by live oaks. Yet if you were an Indian, you would prefer the sweeter acorn of valley oak and would especially prefer the understory herbs they would support because deciduous leaf drop increases sunlight on the ground in winter and composts leaves more quickly into better soil. Nor would an Indian want tons of oak seedlings in an understory dedicated to other crops such as roots and herbs. Hence, an Indian would choose a spot for deciduous oaks in which they would ***not*** reproduce efficiently without some sort of horticultural process. Yet once Indian oak cultivation ceased or once the live oaks had invaded, the regeneration of groundcover crop plants would eventually cease. The insect and bird life accustomed to those plants then would die out. Whole systems would slowly degrade, simply because to this day Euro-Americans still fail to see the hands of people in what we think is "Natural." So next time you hear wild claims as to the causes of endangered species, please consider the following more subtle possibilities**:**

For at least 10,000 years, “Nature,” over every habitable continent, was shaped by hunter gatherers managing plants and animals by regular programmatic disturbance, whether fire, horticulture, hunting, or directed grazing. In many cases, aboriginal peoples introduced plants and animals for their value as foods, materials, weapons, tools, and drugs. Unless the habitat was otherwise so harsh that little else useful could survive (such as North Africa), introduced plants were selected, located, or managed such that they would **not** displace other valued plants out of range or proportion (one reason why native habitat is so open to weed invasion). The reason is simple**:** They needed a wide variety of materials within walking distance. In other words**: People** were once an important source of what is now believed to be “natural” biodiversity, developing and managing complex **processes** both for productive reasons and to reduce transportation, processing, and storage costs.

Managed disturbance promotes successional diversity and composite stability. Frequent fire inhibits plant senescence and eventual catastrophic fire. It stimulates germination and forces adventitious buds to sprout. People used disturbance (fire, harvesting, herding, or hunting) to direct herbivory, force regeneration of perennials, and stimulate reproduction of annual herbs. Annuals are a significant source of protein in herbivore diets having specific relationships with insect life that forms the base of the animal food pyramid (particularly for birds). Diverse, early successional plants also exhibit a larger number of specific symbioses with microbial life in soil, key to several nutrient cycles on a global scale. Managed disturbance can thus stimulate more food production and a wider range of genetics reproducing in closer proximity and in larger quantity.

Proximate diversity also increases genetic plasticity. Plant materials are mixed and mashed by animals, whether soil bacteria and fungi under hoof or masticated and incubated with bacteria in the animal gut. These processes produce greater quantities of loose DNA as mixed with undigested seed, spores, and bacteria. That increases the success rate of horizontal gene transfer between species and therefore the probability of viable differentiation of alleles at greater genetic distances, which in turn increases the rate of unique genetic trials by which to adapt to changing conditions. Hence, from an evolutionary perspective, managed systems are not only more diverse, they can be both genetically and epigenetically more adaptive.

Effectively, adaptive and productive wildland systems are a matter of human priorities; we are *that* influential, whether we choose to do anything to improve system productivity or not. These observations are supported, not just by archaeological and anthropological evidence, but by an ongoing global experiment in which life systems developed over thousands of years to make them stable, diverse, and harmonious have been displaced by simply prohibiting programmatic disturbance, eliminating wildland peoples, and allowing aggressive exotic plants, animals, and pathogens to spread. We all hear the excuses**:** ‘It’s Natural,’ ‘Nature takes care of itself; all we have to do is protect it,’ ‘That’s not my problem,’ ‘It’s too late to do anything about it’… This is at least lazy and irresponsible thinking, but in some cases it involves political corruption and/or genocide. Yet in all cases, the cultural paradigm at root of these disasters is urban; it is *not* innately human. While most urban people don’t want to do the hard dirty work of caring for the land, they do want to control it. Yet under collectivized control, in which no one wants *responsibility* for doing harm, the only thing upon which **everybody** can then agree is to do nothing… and so the land slowly dies from mandated neglect. Yet with so many people looking for meaningful work in a world of increasing automation, this dynamic is not just ecologically destructive, it is socio-economic suicide. Land management is an opportunity, and a potential industry. But these matters are for the next book (which is in the works). So for now, let’s close out this history.

The end of this history begins with its American beginning, in the words of Thomas Jefferson Mayfield. In 1850 at age 6, his family crossed the San Joaquin Valley, settling near the Kings River in the Sierra foothills. His mother died soon thereafter, leaving his father no choice but to leave the boy with a Yokuts tribe while he sought a way to survive with his two other sons. Ten years later, Mayfield as a young man returned to a more settled San Joaquin Valley, finding there a common hatred for Indians. He thus told no one of childhood with the tribe. At the age of 85, after a long and tumultuous life, Frank Latta, an amateur historian and ethnographer coaxed that life story out of Mayfield over a period of six months. Yet the old man never revealed what you are about to read; it was too personal, and too special. Then Mayfield went down with a stroke. Latta came to visit in the hospital, and thus recorded what was almost lost to history**:**

Suddenly my daddy pointed over the tops of the bare hills ahead of us and exclaimed, "Look there!" And there in the distance, until then lost to us in the haze, was our valley. A shining thread of light marked El Rio de San Joaquin flowing, as my mother said, "through a crazy quilt of color." How excited we all were. Everyone wanted to talk at once. Then someone noticed, still farther to the east, that what we had at first taken for clouds was a high range of snow-covered peaks, their bases lost in the purple haze. Finally we started on and passed down the long ridge, which my daddy called a "hog's back," to the small valley below. There we found the grass we had seen from above to be wild oats. They stood as high as our stirrups and were as thick as they could grow...

Leaving the stream, we started across the plains in an easterly direction. We had been told at El Rancho de San Luis that we would in this way arrive at El Rio de San Joaquin where there was a ford. By this time we could see what had caused the mass of color so noticeable from the mountain the day before. The entire plain, as far as we could see, was covered with wild flowers. Almost all of the flowers were new to us. Along the creek were many blue lupines, some of them growing on bushes six and eight feet high. The low foothills were covered with two pretty, lily-like flowers, one tall and straight-stemmed with a cluster of lavender, bell-shaped flowers at the top (right)*…*

Triteleia laxa

…and the other a purple, ball-shaped blossom on a similar stem (right, see caption).

As we passed below the hills the whole plain was covered with great patches of rose, yellow, scarlet, orange and blue. The colors did not seem to mix to any great extent. Each kind of flower liked a certain kind of soil best and some of the patches of one color were a mile or more across.

I believe that we were more excited out there on the plains among the wild flowers than we had been when we saw the valley for the first time from the mountain the day before. Several times we stopped to pick the different kinds of flowers and soon we had our horses and packs decorated with masses of all colors.

My daddy had traveled a great deal and it was not easy to get him excited about wild flowers, or pretty scenery. But he said that he would not have believed that such a place existed if he had not seen it himself. And my mother cried with joy, and wanted to make a home right here in the midst of it all.

For my own part, I have never seen anything to equal the virgin San Joaquin Valley before there was a plow or a fence within it. I have always loved nature and have liked to live close to her. Many times when traveling alone and night has overtaken me, I have tied my horse and rolled up in my saddle blanket and slept under a bank, or among the wild flowers, or on the desert under a bush. I remember those experiences as the greatest in my life. The two most beautiful remembrances I have are the virgin San Joaquin and my mother. – Source

Seeing that the old man was tired, Latta bid him good night. Within fifteen minutes after he left the hospital, Mayfield died, having finally told another human being about this childhood experience, central to his life for 79 years.

These are *Dichelostemma capitatum* here at the *Wildergarten.* What Mayfield was describing was likely *D. congestum,* which has a spherical cluster of flowers. Both were harvested for roots by both grizzly bears and by people. Given the scale of the patches described as "a mile more across," my guess is that much of the valley floor along running streams resistant to fire was at least seasonal bear territory. Even then, when Mayfield first saw it, the landscape had been seriously degraded. By 1850, horses had already overgrazed large portions of the San Joaquin Valley.

It all happened so fast. Exotic filaree *(Erodium spp.)* is spread by animals. It has an estimated migration rate of 30 miles per year. Filaree had invaded California from Mexico so fast that it had produced detectable pollen sediments in the Santa Barbara Channel a decade before the Spanish arrived. Fremont reported that Livermore Valley was carpeted with bur clover in 1841. By 1850 (less than 70 years after Spanish arrival), Mayfield saw grasslands with (exotic) wild oats "up to our stirrups." Today, they are less than half that tall and much more sparse, less than half of the original forage value. The difference is soil, the foundational resource of civilization itself.

"Civilized" Glenwood was going strong as a town when my grandfather was born. When Ed Fenn took those photos, Grampaw could have ridden a horse-drawn wagon or Model T down this road (right) with orchards, farms, and ranches along the way, all now long abandoned. Accordingly, our land changed from a rip-gut brome and wild oat grassland to an impacted and decadent oak woodland full of exotic brush with 100 foot tall invading fir trees within less than a lifetime. The message is this**:** "Fast" – doesn't – stop.

The broom you see at right wasn't there when we first moved in. Yet somehow, when we first see a landscape, we tend to project upon it an impression of permanence, perhaps out of a need for familiarity. Then, when it blows up in a fire, we'll be in shock, even though we knew what would happen with a fuel load like this. After the fire, what will come up will be broom. It's inevitable, just as inevitable as the belief that such a fire would be "Natural." Given the thousands of years of people lighting fires purposefully for food and materials, there never was any such thing. What we fail to incorporate is that while infestation and succession may slow down, there is no real 'Balance of Nature.'

This is the power of myth to change the land beyond recognition. Our beliefs filter the way we "re-cognize" what we see and what we don't. Many an expert has read those Spanish diaries and not seen the implications. I didn't either, believing that Indians once totally dominated all wildlife as they did elsewhere in America. It took a third reading for the alarm bells about bears to go off. We know so little about the system response to disturbance, that "consensus" scientific opinions about them are still just guesswork. With the rate new weeds are still coming in and with succession still progressing to more catastrophic fuel levels, I hope the prospects of policy driven by such ignorant beliefs (rather than by hard experience) are as alarming to you as they are to me. Were we to introduce grizzlies on these landscapes today, they would likely starve to death. We simply have too much yet to learn to be making such massive decisions by defaulting upon our responsibilities. The land needs study, experiment, and process development, **work**, not "preservation." Else, "mystery" repeats itself. Your choice.

Mid-June 2015 – *Clarkia rubicunda* produce small seeds in pods. Clarkia seed is known to have been an important constituent of the local Indian diet (pods are convenient containment),

Understanding these landscapes as process-related adaptations to tribal management facilitates experimentation with which to infer management methods that can sustain the genetic foundations of those landscapes coherent with our modern economy. Restoration IS possible. It is also a lot of work. Work for people. Work of discovery. Work in the most satisfying of settings. It can be done, but not without the genetics. There is not much time left to get to it; much of the native seed bank is starting to die.

So Where Do We Go from Here?

You have just finished the longest and most challenging chapter in the book. The coming five introductory chapters move on to what history has produced here botanically and what has been accomplished in response:

Environmental "Protection" = Mass Extinction documents the slow death of the native annual seed bank, effectively the extinction of locally-adapted plant systems and their symbiotes after two centuries of uninterrupted weed invasions and succession. It quantifies the reality of local biodiversity, both when we arrived and what has been accomplished.

What Is "Native," Really? discusses why native plant habitat is important, how the question of whether or not a particular species is a local native is sometimes difficult. Even some native species , lacking usual disturbances such as fire or animal impact, can behave as if they were invasive exotics and sometimes must be managed as such in limited scope in order to preserve functional biodiversity and figure out what the heck is going on.

Repeat Photography shows the changes we have made on a landscape scale, as is appropriate to taking an overgrown and impacted forest back toward a spacious multi-aged stand structure with varietal groundcovers and grasslands.

Pure Germination of Native Annuals shows that in spite of our 200-year "weed bank" some of the areas we took back to grasslands have been cleansed to the point that they now express an increasingly pure and varietal native annual groundcovers in and among native perennial grasses. Effectively, it documents that we are succeeding at cleansing the seed bank of its exotic components while re-establishing a predominantly native seed bank, if not always one in a climax state from the perspective of its varietal potential.

The closing introductory chapter, Project Overview, describes the rationale and organization of the project from a management resource allocation perspective, showing differences of emphasis in time commitment among various and changing priorities.

After the introductory chapters, the book then moves on to the major habitat types and management processes under the general headings of forestry, grasslands, and 'other' before discussing the ecological forces and political-economic context within which we operate. Whichever path you choose, I hope you have found this history sufficiently enriching to realize that there are similar nuggets of new perspectives to be found in every chapter.

A full Table of Content is at the end of this file. Specifically historical references follow 2 pages hence. If your interest is in original conditions here, there is a chapter that maps my estimated distribution of aboriginal vegetation.

So, on to the gritty nitty. Enjoy!

Wildergarten Site-History References

The following historical, anthropological, ecological, and archaeological sources pertain directly to this area. Other applicable references such as for general anthropology or habitat management can be found here.

Because this section is less cross-linked to other work, there is a bibliography for this chapter here. Most of these sources are liable to remain stable because they are old printed books, but several are so old that they are unlikely to be available unless obtained by inter-library loan, a few are on archive.org. Some were rediscovered in the basement of an old bookstore, so they might still be available on Amazon. Others are only available as republications, but many of those are of absolutely horrible (unreadable) quality, much less suitable for corroborative research. So, good luck with that.

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P9 Kroeber, A.L., Miwok Acorn Granary. Source: Government Printing Office, Bulletin 78, Plate 38, 1925, Bureau of American Ethnology of the Smithsonian Institution, downloaded 5/23/17 from http://www.yosemite.ca.us/library/kroeber/miwok.html

P10 Dally, Frederick; *Salmon weir at Quamichan Village on the Cowichan River, Vancouver Island, ca 1866*, [Public domain], via Wikimedia Commons; https://upload.wikimedia.org/wikipedia/commons/6/66/Salmon_weir_at_Quamichan_Village_on_the_Cowichan_River%2C_Vancouver_Island.jpg

P11 Author Unknown; *Image of Bear at Picnic Table* (Yogi, is that you? Where's Boo-boo??)

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P12 *Relief Map of California*; Retrieved from**:** https://en.wikipedia.org/wiki/Donner_Pass#/media/File:Relief_map_of_California.png .

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P19 Photographer unknown; *Sepia Portrait of J. P. Harrington;* Obtained with permission from the Smithsonian Institution via http://anthropology.si.edu/naa/harrington/.

P22 Thierman, Anne; *Quiroste Indians on Whitehouse Creek, as described by Juan Crespi in his diary entry from the 23rd of October, 1769;* in the UC Santa Cruz Ethnic Studies Building.

P24 Photograph of Oil on Canvas painting by Tomas Horrach Bibiloni of Palma, Mallorca, Spain: *Father Francisco Palóu, O.F.M. 1723-1789. Missionary to Mexico and the Californias, Founder of Mission San Francisco, Biographer of the Venerable Father J. Serra, Historian of Northern California,* Proclaimed illustrious son of Palma, December 31, 1975. Gift of the city of Palma to Mission Dolores, October 9, 1976." http://www.ofmval.org/7/01ma/01/07.php

P25 *Laguna Del Sargento,* Image by Google Earth; retrieved 09/19/17.

P28 Photograph of 1876 painting by Léon Trousset, *Mission Santa Cruz;* courtesy Sr. Betty Pedrazzi, Holy Cross Church, Santa Cruz, CA. Dated by Santa Cruz Sentinel newspaper articles on Aug. 12 & Aug. 19, 1876; oil on canvas. This was painted 14 years after the mission had collapsed in an earthquake and is thus not considered an exact rendition.

P32 *Springtime Wildflowers* obtained from Tejon Ranch Company, Inc,.

P35 Fenn, Ed; Image of Glenwood obtained directly from Ed Fenn.

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P36 Postcard, *Glenwood Hotel*, courtesy Ed Fenn.

P37 *Picnic Train at Glenwood, 1890s*; Image courtesy of SantaCruzTrains.com.

P38, 39 *Railroad Station Switching Yard*, and *Glenwood Dance Hall*, courtesy Derek Whaley. Source unknown but probably the Margaret Koch Collection of the Santa Cruz Museum of Art & History.

P40 Postcard: *Glenwood Highway, 1920*, Courtesy of Gil Pennington

P41 Postcard, *Glenwood Hotel*, courtesy Derek Whaley. Source unknown but probably the Margaret Koch Collection of the Santa Cruz Museum of Art & History.

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P50 *Grazing and patterns of disturbance, San Gregorio*, CA, March 2015, obtained from Google Earth. Google Maps Image URL: https://www.google.com/maps/@37.3272788,-122.3230563,4817m/data=!3m1!1e3.

P52 Vande Pol, Alice (aka “Mom”); *Sleepy Dog, Snow Plant, and me; Calaveras Big Trees State Park, June 1959*, Kodachrome slide.

P54 Fenn, Ed; *Mountain Charlie Road*, obtained directly from Ed Fenn.

P67 *Satellite Image of southern Wildergarten* from Google Earth.

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