

AN ETHNOBOTANY OF BAJA CALIFORNIA'S KUMEYAAY INDIANS

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Anthropology

by

Michael Alan Wilken

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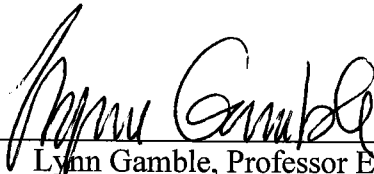
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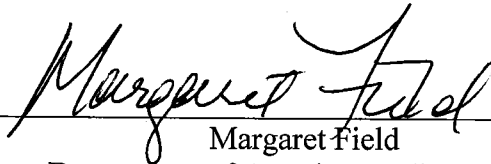
An Ethnobotany of Baja California's Kumeyaay Indians



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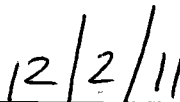
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DEDICATION

This work is dedicated to Baja California's native peoples—past, present, and future; and to all who work for the preservation of Baja California's native cultures and landscapes.

ABSTRACT OF THE THESIS

An Ethnobotany of Baja California's Kumeyaay Indians

by

Michael Alan Wilken

Master of Arts in Anthropology

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The Kumeyaay Indians (also 'Iipay–Tiipay, Ipai–Tipai, or Diegueño in the United States, or Kumiai in Mexico) have inhabited the landscapes of northern Baja California, Mexico, and southern California since long before European contact, originally making a living as mobile hunting, gathering, and fishing peoples in the region's varied environments. The division of Kumeyaay territory in 1848 by two distinct nation states imposed on the region an international boundary as well as separate political and economic structures, cultures, and languages. Historical processes have reduced Kumeyaay territory and population, and transformed indigenous lifeways, yet a few elder Kumeyaay still speak their native language and maintain cultural knowledge of the environment. In this thesis, I explore the questions of how contemporary ethnobotanical knowledge of Baja California's Kumeyaay Indians can make new contributions to scientific research of diachronic human–plant interactions in the study area, and how this knowledge can inform Kumeyaay cultural and linguistic revitalization through its incorporation in interpretive exhibits. I synthesize information from interviews conducted with 16 Kumeyaay plant specialists, documenting Kumeyaay knowledge of traditional uses for 47 native plants as food, medicine, tools, construction materials, and ritual resources, covering indigenous nomenclature, plant scheduling, harvesting, processing, and consumption, as well as cultural meanings associated with plants. I review archaeological, historical, ethnographic, linguistic, and botanical literature to situate the Kumeyaay ethnobotanical data in a regional and diachronic context. I discuss how this study contributes new information on the Kumeyaay and their interactions with the vegetative environment, and provide examples of how I have applied this information to support efforts toward Kumeyaay cultural and linguistic revitalization.

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CHAPTER 1

INTRODUCTION

For some twelve thousand years, native peoples have made their homes in the rugged landscapes of the northern Baja California peninsula (Erlandson et al. 2007). Throughout this vast period, the natural environment changed dramatically as cool, moist Terminal Pleistocene climates gave way to the warmer and more arid Holocene climates of the present (Davis 2006). By the Late Prehistoric period approximately 1300 years ago, the ancestors of the proto-historical and historical Yuman peoples described in written accounts by European explorers and missionaries and later in ethnographic studies inhabited the study area (Gallegos et al. 2002). These mobile hunting, gathering, and fishing peoples developed cultures that allowed them to make a living in the region's arid environments through the utilization of a variety of plant products, hunting small and large game, gathering shellfish, and fishing (Laylander 1987; Massey 1966).

The native populations of the northernmost part of Baja California and southern Alta California are known as Kumeyaay (also *Tipay-Tiipay*, *Ipai-Tipai*, or Diegueño in the U.S., or Kumiai in Mexico). They are related to other tribes of the Yuman family of languages and cultures, which includes peoples living along the Colorado River and other parts of Arizona, as well as groups to the south of them in the Baja California peninsula (Hinton and Watahomigie 1984). Historical and ethnographic documents describe the original territory of the Kumeyaay at the time of sustained European contact in the late 18th century as extending from what is now Escondido, California, in the north to Santo Tomas, Baja California, in the south and east across the peninsular range to the Sonoran Desert (Connolly Miskwish 2007; Hinton and Watahomigie 1984; Mathes 2006). The permanent occupation of Kumeyaay territory by European missionaries and colonists beginning in 1780 (Robertson 1978) continuously reduced the freedom of the Kumeyaay to traverse their territory in annual rounds through coasts, foothills, mountains, and deserts, along with their ability to maintain the knowledge and skills associated with the many habitats found throughout the region (Bendímez Patterson 1987).

Kumeyaay territory was bisected in 1848—only recently in terms of indigenous history—by two distinct nation states that have imposed on the region an international boundary as well as separate political and economic structures, cultures, and languages (Shipek 1991). This study focuses on the southern part of the Kumeyaay region located in Mexico (see Figure 1); it is delimited on the west by the Pacific Ocean, on the east by the Sonoran Desert, on the south by a line extending from the Santo Tomas area east to the desert, and on the north by the U.S.–Mexican border. Although this arbitrary, political division has no bearing on the geology, climate, biotic communities, or prehistory of the region (Wilken Robertson 1993), in the century and a half since the border was first established in 1848, Spanish language and Mexican political, economic, and social institutions have profoundly influenced Kumeyaay history, language, and culture south of the border (Garduño 1994).

Today approximately 600 Kumeyaay people live in five rural indigenous communities of the northern peninsula (Wilken-Robertson 2004b). Among these, only 60 to 70 Kumeyaay fluently speak a variant of their native language; most are elders or middle-aged (Field n.d.). This trend reflects the alarming loss of language diversity observed on a worldwide level, which has been compared to the loss of biological diversity (Hale 1992). The loss of language diversity diminishes ethnobotanical knowledge, since language is one of the primary tools used to construct and organize the natural world, to name plants and habitats, to create taxonomies, and to transmit knowledge of the environment (Hinton and Hale 1994; Wilken 2009).

Many of the Kumeyaay speakers are also knowledgeable in other aspects of traditional Kumeyaay culture, such as the numerous ways that the Kumeyaay have interacted with the region's varied environments (Shipek 1993). This knowledge, the product of centuries of use and intergenerational transmission, has been rapidly disappearing as subsistence activities change and demographic shifts pull native people away from rural communities and into towns and cities (Garduño 1994; Wilken-Robertson 2004b). The scant documentation of Kumeyaay culture (including ethnobotanical knowledge) that exists is scattered throughout scientific literature in Spanish and English, and rarely includes emic perspectives.

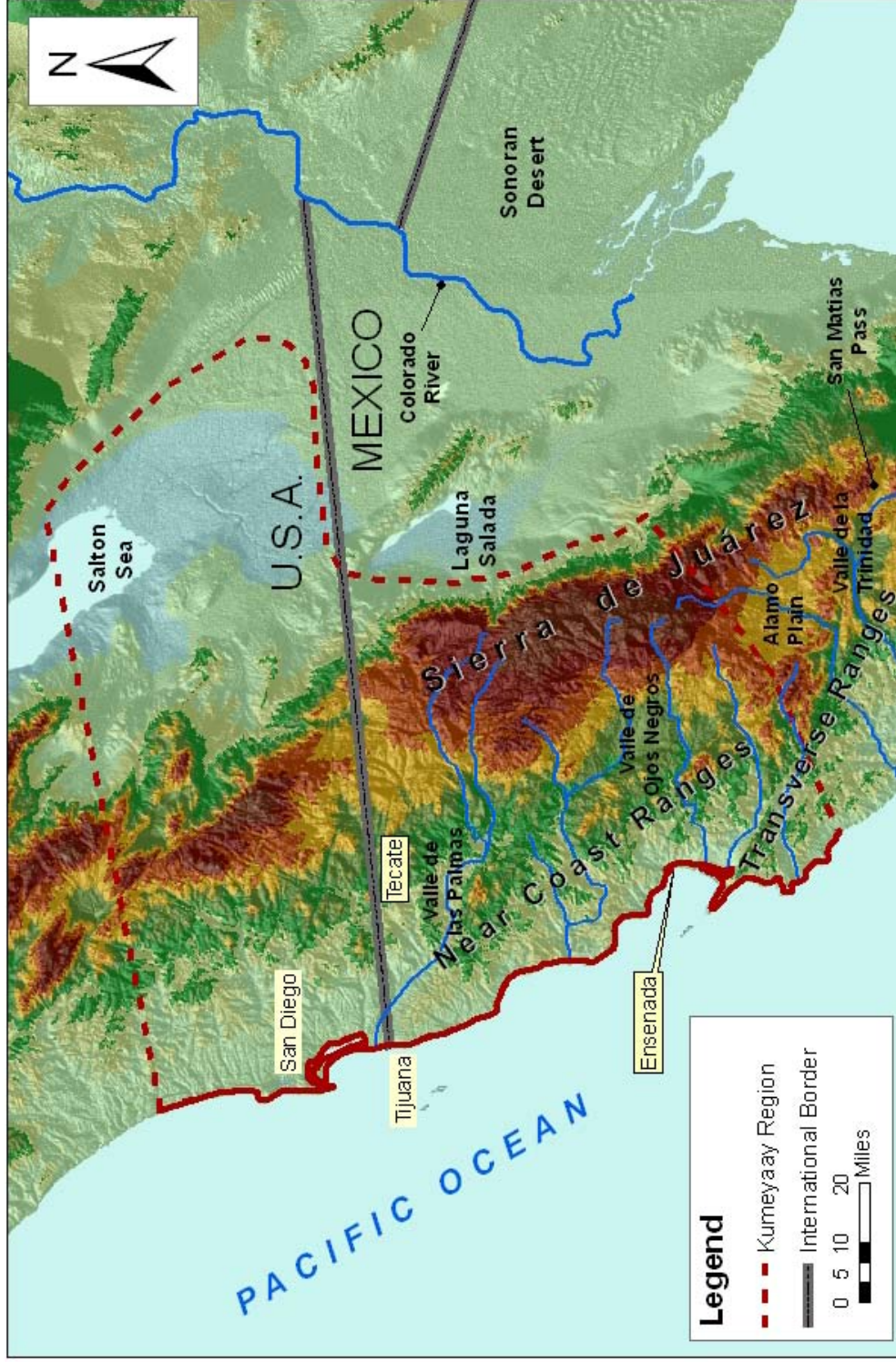


Figure 1. Physical territory of the Kumeyaay Region. Image given to author by Dr. Gerardo Chavez.

Cultural knowledge that has survived to the present may hold important clues to the past (Binford 1962), such as the long-term relationships between humans and the environment of northern Baja California. The ethnographic field work that I have conducted for this thesis has given me the opportunity to work with elders who are fluent Kumeyaay speakers and who grew up using plant resources in their daily lives (or learned of their uses from their ancestors); this process has resulted in the compiling of information to which future researchers might not otherwise have access. Moreover, this information also has great potential to be applied in ways that support Kumeyaay efforts at cultural and linguistic revitalization and to create educational tools such as museum exhibits and teaching materials.

The processes of acculturation, diffusion, or other historical developments have transformed traditional lifeways of indigenous peoples and other descendant populations (Hodder and Hutson 2003; Whitley 1998); in this thesis I consider the possible impacts of some of these processes on Kumeyaay ethnobotanical knowledge. Perhaps cultural transformations among Native Baja Californians have been so profound that current Kumeyaay ethnobotanical knowledge simply reflects contemporary adaptations to contemporary circumstances (Roger Owen, personal communication). The results of this thesis suggest that today's Kumeyaay have incorporated environmental knowledge from prehistoric, historical, and contemporary periods into modern strategies for survival in a globalized world; this persistence of Kumeyaay cultural knowledge reveals a significant amount of information researchers have not previously documented. Thus my research explores two primary questions. First, how can contemporary ethnobotanical knowledge found among Baja California's Kumeyaay Indians make new contributions to an understanding of diachronic human–plant interactions in the study area? Second, how can this knowledge inform Kumeyaay cultural and linguistic revitalization through its incorporation in interpretive exhibits?

Martin describes ethnobotany as “the study of the interactions between people and plants” (1995:xx); I will also consider ethnobotany in the holistic terms of biocultural approaches, which Dufour defines as: “those that explicitly recognize the dynamic interactions between humans as biological beings and the social, cultural, and physical environments they inhabit” (2006:1). This perspective goes beyond simply inventorying plant lore to look for multiple levels of information. For example, how might contemporary

plant gatherers provide clues about how their ancestors left imprints on the physical environment? How might Kumeyaay cultural practices and preferences influence the environment and the environment influence culture? How do contemporary plant uses link the Kumeyaay to prehistoric, historical and present cultural processes? How do interactions with specific plants reflect or assume various levels of meaning within Kumeyaay culture? How is language integral to the construction of this meaning?

In order to respond to the first research question, I review archaeological, historical, ethnographic, and linguistic literature that refers to human–plant interactions of the Kumeyaay region. I then present relevant information from field interviews with Kumeyaay plant specialists as they carried out or described ethnobotanical activities related to 47 plants; the data for each species are synthesized along with information gathered from the existing literature. I discuss how these data make new contributions or confirm extra-regional patterns of indigenous relationships with the vegetative environment.

In response to my second research question, I provide some examples of how the data can be applied toward Kumeyaay cultural and linguistic revitalization efforts. I provide examples of materials I developed in collaboration with Kumeyaay community members designed to reflect emic perspectives in the exhibits of the Tecate Community Museum. These activities were carried out as part of my extended internship with Corredor Histórico CAREM, a Baja California civil association.

“Baja California peninsula” refers to the land area that is comprised of two Mexican states: Baja California, the current state of Baja California (which does not have the word *Norte* in its name), and Baja California Sur, the state that comprises the lower half of the peninsula. Alta California refers to the state of California, of the United States of America. “The Californias” refers to all three Californias, given the prehistoric, historical, and cultural relationships among the states. I have translated all texts from documents, recordings, and field interviews originally in Spanish, unless indicated otherwise. In this work I cite works that I have published using my U.S. name (e.g. Michael Wilken) as well as others following the naming conventions used in Mexico (e.g. Michael Wilken-Robertson) or variants thereof; to add to this complex nomenclature I am required to use my full name as registered at SDSU (Michael Alan Wilken) for this thesis. I recognize that these multiple variations may be confusing to readers, but I suggest that they reflect my negotiation of identity while

straddling two distinct countries, cultures and languages, and writing for both academic and popular audiences.

CHAPTER 2

METHODOLOGY

I have designed this qualitative study to explore the following two questions: How can contemporary ethnobotanical knowledge of Baja California's Kumeyaay Indians make new contributions to our understanding of diachronic human–plant interactions in the study area? How can this knowledge inform Kumeyaay cultural and linguistic revitalization through its incorporation in interpretive exhibits?

In order to respond to the first question, I conducted bibliographic research to examine the archaeological, historical, ethnographic, and linguistic literature of the Kumeyaay region related to human–plant interactions, as well as other regional ethnobotanical studies (including studies from outside of the geographic focus area that have similar vegetative ecosystems, such as the Diegueño, Cahuilla, and Chumash). I also reviewed and synthesized general geographic and botanical bibliography of the region to provide a context for understanding the Kumeyaay physical environment and for purposes of plant identification. This bibliographic background provides a regional and temporal context for situating the Kumeyaay ethnobotanical data collected in the field.

I collected qualitative data by conducting ethnographic field interviews with 16 key informants using open-ended questions (Ervin 2005) covering indigenous ethnobotanical nomenclature, timing of resource use, harvesting, processing, and consumption, as well as cultural meanings associated with 47 plants (see Appendix A), using digital video, audio, and photography. The plants I selected represent a sample of plant types (e.g. trees, shrubs, cacti, and perennials) from distinct ecosystems that play an important role in Kumeyaay culture and provide examples of various plant uses for food, medicine, tools, construction, and ritual–ceremonial purposes. The sample is subjective and reflects the knowledge and priorities of contemporary Kumeyaay consultants as well as my own interests and experience. The plants chosen also serve an educational function in the ethnobotanical gardens of the Tecate Community Museum, where they are part of the interpretive exhibits of the Kumeyaay wing of the museum. Because of this educational use in a public space, I have

chosen not to include certain plants that Native Californians have used in ritual and ceremonial contexts (e.g. jimson weed and wild tobacco), in order to avoid the misuse of these plants by modern populations.

I recorded interviews in the Kumeyaay and Spanish languages, and translated relevant parts of narratives to English for use in the thesis. I took photographs of each plant that I documented; wherever possible these include plant–human interactions.

I selected the Kumeyaay cultural consultants based on three criteria: fluency in the Kumeyaay language, knowledge of native plants, and identification with a specific geographical area of the Kumeyaay region. Language fluency was a criterion because of the importance of indigenous language in ethnobotanical studies (see chapter six) and because I carried out interviews as part of my work on the project “Documentation of Kumeyaay Language Spoken in Baja California, Mexico,” a project of the Documenting Endangered Languages program in coordination with the National Science Foundation and the National Endowment for the Humanities. One of the purposes of the interviews was simply to record Kumeyaay language; thus all of the interviewees were fluent speakers of the Kumeyaay language variety or the closely related Ko’alh language variety. The consultants had to demonstrate a comprehensive knowledge of native plants and their uses; I identified them as plant specialists based on previous ethnobotanical research I had conducted in the region. The consultants were selected based on identification with a geographic area in order to include regional variations in ethnobotanical and linguistic knowledge.

Only one of the sixteen consultants was male. This reflects at least three factors: the majority of fluent Kumeyaay speakers are female (see discussion of language and gender demographics in chapter six); Kumeyaay women tend to be more directly involved in family-related activities such as plant gathering and processing for food and medicine in the vicinity of their communities, while men often work outside of their communities as wage laborers (Garduño 1994); and women were more consistently available to participate as consultants in this study.

From one to three Kumeyaay speakers participated in each interview. I asked speakers from different areas of the Kumeyaay region to provide the Kumeyaay names of all 47 plants for purposes of comparison. Speakers did not always remember the names of plants that do not grow in the area where they live, that they no longer use, or for which Spanish

names have been substituted. The speakers were asked to discuss in detail a few specific plants that grow in their locality. In some cases, the speakers brought up the names and uses of different plants than those on the list; this information was also recorded. The interviews were conducted with speakers in their homes, in the environments where the plants grow, or at the Tecate Community Museum. Long term positive or negative relationships between the interviewers and the community members may have influenced which community members agreed to participate in the study, however it should be noted that all speakers approached were happy to participate. Additionally, a small stipend was offered to participants, which may have influenced some community members' participation in the study.

I synthesized the field data and presented it by genus and species, along with the corresponding bibliographic data, contextual information, and photographs. I also documented plant names and variant names as data for the analysis of the relationships between distinct Kumeyaay language varieties, and between Kumeyaay and other related languages.

To respond to the second question regarding how ethnobotanical information can be applied, I provide examples of how the data from this study has been used in Kumeyaay cultural and linguistic revitalization efforts through its incorporation in interpretive exhibits that I created during my internship.

I have coded the audio and video field recordings referenced in this study in order to facilitate their identification (see audio and video recordings section following references cited). Copies of audio and video recordings as well as field notes are available for consultation at the Biblioteca Cuchuma of Corredor Histórico CAREM, A.C., a Mexican civil association located in Tecate, Baja California. The organization's website is www.carem.org and the address is: Calle Tlaloc no. 400, CECUTEC, Colonia Cuauhtemoc C.P. 21470, Tecate, Baja California, México; telephone: (665) 521 3970.

CHAPTER 3

PREHISTORIC LANDSCAPES OF THE KUMEYAAY REGION

In this section I examine the prehistoric physical and cultural settings in which Kumeyaay–plant interactions developed. I describe the geography and the various vegetative habitats of the study area. I review the archaeological literature that refers to the Kumeyaay region, and explore the ancient cultural chronology of the region as it relates to the evolution of human–plant relationships.

ENVIRONMENTAL SETTING

The Baja California peninsula is the second longest north–south peninsula in the world, joined to the North American continent roughly in the area of today’s U.S.–Mexican border and extending 1300 kilometers south. On the west it faces the Pacific Ocean and on the east the Gulf of California separated it from the rest of Mexico (Roberts 1989). The far northern area of the peninsula is part of a broader geological, climatic, and biological region that includes much of southern California to the north, and the Sonoran Desert region to the east (Minnich and Franco Vizcaíno 1998). To the south of Kumeyaay territory, irregular mountain ranges continue to form the rugged backbone of the peninsula, surrounded by arid desert and coastal plains (Davis 2006).

The Sierra Juárez, the major mountain range within the study area, forms a westward tilting plateau reaching altitudes of 1200 to 1800 meters; its eastern escarpment drops dramatically to the floor of the Sonoran Desert (Minnich and Franco Vizcaíno 1998). On the west side of the mountains, broad, open valleys and plains, including Valle de las Palmas, Valle de Ojos Negros, and the Alamo Plain interrupt hilly terrain sloping toward the Pacific. To the west of these, rugged foothills and plains drop to coastal areas with marine terraces. Running north to south along the Pacific coast, a discontinuous chain of mountains of 1200 to 1500 meters forms the Near-Coast ranges. South of Ensenada, an east–west set of mountains known as the Transverse Ranges bordering the Agua Blanca fault reach 1000 to

1400 meters, extending as far eastward as the northern rim of Valle de la Trinidad and San Matias Pass (Minnich and Franco Vizcaíno 1998).

The North American Mediterranean climatic zone extends into northern Baja California, bringing with it mild and cool winters, with hot and dry summers. The Pacific Ocean on the west strongly influences the region's climate, as winter frontal storms provide the main source of precipitation in the region. Occasional summer thunderstorms may break up the usual extended droughts of summer, primarily in the mountains (Minnich and Franco Vizcaíno 1998). Due to the scarcity of water in the region, most streams are ephemeral and permanent surface water flow is rare (Laylander 1987). Mean annual precipitation varies greatly throughout the environments of the region: along the coast it ranges from 20 to 35 centimeters; along the summits of the near-coast ranges, from 30 to 40 centimeters; on the western flank of the Sierra Juárez it reaches 40 to 50 centimeters. Inland valleys such as Valle de las Palmas and Ojos Negros receive less (17 to 25) due to their location on the lee side of the near-coast ranges (Minnich and Franco Vizcaíno 1998), while desert transition on the eastern escarpment and lowland desert areas of the region are extremely arid with less than 15 centimeters, as they lie in the rain shadow of the mountains (Lightner 2011).

Vegetative communities of the area's landscapes were lush with extensive forests at the end of the Pleistocene when humans first entered the peninsula, but have transitioned to a much more arid climate during the Holocene (West et al. 2007). Before sustained European contact began around 1780, coastal habitat along the western margin of the region included large areas of coastal scrub, native grasslands, estuaries at the mouths of streams, coastal dunes, shorelines, intertidal zones, and islands. Plants such as coastal agave (*Agave shawii*), succulent live-forevers (*Dudleya* sp.), various types of sage (*Salvia* spp.), California sagebrush (*Artemisia californica*), laurel sumac (*Malosma laurina*), toyon (*Heteromeles arbutifolia*), and California buckwheat (*Eriogonum fasciculatum*) commonly populate these areas (Minnich and Franco Vizcaíno 1998; Roberts 1989).

Moving away from the coast into the foothill zone, chaparral vegetative communities mix with scrub and eventually predominate. Lower elevation chaparral includes chamise (*Adenostoma fasciculatum*), chaparral ash (*Fraxinus* sp.), chaparral yucca (*Yucca whippleii*), yerba santa (*Eriodictyon* spp.), manzanita (*Arctostaphylos* sp.), and holly-leaf cherry (*Prunus ilicifolia*). Riparian communities include oak (*Quercus agrifolia*) woodlands and deciduous

forests of sycamore (*Platanus racemosa*), cottonwood (*Populus fremonti*), willow (*Salix* spp.), and elderberry (*Sambucus nigra*) as well as riparian shrubs and perennial herbaceous plants such as yerba mansa (*Anemopsis californica*) and juncus (*Juncus acutus* and *J. textilis*) (Minnich and Franco Vizcaíno 1998; Roberts 1989). Wide native grasslands once covered inland valleys, but today these have been transformed by the introduction of exotic grasses as a result of livestock grazing, or have been cleared for agriculture, industry, and urbanization (Minnich and Franco Vizcaíno 1998; Shipek 1993).

Chaparral plant communities at higher elevation slopes and mountain ranges include red shank (*Adenostoma sparsifolium*), Mohave yucca (*Yucca schidigera*), juniper (*Juniperus californica*), sugar bush (*Rhus ovata*), Indian tea (*Ephedra californica*), jojoba (*Simmondsia chinensis*), big sagebrush (*Artemisia tridentata*), and prickly pear (*Opuntia* spp.). Forests of the Sierra Juárez contain a wide variety of conifers including two types of pinyon, *Pinus monophylla* and *Pinus quadrifolia*, as well as broadleaf evergreens such as canyon live oak or sweet acorn (*Quercus chrysolepis*). These forests are often mixed with chaparral. Along the eastern escarpment to the base of the mountain ranges, the desert transition zone is dominated by Sonoran Desert scrub including desert agave (*Agave desertii*), except where oases of California Fan Palm (*Washingtonia filifera*) and Mexican Blue Palm (*Brahea armata*) occur along streams draining off the mountains (Minnich and Franco Vizcaíno 1998).

SOURCES: KUMEYAAY PREHISTORIC ARCHAEOLOGY

Few researchers have carried out archaeological studies in the Mexican section of the Kumeyaay region. Treganza (1947) conducted reconnaissance work in the Sierra Juárez and at two sites in the Kumeyaay region along the Pacific coast of northern Baja California. Rodgers (1966) conducted surveys and excavations in the Baja California Kumeyaay region during the 1920s and 1930s that he used in the development of his regional cultural chronology. Massey (1966) conducted research throughout the Baja California peninsula and proposed a general synthesis of its prehistory. However, his work in the Kumeyaay region was limited primarily to surface surveys in coastal areas. Moriarty (1968) presented radiocarbon dates collected by Hubbs and others from sites within and outside of the Kumeyaay region in the 1950s and early 1960s. Gruhn and Bryan (2002) excavated at the

Abrigo de los Escorpiones on the Pacific coast, finding evidence of early Holocene occupation. Rose Noble (1973), a physical anthropologist at the San Diego Museum of Man, synthesized information on human skeletal remains from throughout the peninsula, including osteological materials from within the study area. More recently, researchers working for government-managed cultural resource management operations have excavated in the study region (Baeza Catalán 2005; Drakik Ballivian 2007; Oviedo García 2008; Oviedo García and Guía Ramírez 2008a, 2008b; Porcayo Michelini 2008), generally basing their cultural chronologies on those developed for southern California (Laylander 1992), due to the lack of a comprehensive locally based cultural chronology.

Rogers (1939, 1945), Warren (1968) and many others have developed numerous cultural chronologies for the neighboring southern California region; researchers continue to debate these (Gallegos et al. 2002) but archaeologists on both sides of the border still widely use a version of the three stage synthesis. Recently, larger scale approaches examine the occupation of the Pacific coast of North America, including evidence from archaeological studies of the three Californias (Erlandson et al. 2008).

PREHISTORIC CULTURAL CHRONOLOGY

The timing and routes of the first human migration into the Americas are far more complex than original theories postulated (Waguespack 2007), however evidence from Terminal Pleistocene sites along the Pacific coast of Alta and Baja California has strengthened the argument for coastal migration of Paleo-indigenous peoples in the initial colonization of the continent (Erlandson et al. 2008). The first explorers who occupied the northern peninsula left only faint traces of their presence, including Clovis points and other stone tool assemblages (Aschmann 1959; Erlandson et al. 2008). At that time the region was transitioning from the moister and cooler Ice Age climate to a dryer and increasingly arid (though variable) Holocene climate (West et al. 2007), and sea levels were 35 to 55 meters lower than at present (Masters and Aiello 2007). Biotic communities during this period would have been similar to those of contiguous areas of southern California and included more coniferous forests at lower altitudes than at present (West et al. 2007), as well as fauna such as horse, bison, camel, mammoth, and llama (Davis 2006).

In the southern California–northern Baja California region, researchers generally refer to the archaeological complex associated with sites dating from this earliest time period as “San Dieguito” (Laylander 1987; Rogers 1939). Although rising sea levels may have destroyed or submerged many of the earliest sites, most of the currently known sites from this period are “located near the coast and have strong emphases on littoral resources” (Erlandson et al. 2008:2242). While sites from this period potentially exist in northern Baja California, there is currently no information available on Terminal Pleistocene sites (Porcayo Michelini 2008) except one date from $10,120 \pm 40$ cal BP found in excavations at *Abrigo de los Escorpiones* rock shelter near Santo Tomas, Baja California (Gruhn and Bryan 2002). In recent years the accelerated pace of development along the coastline between the U.S. border and Punta Banda, Baja California has resulted in the destruction or degradation of many sites in coastal areas; others are gravely threatened (Porcayo Michelini 2008).

During the warmer climates and increasing aridity of the Middle Holocene, 8000 to 1,300 years ago (Gallegos et al. 2002), landscape patterns shifted to the current distribution of chaparral, pine forest, oak forest, coastal and desert scrub, while sea levels eventually rose to present levels (Delgadillo Rodríguez 2002; Masters and Aiello 2007; Minnich and Franco Vizcaíno 1998). New cultural traits showing a greater emphasis on seed grinding and exploitation of coastal resources began to appear in northern Baja California (Carrico 2008; Shackley 2004; Warren 1968). Known generally as the La Jolla complex in southern California and northern Baja California, these cultures are characterized archaeologically by extensive shell middens, larger amounts of milling stone, and burials that often include broken metates placed over skeletons (Noble 1973). Archaeologists have not yet agreed whether or not these populations are related to those of the Late Prehistoric, the final prehistoric cultural period of the northern peninsula associated with major innovations such as ceramics and the bow and arrow. Whether the changes of the Late Prehistoric, which begin to show up in the archaeological record approximately 1,300 years ago, represent the influx of new populations or the result of cultural diffusion (or a combination of both) is an important issue in the prehistory of Baja California (Laylander 1987). Fluctuations in climate such as those caused by the El Niño–Southern Oscillation undoubtedly affected the environment throughout the Holocene (Davis 2006), including the Late Prehistoric period,

but researchers have not yet reported the impacts of these on native peoples' interactions with their natural surroundings in the study area.

Peoples of the Late Holocene–Late Period (1,300 to 200 years ago) belong to the Yuman archaeological complex (Gallegos et al. 2002; Rogers 1945; Shackley 2004); their languages and many aspects of their cultures share much in common with closely related indigenous groups of southern California and Arizona (Massey 1966; Hinton and Watahomigie 1984). Archaeologists have carried out few excavations in the study area (Baeza Catalán 2005; Drakik Ballivian 2007; Porcayo Michelini 2008) and little local archaeological information is available on the cultures of the Late Period and the environments in which they constructed their cultures; consequently researchers working in Baja California extrapolate concepts from the Yuman archaeological complex based on archaeological excavations in neighboring southern California (Gallegos et al. 2002) as well as from historical period and ethnographic documents. Along with pottery and smaller projectile points used with bows and arrows that are key indicators of the Late Period, archaeologists have inferred cultural patterns from archaeological sites of the larger region that include larger populations, the establishment of permanent or semi-permanent seasonal village sites, increased numbers of acorn milling sites, enhanced methods of food storage, and interment by cremation (Gallegos et al. 2002; Kwiatkowski 2008). Kumeyaay transhumance included seasonal occupation of higher elevations of the Kumeyaay region where important resources such as pine nuts, acorns, and other seeds were available (Kwiatkowski 2008) as well as movement to winter residence at lower elevations (Carrico 2008). Some of these cultural patterns persisted into the early historical period, when non-Indian travelers to the region, in accounts from some of the first contacts between indigenous and non-native groups, described the Late Period ancestors of the historical and contemporary Kumeyaay peoples (Gallegos et al. 2002).

CHAPTER 4

ETHNOHISTORY:

LATE PERIOD LIFEWAYS IN TRANSITION

Historical sources, including European explorers, Franciscan and Dominican missionaries, and 19th century writers provide early written accounts of Kumeyaay plant use during a period of dramatic transitions in native lifeways (Mathes 2006). They describe mobile hunting, gathering, and fishing populations in northern Baja California during the periods before and after enormous changes impacted the native world (Mathes 2006). These documents bring to life fragmentary and often highly biased, but nonetheless extraordinarily valuable information regarding native peoples' interactions with the environment; their material culture; subsistence, social, and political organization; religious and ceremonial life; and languages. They also shed light on the impacts of historical processes through which aboriginal Kumeyaay ethnobotanical knowledge has been filtered, such as the diffusion of cultural practices from other regions (in particular other part of Mexico and Spain), constrictions on land use, diminishing access to natural resources, and introduction of exotic species (Gamble and Wilken-Robertson 2008; Laylander 1987). In this section I will outline sources from or about this period and discuss how they demonstrate the changing relationship between the Kumeyaay and their natural environments (see Figure 2).

SOURCES

The earliest of these descriptions are the works of European explorers such as Juan Rodríguez Cabrillo, who traveled along the Pacific in 1542; and Sebastian Vizcaíno, who in 1602 passed along the Pacific coast; both provided fleeting descriptions of the land and its inhabitants (Mathes 2006). A century and a half later, the 1769 expeditions of Franciscan missionaries, including Fathers Serra and Crespí, would journey through the area and take detailed notes on the native peoples and their environments (Crespí 2001; Crosby 2003; Gómez Canedo 1969). As the Dominicans subsequently took over administration of the missions in the northern peninsula from the Franciscan order, they also left written

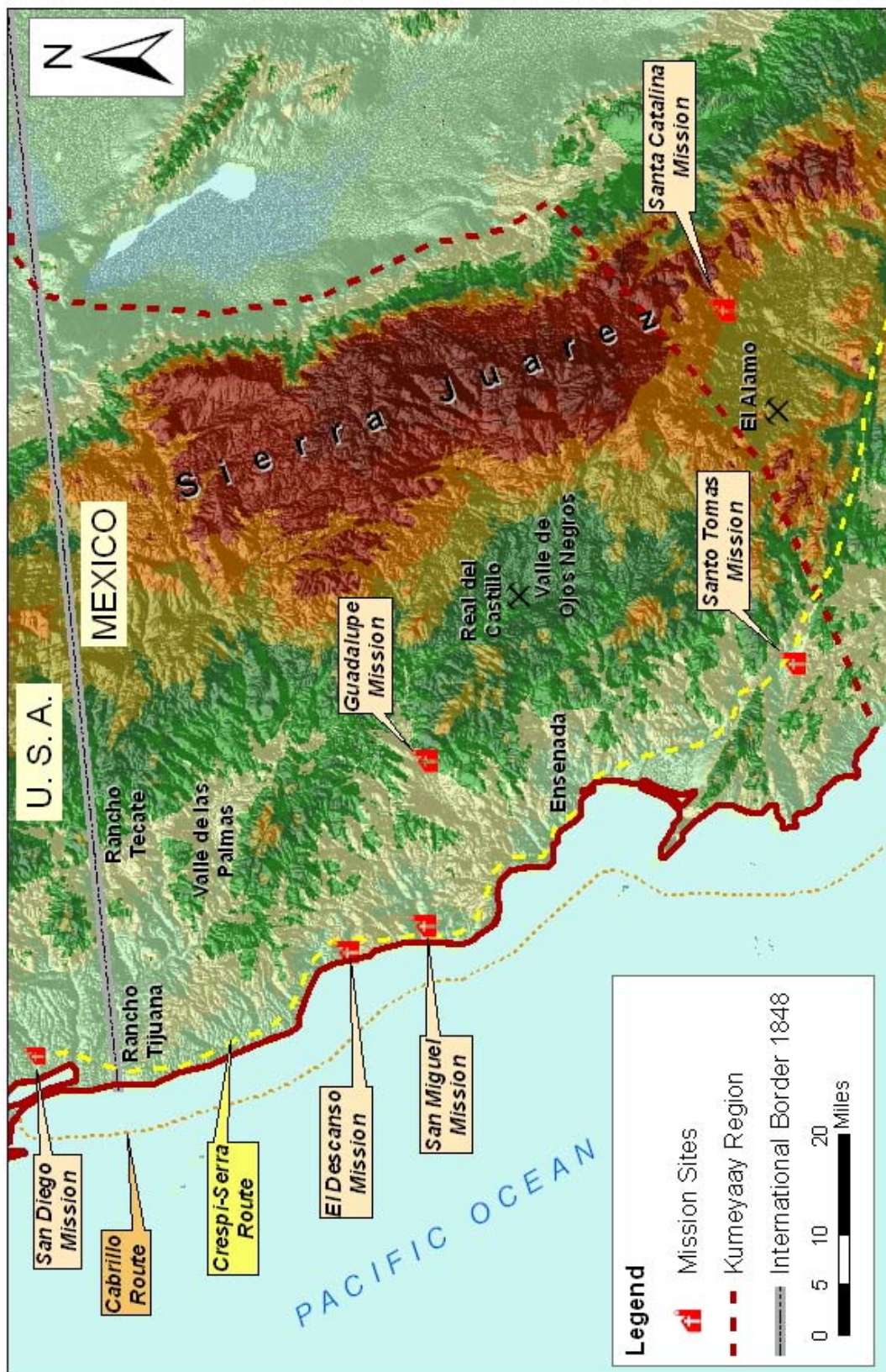


Figure 2. Historical period Kumeyaay Territory. Image given to author by Dr. Gerardo Chavez.

descriptions of the aboriginal peoples under their administration (Meigs 1935; Sales 2003); their writings also include descriptions of indigenous plant use. The 1796 diary of Joaquín Arrillaga (1969), then governor of the Californias, from his survey of southern Kumeyaay lands offers vivid descriptions of vegetation in different ecosystems of the Kumeyaay region. Minnich and Vizcaíno (1998) compared the journals of the Franciscans Serra and Crespi, Longinos (the leader of a Spanish scientific expedition), Arrillaga, and other historical documents with current studies of vegetation communities in northern Baja California to assess the impacts of historical processes on native vegetation. The establishment of missions in the Kumeyaay region brought with it epidemic diseases and the demographic impacts on native populations; Meigs (1935) and Jackson (1981, 1983) examined these impacts through analysis of mission records.

During the nineteenth century, Clemente Rojo, a former governor of the northern peninsula, conducted interviews with prominent and everyday personalities of the region, including Kumeyaay people (Rojo 1987). Engineer David Goldbaum (1984) published a report on the surviving indigenous communities of Baja California in 1918. Anthropologists Roger Owen (1963) examined the impacts of historical events such as the armed movement of 1911 (related to the Mexican revolution) on the native groups of northern Baja California. Julia Bendímez Patterson (1987), longtime director of the Baja California offices of the National Institute of Anthropology and History, synthesized a number of documents to present an overview of the history of the Kumeyaay and other indigenous groups of northern Baja California, including a discussion of the loss of access to traditional territory and resources. Everardo Garduño (1994) synthesized data from his own field research with the Kumeyaay and other Baja California Yuman groups, and analyzed historical processes that transformed indigenous lifeways. Anthropologist Heather Kwiatkowski (2008) described changes in Kumeyaay culture and land use during the historical period based on an ethnoarchaeological survey conducted in Peña Blanca.

ETHNOHISTORICAL LANDSCAPES OF THE 18TH AND 19TH CENTURIES

Early written accounts from the Kumeyaay region describe hunting, gathering, and fishing peoples living in the various environments of the region, in many cases providing

specific information about interactions with plants that give human form to cultural patterns suggested by archaeological data (Gamble and Wilken-Robertson 2008). As late as 1769, chroniclers encountered practices that suggest culture patterns prevalent in the Late Period (Crespí 2001), including small bands seasonally exploiting locally available plant foods, the use of ceramics, bows and arrows, and fiber nets. Epidemics that preceded the advance of Spanish colonization from the south and east may have already affected Kumeyaay populations, and exotic plants may have already started to invade the region (Preston 1998), however in many ways the people described provide important clues to understanding aboriginal cultures that can serve as a baseline from which to understand the many changes that would later occur during the mission, ranch, and mining periods (Gamble and Wilken-Robertson 2008).

Juan Rodríguez Cabrillo's 1542 expedition along the Pacific coast provides the earliest account of indigenous Baja Californians from just south of the Kumeyaay region. In the area of Cape Colonet, a group of sailors went to shore to supply the ship with water, when they encountered a group of native people. The chronicler reports: "To this watering place came forty Indians with bows and arrows. They could not make each other understood. The Indians were naked; they brought roasted maguey and fish to eat" (Bolton 1959:21). A few days later, in the area of Ensenada, they saw "Indians in some very small canoes" (Bolton 1959:21-22), most likely tule balsas or rafts later described by missionaries (Crespí 2001; Cunningham 1989).

As they headed north past the Coronado Islands, "great smokes were seen on the land" (Bolton 1959:23), and as they sailed north past San Diego along the northern part of Kumeyaay territory, they described "many valleys and plains, and many smokes, and mountains in the interior" (Bolton 1959:24). Sixty years later, in the fall of 1602, Father Antonio de la Ascención of the Sebastiano Vizcaíno expedition described a similar scene as the expedition sailed north past the Coronado Islands: "The Indians made so many columns of smoke on the mainland that at night it looked like a procession and in the day the sky was overcast" (Bolton 1959:79-80). The "smokes" might have involved prescribed burning by the Kumeyaay (Anderson 2005; Shipek 1993; Timbrook et al. 1993), although communication signals or other causes might also explain the phenomenon.

Diaries from the 1769 expeditions of Franciscan missionaries Junípero Serra and Juan Crespí and the Spanish soldiers who accompanied them as they traveled northward from Baja California to establish the Mission of San Diego provide a vivid glimpse of Kumeyaay lifeways before ongoing contact with European colonizers (Gamble and Wilken-Robertson 2008). Crespí's large land expedition spent 22 days traveling through the region, from April 21 through May 13, having many encounters with Kumeyaay peoples along the way. In the Santo Tomás Valley, the group found well-beaten trails and much evidence of Kumeyaay presence, but saw none (as usually occurred) because they were hiding from the Spanish. Crespí noted that some members of the expedition found "piles of the very tasty seeds eaten by the heathens, a very large, very thick bowl made of baked clay, and other very strongly and smoothly made pottery" (Crespí 2001:221). Both hostile and friendly encounters took place throughout the time the group was in Kumeyaay territory. For example, on May 10th, in the area that is now the coastal town of Rosarito, Crespí described a large number of local Kumeyaay people who were very keen on trading with the Spanish:

Some of the men carried the usual bow and arrows, others war clubs, still others very long fish gigs, these last being very sharp in the point, which is made of bone or shell. They all carry a great many very neatly and well-made fishing nets of all colors that they wear tied at their waists. Our commander made all of them a present of beads, ribbons, and other items, with which they were all very well pleased. Some of them presented barbequed sardines and mussels to the commander, who gave them very good presents, which they returned one more time by presenting him with one or two nets that they took from their waists and four or five arrows, from their quivers, that were very much painted and had very fine flints of all hues. [Crespí 2001:243]

Father Junípero Serra, who traveled with the second 1769 Franciscan expedition to Alta California in the same year, also described in his diary numerous encounters with the Kumeyaay. He found them to be astute traders, and describes them as able fishers who went out in their "little canoes" made from cattails especially to bring fish for the group. Along the coast in the area that is now El Descanso, he observed that "often in the ocean we would see two, or sometimes four or five little canoes with Indian fishermen, and far out in the water" (Gómez Canedo 1969:64). In the same area he noted: "We saw the land was covered with very good mescal [*Agave shawii*] but I think the Indians pay little attention to it due to the abundance of fish and other foods" (Gómez Canedo 1969:64). The lack of attention probably had more to do with the season, since the expedition passed through Kumeyaay territory in

June, and coastal agave ripens later in the year (Roberts 1989). Serra mentions enjoying a drink made from chia that was brought to him by Indians; he also received a gift of a basket full of spicy powder, perhaps ground sage seeds, which was used to season fish (Gómez Canedo 1969).

These descriptions from Crespí and Serra depicting hunting, gathering, and fishing peoples as they interact with the coastal landscapes of the Kumeyaay region reinforce the evidence from the archaeological record of the Kumeyaay region, where material culture included fiber cordage, bows and arrows, stone, bone, and shell tools, tule rafts, nets, and spears, as well as ceramic and lithic technologies associated with the storage or processing of plant materials (Gallegos et al. 2002; Gamble and Wilken-Robertson 2008). The plentiful terrestrial and marine resources along the Pacific coastal terraces of the Kumeyaay region supported large native populations (Meigs 1935).

The Franciscans went on to found San Diego de Alcalá Mission in 1769, the first mission in the Kumeyaay territory of Alta California. In Baja California, the Dominicans first began establishing missions in the territories of Yuman groups south of the Kumeyaay, picking up where the Franciscans left the advancing chain of missions at San Fernando Velicatá with the intention of linking the peninsular missions to the Franciscan missions of Alta California (Meigs 1935). The Dominicans established the missions of El Rosario Viñaraco (1774), Santo Domingo (1775), and San Vicente Ferrer (1780) south of Kumeyaay territory (Meigs 1935). In 1787, the Dominicans established the mission of San Miguel Archangel, the first in Kumeyaay territory, located in a major river valley where both Crespí (2001) and Serra (Gómez Canedo 1969) previously described a village with many huts. The mission was built on top of an ancient midden site, where the dark soil still contains shells of abalone, clams, and mussels (Robertson 1978). In 1791 the Dominicans established the mission of Santo Tomás, linking the southern missions with San Miguel. Thus began the permanent colonization of Kumeyaay territory as new immigrants appropriated key ecosystems in order to establish European agricultural and pastoral economic models (Preston 1998).

The Dominicans hoped to establish contact with the missions of Sonora, and also to have a mission in a strategic location to monitor the activities of the Colorado River Yuman peoples, so Dominican and Spanish authorities made several surveys of the frontier in the

1790s, looking for an appropriate site. In September of 1796, Governor Joaquín Arrillaga visited the Sierra Juárez, then known as the Sierra del Pinal (because of the extensive pine forests), where he found several *rancherías* (seasonal encampment sites and the extended family bands that inhabit them) in the pinyon groves (Arrillaga 1969:14). He also reported meeting a group of Indians who were “in their prickly pear harvest, and also gathering other seeds” (Arrillaga 1969:63). He reports *rancherías* of some five to ten huts, usually with small, deep wells nearby. Many were empty, because “it is summer and they were absent looking for pinyons and other seeds” (Arrillaga 1969:63). He describes other seasonal encampments and a place where a dance was held that Colorado River Indians had attended.

The Dominicans built Mission Santa Catarina in Ko’alh and Paipai territory in 1797, Mission El Descanso in 1817, and Guadalupe, the last of the Dominican missions, in 1834 (Meigs 1935). With the establishment of the Dominican missions, extensive agricultural and ranching operations and transportation corridors in key parts of their territory, free movement by Kumeyaay hunters and gatherers became more restricted to more confined areas, probably leading to more intensive use of localized biotic resources by non-missionized Kumeyaay (Minnich and Franco Vizcaíno 1998). The presence of missionaries and Spanish soldiers interrupted the Kumeyaay’s seasonal rounds between the coast and the mountains. Clemente Rojo’s interview from the 1870s with Janitín, a Kumeyaay Indian of Nejí, illustrates this process of disruption:

I and two relatives of mine came down from the Nejí Mountains to Rosarito Beach to catch clams, to eat and take back to the mountain as we were accustomed to doing every year; we did no harm to anyone on the way, and on the beach we thought only of catching and drying clams to take to our settlement.

While we were doing this, we saw two men on horses racing toward where we were; my relatives, of course, were afraid and began to run away as fast as they could, hiding in the thick willow grove which existed at that time in the gully of Rosarito Rancho.

When I saw that I was alone, I became afraid of those men too, and I ran toward the forest to join my companions, but it was too late, because just then they caught me and lassoed me and dragged me a long ways, banging me around a great deal on the branches over which they dragged me, pulling me, lassoed as I was, as fast as their horses would go; after this they tied me up with my arms behind me and took me on to the mission of San Miguel.... [Rojo 1972:30]

The Kumeyaay responded in various ways to Spanish colonization. The “brancos” or unbaptized Indians avoided contact with the missions and Spanish colonial society, and modified their hunting and gathering movements to circumvent the newly occupied areas. Some Kumeyaay found it useful to visit the missions as part of their seasonal cycles, particularly at times when agricultural resources were available, but avoiding baptism, since this would imply relinquishing their freedoms to the church (Magaña Mancillas 1997). Some voluntarily or involuntarily accepted conversion into the Catholic faith and the mission culture, a transformation that implied the beginning of cultural and linguistic assimilation into the Spanish colonial system (Meigs 1935). The presence of the missions in the region represented the first phase of the larger Spanish colonial program of pacification and reduction designed to convert the native peoples into useful subjects of the Spanish empire and to transform the landscape in ways that would support an agricultural and pastoral economy (Meigs 1935; Preston 1998; Rawls 1984). This deeply impacted the hunting, gathering and fishing economy of the Kumeyaay, and limited their ability to maintain many traditional practices, such as prescribed burning of parts of the landscape, which was outlawed by the Spanish because it was considered a threat to new models of land utilization (Timbrook et al. 1993).

The new economic and religious systems introduced a radically different set of technologies and ideologies for utilizing the land, marking the beginning of new patterns of environmental exploitation that would dramatically impact the Kumeyaay and their interactions with their natural and cultural landscapes. Access to a wide range of plant resources began to shrink as “their ecosystem would undergo transformations and deterioration due to the cultivation of grains, the grazing of animals and the cutting down of trees, especially of oaks” (Santiago Guerrero 2005:57).

Even those living away from the missions found it hard to escape their growing influence. The testimony of legendary Kumeyaay leader Jatiñil illustrates the predicament of the Kumeyaay during this difficult period of transition:

I came to help Father Felix raise Mission Guadalupe from its foundations to the end, and I also helped him to sow every year and to harvest his crops; and the father used to give us what he wanted to—corn, barley, and wheat, from that which we ourselves had sowed and harvested but, not content with this, he tried to get us to be baptized several times in order to shut us up in the mission and handle

us like the rest of the Indians . . . this made me very angry and for that reason I went to look for him in Guadalupe with the intention of killing him . . . After that, I returned to this settlement [Nejí] and I haven't gone anywhere. [Rojo 1972:45–46]

In 1821, Mexico gained its independence from Spain. Laws of the new republic decreed the secularization of the missions and the return of most of the land to the native peoples. In practice this rarely happened, and in Baja California many of the mission establishments continued functioning into the 1830s and 1840s (Meigs 1935). The new government did not return former mission holdings to the Kumeyaay because in Baja California the lands were considered property of the nation, since native peoples did not have permanent settlements (Bendímez Patterson 1987). By the 1880s, in the course of a few generations, former Spanish soldiers and other non-Indian colonists had appropriated large areas of Kumeyaay traditional lands (Santiago Guerrero 2005). Throughout this period, many Kumeyaay resisted, carrying out numerous attacks against the new settlements (Connolly Miskwish 2007). Non-Indians slowly colonized Kumeyaay strongholds in the foothill and mountain areas that were still geographically distant from the missions. These new colonists considered the region “a land of wild Indians, a frontier land, since in that territory missions had never been founded. The non-Indian population began to move in to this space, as ranches were extended into this ‘virgin territory’” (Santiago Guerrero 2005:63).

Some Kumeyaay went to work on the new ranches and settlements, learning the arts of agriculture and pastoralism, and even installing fences across their own territory. In spite of these transformations, some parts of Kumeyaay territory in Baja California continued to be fairly isolated, providing a refuge where non-Christianized Indians displaced by demographic pressures from the newly colonized areas could settle around remote, permanent springs out of sight of the new colonists (Shipek 1987). In 1848, the Treaty of Guadalupe Hidalgo divided into two separate countries the Kumeyaay region and its natural and cultural landscapes (Connolly Miskwish 2007). Over the following century and a half, the Kumeyaay on both sides of the border maintained limited contact in spite of increasing border regulation, and some California Kumeyaay migrated to Baja California as a refuge from the displacement and persecution suffered in the U.S (Shipek 1991).

In the 1870s, gold was discovered in Real del Castillo and other parts of Kumeyaay territory, resulting in an influx of prospectors from California, Sonora and Europe whose

interest in the exploitation of mineral resources would impact traditional Kumeyaay uses of the environment (Chaput et al. 1992). Kumeyaay lost access to more of their territory as the Mexican government granted mining claims. The mining operations needed workers, so some Kumeyaay found employment in the mines (Chaput et al. 1992; Santiago Guerrero 2005). By the late 19th century, Kumeyaay population was at a low point (Bendímez Patterson 1987) and many lived on remote ranches and settlements. They managed to survive by combining hunting and gathering with horticulture, livestock grazing, mining, and wage labor on neighboring ranches (Goldbaum 1984). Some of these traditional settlements, once seasonal encampments on the seasonal rounds of the Kumeyaay, would survive to become today's federally recognized communities or ejidos (Garduño 1994). With the reduction of their territorial extension, knowledge and utilization of the landscape became more localized and influenced by Mexican culture (Gamble and Wilken-Robertson 2008). Many Kumeyaay would eventually leave their lands to work in nearby towns and cities, often losing their identification with their Kumeyaay ancestry and their direct relationship with the land (Bendímez Patterson 1987; Garduño 1994). For those who continued to live in the more remote landscapes, ethnobotanical knowledge became one more asset in a diversified economic base (Wilken-Robertson 2004a).

CHAPTER 5

ETHNOGRAPHY: DREAMED, REMEMBERED AND CONTEMPORARY LANDSCAPES

In this section I will review the existing ethnographic literature related to ethnobotany to provide a context for understanding the current state of research in the Kumeyaay region. I will explore the journey of ethnobotanical knowledge from ancient times to the present through oral tradition, through ethnographic descriptions of Kumeyaay relationships to plants and the land, and through contemporary views of Kumeyaay community landscapes.

SOURCES

Ethnographic accounts of the northern peninsula's Yuman groups produced since the early 20th century contain valuable cultural information that sheds light on both prehistoric and historical indigenous lifeways, including documentation of native plant collection, processing, and consumption, and the cultural and historical contexts in which these activities were conducted (Laylander 1987; Wilken-Robertson and Laylander 2006). Since the beginning of the discipline, anthropologists have recognized the urgency of documenting the interactions between native peoples and their environments, especially given the dramatic decline in indigenous populations and cultures, which they assumed (often erroneously) to be on the verge of disappearance (Laylander 1987, Lightfoot and Parrish 2009). In Baja California, U.S. researchers carried out early efforts to describe "vanishing" indigenous lifeways, including observations of human-plant interactions, as part of wider efforts to establish cultural histories of California and the Southwest (Drucker 1937, 1941). Anthropologists often completed reconnaissance reports in just a few days or weeks; even with this limitation, however, many managed to gather useful ethnographic (including ethnobotanical) information (Gallegos et al. 2002).

In this study I focus on the Baja California section of the Kumeyaay region, however I also consider work done in the U.S. that is relevant to the ethnobotany of Baja California

and its cultural contexts. Kumeyaay cultural authorities such as Delfina Cuero (Shipek 1991) have demonstrated strong continuities between Kumeyaay culture north and south of the U.S.–Mexican border, and biologists (Minnich and Franco Vizcaíno 1998) have likewise demonstrated the transboundary continuum of botanical resources and the physical environment.

One of the earliest researchers was Constance Dubois, a writer and advocate for Indian peoples whose work, while focused on mythology and ceremonies of southern California's Kumeyaay, also included information relevant to Baja California's Kumeyaay (Laylander 2004); Thomas T. Waterman (1910), an anthropologist at the University of California, Berkeley (UCB) later published similar work. Edward Winslow Gifford (1918), a professor of anthropology at UCB, examined social organization and kinship systems of the Diegueño. Leslie Spier (1923), a student of Franz Boas, worked with a Kumeyaay consultant from Campo, just north of the study area; like other reports from southern Kumeyaay territory, his information was relevant to native people both north and south of the international border. Peveril Meigs (1939), a cultural geographer from UCB, carried out ethnographic studies in northern Baja California between 1928 and 1936; including a monograph on the neighboring Kiliwa Indians; he did not publish much of his work on the Kumeyaay until later in his life (1971, 1972, 1974). Philip Drucker's (1937, 1941) interviews with Kumeyaay consultants, part of the UCB "Culture Element Distribution" project, included information about plant use as part of subsistence.

By mid-century, ethnographers had begun to conduct more detailed, long-term studies in the region that often included significant information on ethnobotany. Between 1948 and 1951, William D. Hohenthal (2001) carried out field work in northern Baja California, producing field notes that were eventually consolidated into an ethnography and published posthumously. Scattered throughout his work are many references to plant uses and ethnogeography. Roger Owen (1962, 1965), working on a University of California, Los Angeles, project in Santa Catarina, produced a doctoral dissertation on Paipai concepts of disease and curing that included the first formal ethnobotanical study in the region as well as valuable ethnographic data; he also published on Yuman social organization. Although he conducted his research in the Paipai community, many of the consultants he worked with belonged to the Ko'alh cultural and linguistic group. Ralph Michelsen (1968, 1970a, 1970b,

1977), an anthropologist from the University of California, Irvine, who worked with Ko'alh and Paipai speakers in the Santa Catarina project with Owen, published ethnographic accounts and photographs of aboriginal dwellings made from native plants, indigenous technology, the processing of agave fiber, emic concepts of territoriality and pinyon nut harvesting (Michelsen and Michelsen 1979).

Around the middle of the twentieth century, anthropological interest in human interactions with the environment lead to the application of concepts and methods from biological evolution, human cultural ecology, and systems theory that relied on biological models of environmental adaptation such as optimal foraging (Binford 1962; Casteel 1979; Moran 2006). In Baja California, the works of Homer Aschmann (1952, 1959, 1986) in the central desert south of the study area and Hicks (1963) within the Kumeyaay region reflect this theoretical emphasis to varying degrees. Both works synthesized biological, geographic, archaeological, historical, and ethnographic evidence to examine the relationship between humans and the environment. Aschmann (1959), drawing heavily from mission-period documents, carefully analyzed the demographics of native populations of the central peninsula before and after European contact, using ecological concepts such as carrying capacity of the land to explain social organization. Hicks (1963), who participated in the Santa Catarina project with Owen and Michelsen (1994) examined resource use (mainly plants) among western Yuman peoples, drawing primarily from ethnographic data to reconstruct aboriginal lifeways such as seasonal migration patterns. These researchers designed approaches to generate information useful for future archaeological research, in accordance with processual archaeological theories prevalent at the time (Whitley 1998).

Anthropologists such as Geertz (1963) and Moran (1984) as well as biologists (Gould and Lewontin 1979) criticized aspects of cultural ecology as promoting biological determinism and ignoring the role of culture in mediating human interaction with the environment. In response, new approaches sought to understand the role of culture in shaping human interactions with the environment (Dufour 2006; Gould 1996). For example, McGuire and Hildebrandt (2005) argue that ideational preferences such as “costly signaling” arguably may take priority over biological processes. Traditional cultural knowledge transmitted over many generations may include highly practical aspects such as efficient methods of plant harvesting for increased yield as well as ideological beliefs regarding the sharing of food

resources—ideas that may affect the ways that people interact with their environment apart from simply choosing an “optimal” response to a biological stimulus (Davidson and Berkes 2003).

Recently anthropologists such as Shipek (1993) and Anderson (1993) have focused on environmental management among hunters and gatherers of the Californias, posing new questions and methods for investigating human ecological interactions, in particular the role that culture plays in those interactions. How did Native Alta and Baja Californians actively manipulate their vegetative environment through the use of controlled burning and water management, specialized harvesting techniques, and cultural proscriptions regarding resource utilization? (Anderson 1993; Gamble 2008; Lightfoot and Parrish 2009; Shipek 1993). Anthropologists such as Lambert and Walker (1991) and Raab (1996) contest some of the basic tenets of indigenous environmental management, pointing to archaeological evidence for prehistoric anthropogenic environmental degradation due to factors such as overexploitation of resources, in some cases linked to political manipulation by elites. All of these ideas point to the importance of cultural factors as key elements in the interactions between human and plant populations, and consequently in the environmental outcomes that result from these interactions.

Anthropologist Florence C. Shipek, a specialist in Kumeyaay culture, was an early proponent of the concept of indigenous environmental management. Shipek (1986, 1987, 1993) explored the changing relationship between Kumeyaay people and the environment, aboriginal and historical period social organization and land tenancy and she suggested that Kumeyaay engaged in “plant husbandry,” a complex form of environmental management that included controlled burning, planting, and tending of native plants. Her biography of Delfina Cuero, a Kumeyaay woman who lived in both Alta and Baja California, includes a section on ethnobotany (Shipek 1991).

Wilken (1981) and Wilken-Robertson (1987) documented agave fiber processing, willow house construction, and ceramic production among Paipai and Ko’alh speakers and more recently surveyed Baja California’s indigenous communities to document traditional and modern uses of natural resources as part of applied anthropological projects aimed at promoting sustainable development and cultural revitalization (Kilpatrick et al. 1997; Wilken 2008a; Wilken-Robertson 2004a, 2004b, 2004c). Paul Campbell (1999) worked with a

number of Kumeyaay and Ko'alh plant specialists to document food gathering and technological skills such as the manufacture of basketry. Gamble, Wilken-Robertson, and a binational team of researchers (Gamble et al. 2004) conducted fieldwork exploring Kumeyaay interactions with the environment in the Tijuana River Watershed. Gamble and Wilken-Robertson (2008) examined Kumeyaay conceptualization of cultural landscapes, exploring the persistence, transformation, and evolving symbolic meanings of environmental interactions among contemporary Kumeyaay.

ETHNOGRAPHIC CONTEXT OF ETHNOBOTANICAL KNOWLEDGE

After almost two and a half centuries of cultural exchange between indigenous and non-native peoples in the region, and a century of ethnographic descriptions of indigenous interactions with plants and the environment, how can the ethnobotanical knowledge of contemporary Kumeyaay consultants be presented in a way that recognizes its long journey from prehistory to the 21st century? In this section I synthesize relevant information from ethnographic documentation to contextualize current indigenous ethnobotanical knowledge and practice. I will consider three phases of Kumeyaay time and space based on ethnographic materials and my own fieldwork. In the first I consider a time when the Kumeyaay world was formed, and occupied all space. In the second I explore the remembered territory and lifeways of the Kumeyaay as Kumeyaay ethnographic consultants have described them. In the final section I examine the contemporary landscapes of today's Kumeyaay communities, including those of the consultants whose knowledge has enriched this study.

The Dreamed Landscape: Kumeyaay Origins

In most early accounts of Kumeyaay origin mythologies (Dubois 1901; Gifford 1918; Waterman 1910), the relationship between humans and the land begins in a dreamlike sea, a primeval amniotic fluid from which two brothers emerge to create the world. They create the sun, the moon, and humans out of clay, and their sibling rivalries lead to many of the problems that exist in the world today. Kumeyaay consultant Aurora Meza Calles of Nejí tells a version of the myth learned from her grandmother:

On this day we are going to tell the story of the twin boys who came up from the bottom of the sea to make the world. The twins were at the bottom of the ocean

when they thought, "Let's create the world. Let's make people up there," they were thinking.

"How are we going to get up there?" asked the older one.

"Swimming," said the younger one.

"How will we get there?"

"Swimming," they both were thinking.

"Let's get going!" So then the older one leaped up.

He went up first, swimming with his eyes closed. He came to the edge of the water and then sat down. The younger one was still underneath, and then he asked, "How did you get up there, brother?"

"Looking around, with my eyes wide open, I came up through the water."

"How is it up there?"

"It's really cold."

"Oh!" said the one underwater. The younger brother came up with his eyes open and the seawater burned his eyes. "Oh brother, why didn't you tell me the truth? Now I am blind." He now had his eyes closed, they were hurting.

"It's not my fault you're blind. I came up and nothing happened to me. So now I'm going to make the earth." He was supposedly going to make the world, but he had no idea how to do it. Then he said, "My brother, it's not easy making people."

"What is the world like?" asked the blind one.

"Well the sky is stuck to the earth," said the older one.

"Ahhh," said the blind one.

"Now I'm going to make the world."

He lay down on his back, and with his two feet and his hands he pushed the sky up, and there it stayed. He kicked it until it stayed up there.

"I'm very cold, brother. Make me a sun so that it will warm things up."

So the older brother quickly formed a tortilla of clay and threw it toward the east. But it would slip off and fall down, and when he tried again it just kept falling.

"Oh, little brother, it keeps falling down, I don't know what's wrong with it."

"Give it to me," said the younger one. "Bring it over here." So he brought him some clay and the blind one started forming it. He made a little ball, and then he made it into a round tortilla. He pulled out one of his whiskers, stuck it in the middle and then threw it toward the east. It stayed up in the sky.

"Did the sun come out?" asked the younger brother.

"It's there now, but it's still cold." (It was the moon.)

“Then something is missing. Give me more clay.” He started forming it. He made a tortilla, then pulled out several of his own whiskers and put them around the edge of the tortilla, and threw it toward the east. He threw it, and the sun came out. When it came out, it started warming everything up.

“Oh older brother, you should make people because the world is too empty.”

He started forming clay to make people, but he just made a long round piece without any figure. Then the blind one asked, “What are they like? Did you give them a mouth and nose and eyes?”

“No,” said the older one. “It’s very windy; the wind would just get in their eyes, that’s why I didn’t make them.”

“Oh, brother, bring me some earth and I will make them.” Then the blind one made them, he gave them form. He made them with feet, hands, head, nose, eyes, and mouth. From his own whiskers, he made their hair. He lifted them up, breathed into their nose, and put them back down. And that’s how he gave life to the clay figures. [Meza Calles 2011:VR]

A century earlier, Jim McCarty of Campo, California, told a similar version in which plants are provided for people to use: “Wild plums (*akai*) and chemise brush (*epi*) were here at Campo for the people to eat and burn” (Gifford 1918:172). Like myths from many parts of the world, these Kumeyaay prose narratives illustrate the construction of culture (Brunvand 1978), and anchor the people, their behavior, and their relationship with the environment in both the natural world and the one created by the “thinking” of the brothers (Waterman 1910). After this original creation, “the plants and animals used to be people” (Waterman 1910:336) until later culture heroes gave them their names, distinctive markings, and present appearances. The activities of plants during this mythological time explain the development of their current distribution in distinct ideational landscapes of the Kumeyaay (i.e. landscapes that encompass and embody symbolic, natural and economic features) as the story “The Journey of the Sacred Trees” as told by Kumeyaay Ofelia Muñoz illustrates:

Many years ago, the pine, the pinyon and the oak tree came up this way from the cliffs of the Rumorosa. They were walking toward the coast.

After much walking, the pinyon became tired and stayed in the highest part of the mountains; but the pine and the oak kept going. When they were almost about to arrive at the village of La Huerta, where the Kumeyaay Indians still live, the pine became tired and stayed there; for this reason we know that place as the Dancing Pine. From that time on, the Cucapá would do their final singing practice before their arrival at La Huerta, where year after year they would always go for the annual fiesta held on October fourth.

Finally, the oak continued its journey, for it intended to continue on to all of the Kumeyaay tribes to give them the acorns they use to prepare their food, and so it was that it made its way to all of the communities of the coast. And so it is that today, all of the Kumeyaay communities have oaks with which to make acorn mush. [Muñoz Aldama 2001:22]

The story distinguishes between four major environmental regions of importance to the Kumeyaay. The Rumorosa region along the eastern escarpment of the Sierra Juárez is an area of desert transition that links Baja California with the Colorado River desert lowlands. Along the base of the Rumorosa, palm oases have long supported life in the arid region (Franco Vizcaíno 2009). The high sierra pinyon groves, generally to the east of the tall pine forests, provide an important food resource in late summer, where Kumeyaay, Cucapá, Paipai, and other groups often gathered (Hicks 1963). The foothills, such as the area where La Huerta is located, support chaparral and riparian springs such as Jtá (now La Huerta), where bands of the *Jat'am* lineage stayed during seasonal treks to and from the mountains, desert, and coast (Wilken 2008b). The actual “dancing” pine trees are an isolated grove growing in foothill chaparral along the old trail that leads from La Huerta up to the mountains along which the Kumeyaay used to travel up to the pinyon harvest (Teodora Cuero, personal communication). The “communities of the coast,” although they are no longer geographically located on the coastline, do occur in association with Coastal Live Oak woodlands (Wilken-Robertson 2004a) and continue to be linked to the coast through Kumeyaay oral tradition.

Remembered Landscapes: Ethnographic Studies of Kumeyaay Hunting, Gathering, and Fishing Economy

The ancestors of the Kumeyaay made a living as gatherers, hunters, and fishers in the diverse habitats of the region (Hicks 1963; Hohenthal 2001). Although they were aware of agriculture and sometimes traded with the Cucapá and other groups of the Colorado River desert for agricultural items, the Kumeyaay chose to make a living through interaction with the flora and fauna of their territory (Laylander 1987). Small, mobile bands seasonally exploited resources in a variety of habitats, moving from coast to mountains to desert, as different plant resources became available (Hicks 1963; Owen and Michelsen 1994; Shipek 1987). It is not clear if permanent village sites also existed; Owen and Michelsen suggest that bands revolved around a “home base” (Owen and Michelsen 1994). Members of bands

belonged to lineages known as *shimulh* in Kumeyaay; these named descent groups were patrilineal, autonomous, and associated with specific territories and resources (Laylander 1987). Five to ten families including affinals often composed extended family bands; exogamous marriage rules ensured that members of other *shimulh* formed part of the group, providing access to other territories and resources (Shipek 1987). Certain resource areas such as the pinyon groves and the coast may have had wider tribal access; when resources were abundant, several bands might coalesce in these areas (Laylander 1987; Shipek 1991). Movement throughout the differing ecosystems varied from year to year, depending on the climate and other factors, but generally the Kumeyaay seem to have occupied highland zones during the warmer part of the year and lowland (coastal or desert) zones in the cooler seasons (Hohenthal 2001). Kumeyaay elder Teodora Cuero recalled the migratory pattern that her ancestors from La Huerta followed in the past:

They say that back in the early times there was plenty of manzanita, barrel cactus, chia, pamita seeds, pine nuts, acorns, sweet acorns; all these things produced a lot and that's what people would gather to have food all year long. Certain times they would go down to the coast, to Eréndira, to the coast of Ensenada, and further on, wherever they could go along the shore to gather mussels and abalones which they would also pack up to carry later for food. They would go down there in winter because it wasn't so cold and once the winter was over, in springtime they would come up this way (La Huerta) since they knew that there would be greens and all kinds of things to eat. From here they would head up to the mountains during the hot time of year to pick pine nuts, acorns, pamita seed, chia and all those things. Once the pine nuts ran out, they would come back here and then back they go to the coast. [Wilken-Robertson 2004b:51]

Specific routes for moving through these different habitats depended on both the physical and social geography of the region; cultural consultants often noted specific routes taken by their ancestors (Hohenthal 2001). Extended family bands had inherited use rights for certain areas and plant, animal, hydrological, mineral, and symbolic resources, or could gain access through affinal relationships with other lineages (Michelsen 1977; Shipek 1987; Spier 1923). Some Kumeyaay were based on the desert side of the mountains and followed an annual round that took them from the desert in the winter up into higher elevations as resources became available, probably focusing more on agave and other plants of the Colorado River desert, and less on coastal live oak acorns (Hohenthal 2001; Spier 1923).

Syntheses of seasonal availability of plant resources in the Kumeyaay and Ko'alh regions may be useful in reconstructing overall patterns of movement through the various habitats of the Kumeyaay region (Hicks 1963; Owen and Michelsen 1994), however more interdisciplinary research is needed to determine the possibilities of the environment to sustain foraging activities in the region. Generally, the most important resources available to the Kumeyaay in the course of a year would include annual greens in the coastal regions in late winter–early spring (supplemented by fish, shellfish, and acorns left from fall harvest); desert agave and chaparral yucca in foothill areas in late spring; sage and chia seeds, barrel cactus buds, and manzanita in summer, with prickly pears and Mohave yucca fruits ripening after midsummer; by late summer, pinyon and sweet acorns in the Sierra Juárez; in early fall wild cherries; and by late fall–early winter, the harvest of the all-important bitter acorns of the live oak, which the Kumeyaay stored for use throughout winter–early spring (Hicks 1963; Hohenthal 2001; Owen and Michelsen 1994).

These uses of resources have been noted by 20th century ethnographers (Hicks 1963; Owen and Michelsen 1994), however researchers have also pointed out numerous diachronic processes that need to be considered when attempting to reconstruct aboriginal patterns of movement (Timbrook et al. 1993). The abundance and availability of native plant harvests varied from year to year due to climatic cycles and fluctuations throughout the Holocene (West et al. 2007). Beginning in the late 18th century, some resources such as native grasses, originally important in the diet of Native Californians, became extinct due to anthropogenic processes such as the introduction of livestock and exotic plant species into the ecosystems of Kumeyaay territory (Shipek 1986, 1993; Timbrook et al. 1993). As the Spanish colonists sought to establish a sedentary, agricultural, and ranching economy in the Californias, they prohibited indigenous traditional management activities such as prescribed burning, and access to many traditional gathering areas became increasingly limited; these changes in human–plant interactions affected the populations of both (Anderson 2005). Data recorded by ethnographers reflect the adjustments native peoples had incorporated into their lifeways as a result of Spanish and Mexican colonization (Timbrook et al. 1983). These factors need to be considered when interpreting ethnographic documentation of human interaction with plant resources.

MATERIAL CULTURE ASSOCIATED WITH PLANT USE

The high level of mobility and the need to gather, process, and store plant materials required lightweight, highly efficient material goods and extensive knowledge of plants, animals, soils, geology, climate, hydrology, and environmental processes. All material items had to be made on site, carried, or stashed for future use (Campbell 1999; Michelsen 1970b). The Kumeyaay used plant materials for clothing, adornment, ceremony, construction of structures, furniture, rafts, tools, utensils, trade, and magic; I discuss many (but not all) of these specific uses by plant species in the results chapter of this thesis. In this section, I summarize some of the most widely used material culture associated with plants.

Kumeyaay used split juncus coil basketry for gathering, preparing, and storing foods. They made large, flat trays called *sawil* for winnowing, sifting, and toasting seeds with hot stones or coals (Shipek 1991) and baskets with upright shapes called *jilu* for gathering and storage. Weavers made large granaries, including baskets of willow leaves called *chiquin* to store acorns and other seeds. The Kumeyaay community of San José de la Zorra continues to use basketry technology; however its function has shifted to art object (Wilken-Robertson 2004a). Kumeyaay potters made clay vessels in a variety of shapes for cooking, storing, and consuming plant foods (Wilken-Robertson 1987). Potters produced ceramics throughout the Kumeyaay region in the past (Meigs 1974); today pottery is made primarily by the Ko'alh potters of Santa Catarina (Wilken-Robertson 2004c).

Kumeyaay hunters, gatherers and fishers developed strong cordage and efficient netting technology using agave fibers (Owen and Michelsen 1994) and probably other plants such a milkweed (Spier 1923), making smaller nets to gather fruits such as prickly pears and larger nets to carry loads, to trap quail and rabbits, and to fish (Michelsen 1970a).

Hunting and weapons technology required detailed knowledge of the plants that were used to create them. Bows and arrows, “boomerang” shaped hunting sticks, and clubs serve us as weapons in warfare and for hunting (Campbell 1999, Silva Espinoza and Melendrez Silva 2010). The appropriate wood was carefully chosen for its durability, strength, lightness, or density, depending on how it would be used. For maximum strength, many consultants prefer to cut wood around the time of the full moon (Meza Cuero 2011:5).

The Kumeyaay used stone tools to cut, pound, perforate, and pulverize native plants. Bedrock and portable metates, mortars, pestles, grinding slicks, and mano stones provided the basic materials that the Kumeyaay needed to process many foods and render them edible (Hohenthal 2001). Today the Kumeyaay prepare many traditional foods such as acorn mush using a metal hand grinder or an electric blender.

The Kumeyaay used a variety of techniques for processing plant foods; these are common throughout the Californias (Barco 1973; Bean and Saubel 1987; Timbrook 2007). They ground many seeds raw or toasted into a flour (*pinole* in Spanish) that they could eat plain or mix with water to make a mush or a drink (*ja shukat*). Seeds requiring leaching were usually ground raw and then leached in an open-weave leaching basket, in sand pits or, more recently, in a cloth. They added the leached paste to boiling water and made it into a mush, which they considered a good accompaniment to meat (Campbell 1999). They cooked agave hearts (the base of the rosette) and some root plants by roasting in an earth oven. The process usually involves heating rocks in a pit, adding the plant to be cooked and covering it all with sand for one to three days as it cooks (Hicks 1963). They roasted some plant foods such as chaparral yucca stalks directly on coals. They also used this process for softening up Mohave yucca leaves to be used as bindings or willow staves when shaping them into a bow (Campbell 1999).

The Kumeyaay extended the period of availability of many vegetable foods through storage in pottery, baskets, nets, or granaries. They cut open some fruits, such as prickly pear or Mohave yucca pods, and dried and stored them for later use, usually through rehydration (Hicks 1963). They dried many seeds such as manzanita or juniper to remove residual moisture and then stored them. They often dried holly-leaf cherry seeds and acorns in the shell, and then stored them in granaries until ready to use, at which time they would be hulled and then processed. They made cooked agave hearts into patties or loaves and stored them, to be rehydrated and made into a drink as needed (Campbell 1999). They dried and stored or traded greens (Shipek 1991).

HEALING AND PLANTS

Kumeyaay beliefs regarding healing represent a complex syncretism of aboriginal, Spanish, and Mexican cultural systems (Almstedt 1977). Kumeyaay healing practices

described in historical documents and by ethnographic observations suggest classic elements of hunter-gatherer shamanism around the world; these include spirit possession, witchcraft as a causal agent of illness, removal of foreign objects from a patient's body, contagious magic, and the use of dreams, trance, incantations, and singing in the healing process (Almstedt 1977; Owen 1962).

Among the Kumeyaay, the kind of healing process applied to a patient depended on the nature of the illness. Disorders caused by witchcraft required the intervention of a specialized spiritual healer or *kusiaay* (literally “doctor”); these processes generally did not use plant materials except for herbs such as sage that are burned for purposes of ritual purification. For disorders considered to be of a non-magical origin, such as accidents or other “natural” causes, many Kumeyaay continue to use a wide variety of herbs (Almstedt 1977; Hinton 1975; Longstreth 2006; Owen 1962) and while they considered some people plant specialists (Shipek 1993), the practical knowledge of how to use plant medicines to cure a baby with a fever or to relieve diarrhea represents a type of “green social security” shared by rural people in the areas where medicinal plants grow (Cunningham 2002:1). The uses provided by consultants in this study sometimes reflect the syncretic elements of Spanish and Mexican folk medicine overlying aboriginal practices (Fleuriet 2007). Means of preparing medicine include infusion (a tea made by steeping plant parts), decoction (a stronger solution made by boiling), vapor (boiling an herb and inhaling the steam), poultice (application of the solid plant material directly to the affected area), compress (application of an infusion or decoction with a cloth), salves made with plant material and some kind of oil, and smoke (herbs burned for aroma or environmental purification) (Hoffman 1990). Many of the recipes call for making a diluted infusion and drinking it in place of water throughout the day (*agua de uso* in Spanish).

Contemporary Kumeyaay Landscapes

Today some 600 Kumeyaay and Ko'alh speaking descendants live on a fraction of their original lands in five federally recognized indigenous communities or ejidos as well as non-recognized settlements, towns, and cities of the northern peninsula (see Figure 3). Each of the communities holds its remaining territory communally through the Mexican federal government's legal configuration of *comunidades indígenas* (indigenous communities) or

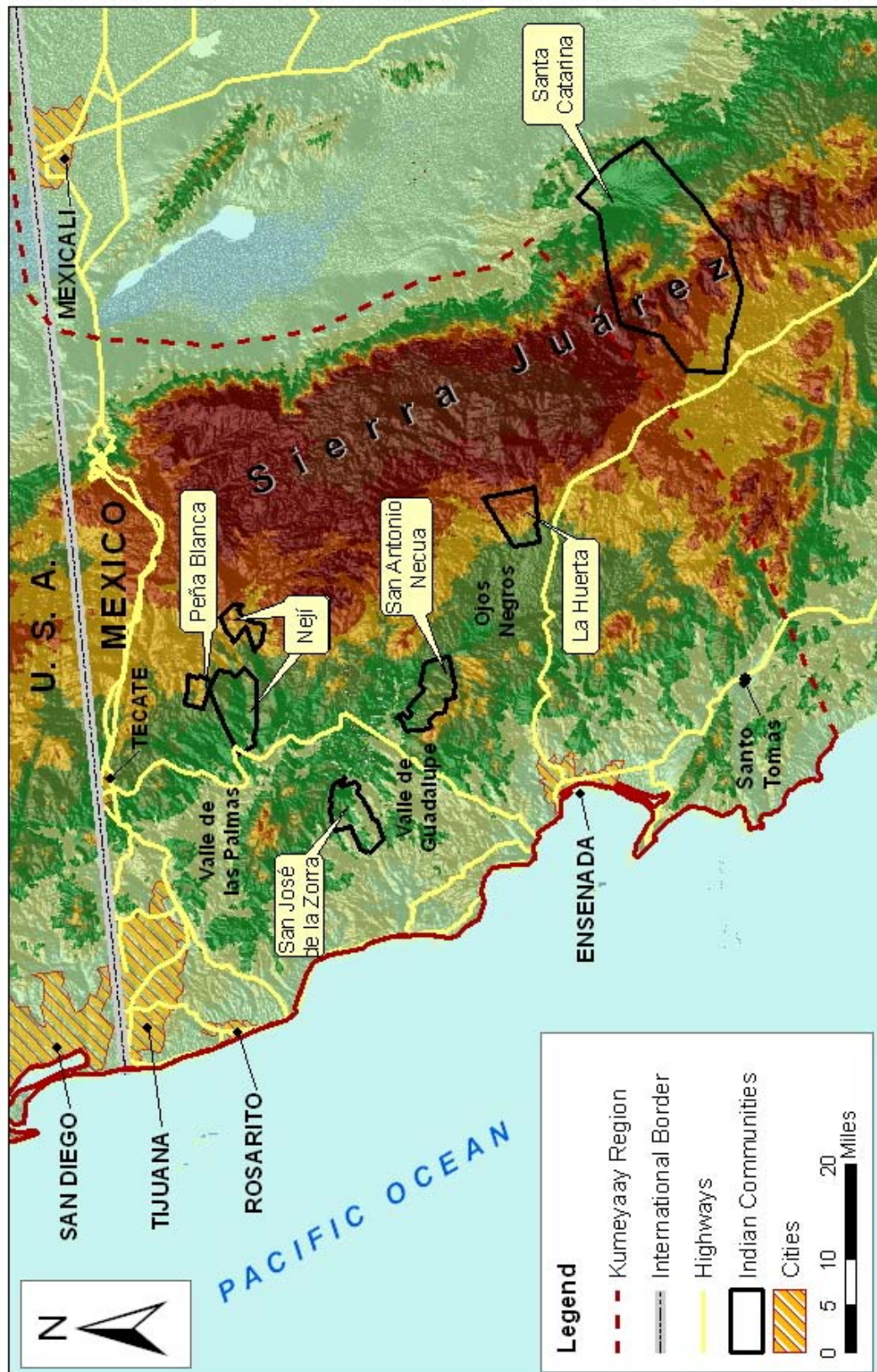


Figure 3. Contemporary Baja California Kumeyaay communities. Image given to author by Dr. Gerardo Chavez.

ejidos (Garduño 1994). These primarily rural communities have developed diversified economies that include cattle ranching, agriculture, seasonal wage labor, government funded projects, handcraft production, and natural resource use. Some tribal members migrate seasonally or permanently to nearby towns in search of employment and better education opportunities for their children (Wilken-Robertson 2004b).

Often, those who remain on communal lands retain knowledge of indigenous uses of native plants, especially for practical applications such as food, medicine and traditional arts that increase their possibilities for survival as they adapt to challenging economic, environmental, social, and political changes (Wilken-Robertson 2004b). However the Kumeyaay continue to recognize symbolic values of plant resources such as acorn, pine nuts, and sages, incorporating them into contemporary social events, ceremonies, and rituals (Gamble and Wilken-Robertson 2008). The Kumeyaay communities are Juntas de Nejí, San José de la Zorra, San Antonio Necua, and La Huerta; Ko'alh speakers live in the Paipai community of Santa Catarina. A few traditional (but non-federally recognized) Kumeyaay settlements exist, such as Peña Blanca, Aguaje de la Tuna, and San José Tecate in the Municipality of Tecate (Gamble and Wilken-Robertson 2008; Garduño 1994; Wilken-Robertson 2004b).

JUNTAS DE NEJÍ (AND PEÑA BLANCA)

The northernmost Kumeyaay community of Baja California, Juntas de Nejí is located within the municipality of Tecate. Nejí is composed of two separate polygons with a combined total of 11,590 hectares, both of which lie relatively close to the international border and within the watershed of the Tijuana River (Gamble and Wilken-Robertson 2008). The Kumeyaay of Nejí are closely related to the Kumeyaay groups of southern San Diego County such as Campo and Jamul. Bordering on the western polygon of Nejí is the traditional Kumeyaay settlement of Peña Blanca (Kwiatkowski 2008). Nejí's foothill terrain includes extensive areas of scrub and chaparral, granitic outcroppings, ephemeral streams with oak woodlands, and canyons such as Ja'a (El Alamo) with permanent springs. Most of the inhabitants of Nejí have moved to, or live part-time in the nearby towns of Tecate, Valle de las Palmas, El Testerazo, El Hongo, or larger urban areas where they find opportunities for employment, education and medical assistance. The remaining residents make a living

through subsistence agriculture, cattle ranching, and other seasonal labor in neighboring communities of *mestizos* (persons of mixed indigenous and European heritage). The community is sparsely populated with settlements located far from the highway, accessible only by rough dirt roads. Residents practice small scale agriculture, work as wage laborers on neighboring ranches or in government programs, gather acorns and other wild foods and medicinal plants in addition to occasional hunting (Gamble and Wilken-Robertson 2008; Wilken-Robertson 2004a).

SAN JOSÉ DE LA ZORRA

This community of 14,440 hectares in the municipality of Playas de Rosarito is centered in San José, a small, remote valley located about halfway between the former mission site of San Miguel on the Pacific Coast and the Valley of Guadalupe, also a former mission site and today Mexico's most important wine producing region. La Zorra, another traditional settlement now occupied by neighboring ranchers, is a small valley a few miles northwest of San José. As in most communities, residents locate their ranches in a dispersed pattern over a wide area, wherever permanent water sources exist. The lower altitude and relative proximity to the coast combine to create a mild climate where oak woodlands, scrub, chaparral, and grasslands come together. The Kumeyaay and non-Indian ranchers have carried out a limited amount of agriculture in the valley—for the most part dry farming along with some irrigated crops—since the early 20th century. Livestock grazing and wage labor through government programs have also driven the local economy (Rivera Medina 2000; Wilken-Robertson 2004a).

Wetlands plants such as willow (*Salix* spp.) and juncus (*Juncus* spp.) are particularly important in this community, since they are the raw materials from which artisans produce a variety of forms of Kumeyaay basketry. The increasing demand for Kumeyaay basketry has become a major force in the local economy, where a large percentage of the local residents now depend to some degree on the income generated by this traditional activity (Wilken-Robertson 2004a).

SAN ANTONIO NECUA—CAÑÓN DE LOS ENCINOS

Nestled into a northeastern corner of the Guadalupe Valley, this community of 6,262 hectares lies on the outskirts of Mexico's prime wine producing region and at the base of a series of mountain ranges, including the prominent Sierra Blanca and Sierra de los Pinos, which provide an important source of water for the community. Over the last century, residents have moved from the historical Kumeyaay settlements of Jamatay and San Antonio Necua at the base of the nearby sierras (Goldbaum 1984) to the Cañon de los Encinos (Oak Canyon) on the edge of the wide Guadalupe Valley in order to be closer to employment opportunities. Necua's vegetative communities include oak woodlands, coastal scrub, and chaparral, with conifer forests on Sierra de los Pinos. Many Necuans work in cattle ranching and in nearby agricultural enterprises; currently the Mexican government is funding the development of ecotourism infrastructure in the community (Wilken-Robertson 2004a).

LA HUERTA

The southernmost of the Kumeyaay communities, located on the eastern edge of the Ojos Negros Valley and at the base of the Sierra Juárez, this community's 6,268 hectares include fertile soil and plentiful springs, giving it the rich agricultural potential that its name, La Huerta or "The Orchard," suggests. In the past, when indigenous groups were more mobile, the site of La Huerta represented an important encampment in the yearly migration from the coast up to the mountains. Many Huerteños also remember the tradition of cultural and economic exchange with the Cucapá, who came up from the Colorado River delta region every summer, creating a link with other groups of the Colorado River region and beyond (Wilken 2008b). Currently, several small family orchards exist, but most residents' subsistence strategies revolve around livestock ranching or work as day laborers on neighboring ranches or in the agricultural fields of the Ojos Negros Valley. The community's territory includes chaparral and oak woodlands, so some residents also gather local natural resources such as herbs, jojoba, and wildflower seeds for sale to Mexican or U.S. enterprises. As in other indigenous communities, many traditional foods, such as pine nuts and acorns, have become less accessible to Huerteños, since the traditional gathering areas have become the property of neighboring ejidos. (Wilken-Robertson 2004a). La Huerta is currently

developing an ecotourism site with funding from the Mexican government in “El Barbon,” an oak woodland riparian zone a few kilometers from the main community settlement.

SANTA CATARINA

The nucleus of this community is centered around the former Dominican mission site of Santa Catarina, with outlying ranches concentrated in the western section of the 67,828 hectares of mountain, high desert, and desert transition terrain that belong to the Paipai. The Dominican order established a mission here in 1797 on a small knoll overlooking a high desert valley near a permanent stream; they settled members of the Ko’alh and Paipai groups into a permanent village based on an agricultural and livestock grazing economy (Meigs 1935). These activities have remained an important part of the Paipai subsistence strategy, as have wage labor and use of natural resources. A small number of artisans—most of them Ko’alh speakers—make traditional arts in the Kumeyaay tradition: paddle and anvil coil pottery, agave fiber cordage, nets and sandals, and bows and arrows. Many Paipai and Ko’alh speakers have a long tradition of traveling to the stands of pinyon in the nearby Sierra Juárez for pine nuts and continue to eat sweet acorn, prickly pears, barrel cactus buds, and other wild foods. The Santa Catarina community now harvests Mohave yucca (*Yucca schidigera*), long valued as a fuel for firing pottery and for making soap, which they sell as a liquid extract on the international market (Ahumada Cervantes et al. 1999; Wilken-Robertson 2004c).

CHAPTER 6

SPEAKING OF PLANTS: KUMEYAAY LANGUAGE

This section examines the Kumeyaay language as an integral, yet endangered part of Kumeyaay culture, and discusses its potential for enriching our understanding of Kumeyaay ethnobotany. I first review the relevant literature and provide background on the historical relationship between Kumeyaay and related languages of the region. I examine the demographics of Kumeyaay speakers and how evolving trends reflect contemporary processes that have affected indigenous languages around the world. I explore why I have documented information on Kumeyaay ethnobotany in both Kumeyaay and Spanish, and some of the ways that linguistics and ethnobotany may be combined to create materials that are useful for scientific research and applicable toward current efforts to revitalize Kumeyaay cultural heritage.

LINGUISTIC SOURCES

Surveys of Baja California's Yuman languages include a 167 word list compiled in 1867 for the Smithsonian Institution by W.M. Gabb who composed wordlists for the Hataam or Tomaseño of the Santo Tomas area, the Yuma (Quechan) of Arizona, San Quintín Kiliwa, and San Borja Cochimí (Gabb 1867). J.P. Harrington carried out linguistic fieldwork in Baja California in the 1920s, however his work remains largely unpublished (Walsh 1976). In the second half of the twentieth century, linguists from both the U.S. and Mexico began to conduct ethnographic surveys with descriptions of Baja California's Yuman languages (Ochoa Zazueta 1982; Robles Uribe 1965; Trujillo 1983) including general syntheses of the Yuman language family and suggestions regarding the place of Baja California's Kumeyaay within the greater family (Hinton and Watahomigie 1984; Langdon 1990), and historical linguistic approaches to understanding the genetic relationships between varieties and branches and their associations with prehistoric settlement and migrations (Laylander 1997;

Mixco 2006). Linguistic research on the Kumeyaay language describes in detail specific variants of the language (Langdon 1990; Miller 2001).

Although the grammar of U.S. varieties of Kumeyaay have been thoroughly documented (Langdon 1970, Miller 2001, Miller and Langdon 2008), the grammar of Baja California Kumeyaay, and the extent of dialect variation across it, had not yet been thoroughly documented; this documentation is one of the goals of the larger project for which the data in this thesis (and many other linguistic and ethnographic materials) were collected (Field 2008). I have been involved in this project from its inception in 2007, first as a community organizer and later as a research assistant. Working closely with Dr. Margaret Field and community member Jon Meza Cuero, we first undertook a pilot study of the Baja California speech community in order to determine whether a larger language documentation and revitalization project would be feasible. In 2009, Field submitted and was awarded a National Science Foundation grant to document the varieties of Kumeyaay spoken in Baja California. This research is ongoing.

LANGUAGE FAMILY CONNECTIONS

The Kumeyaay language belongs to the California–Delta branch of the Yuman language family; this branch also includes the language of the Cocopah (spelled *Cucapá* in Mexico). The Yuman language family region extends into southern California, and along the Colorado and Gila Rivers well into Arizona (Hinton and Watahomigie 1984). The Yuman family of languages forms part of the Hokan phylum, the oldest linguistic relationship among western North American languages, possibly representing a time depth of 8,000 years. This relationship links the Yuman languages with isolated languages or subfamily clusters from northern California through southern Mexico (Golla 2007), and might suggest that the ancestors of the Kumeyaay have been interacting with the landscapes of the region since the Early Holocene (Archaic Period).

Our ongoing language documentation project has found strong similarities between the Kumeyaay varieties spoken in southern San Diego (i.e., Tipaay communities) and that spoken in the Baja California communities (although there are also some differences across all Tipaay dialects). We have also found that the Ko’alh language variety found in the Paipai community of Santa Catarina, which previously had been described as a dialect of Kumeyaay

(Mixco 2006) does not appear to be mutually intelligible with Kumeyaay, and is distinct enough that it should probably be considered a separate language (Miller, personal communication).

The Paipai language is more closely related to the upland Pai languages (Yavapai, Hualapai, and Havasupai) of Arizona than to Ko'alh or Kumeyaay (Hinton and Watahomigie 1984). Due to the close linguistic, cultural, and familial relationships between Kumeyaay speakers and Ko'alh speakers, members of the latter group have been included as consultants in the present study of Kumeyaay ethnobotany.

KUMEYAAY LANGUAGE TODAY

Kumeyaay, like the languages of indigenous hunting and gathering peoples the world over, has been dramatically devastated by the impact of colonial transformation and the resulting social inequality that has led to the eradication of entire linguistic codes (Phillips 2006). The division of Kumeyaay ancestral territory into two separate nations by the U.S.-Mexican international border has resulted in divergent influences on the surviving languages due to the imposition of distinct languages (i.e. English and Spanish), cultures, and political systems over the last century and a half.

Our survey (Field 2008) found fewer than 60 fluent speakers of Kumeyaay, all over age 40. The researchers and community members interviewed felt confident that the survey of 56 speakers represents 90% of the fluent Kumeyaay speaker population. The survey, which was carried out by Dr. Margaret Field, Kumeyaay speaker Jon Meza Cuero, and myself, included names, community of origin, current residential location, birth date, and gender. Meza Cuero elicited a series of words or phrases from respondents.

By using this data it is possible to assess the age distribution of the Kumeyaay speaker population when compared with that of the general Kumeyaay population, bringing into focus the current state of the Kumeyaay language. To compare the data for age in the population structure of the general indigenous population, data were taken from the 2005 SDSU thesis of Krista Kornlyo entitled "Type 2 diabetes, dietary and physical activity patterns in eight indigenous tribes in Baja California, Mexico." Kornlyo's data included 907 members of the Kumeyaay, Paipai, and Kiliwa tribes. Kornlyo found that gender and age

distributions were homogeneous throughout the indigenous communities and therefore combined the results for analysis (See Table 1) (Kornylo 2005).

Table 1. Frequencies and Percentages of All Tribal Members vs. Diabetic Tribal Members by Gender and Age in 8 Indigenous Communities in Baja California, Mexico

	All tribes (n = 907)		Diabetics (n = 121)	
<i>Sex</i>	n	Percent	n	Percent
Male	443	49	42	35
Female	404	45	64	53
Missing	60	7	15	12
<i>Age</i>				
0–9 years	171	19	4	3
10–19 years	154	17	2	2
20–29 years	146	16	11	9
30–39 years	102	11	15	12
40–49 years	67	7	16	13
50–59 years	45	5	15	12
60–69 years	35	4	13	11
70 and above	17	2	4	3
Missing	170	19	41	34

There is clearly a strong association between age and language use. Birth date information from both surveys was coded into three age groups to correspond to three broad categories: youth (0–19), middle aged (20–59), and elder (60 and up). Among speakers there are no fluent youth (0–19); 29% are middle aged (20–59) and 71% are elders (60 and up); this compared to the non-speaker population in which youth make up 44% of the population; middle aged are 49%; and only 7% are elders. This places Kumeyaay in the state of being a “moribund” language, which according to Krauss (1992:4) is a language “no longer being learned as mother-tongue by children” and underscores the urgency of documentation and revitalization efforts.

The data on gender also show a strong association between sex and use of language: 68% of speakers are women while only 32% are men. This may reflect Kumeyaay women's reduced mobility in a culture where they are more tethered to the domestic sphere, whereas Kumeyaay men are likely to leave their home and even their communities for extended periods of time to work as cowboys or other types of wage labor in neighboring *mestizo* communities. The results might also suggest that women have a larger role in learning and transmitting the language, as well as in the domains in which language-related cultural activities such as basket making and traditional food processing are performed.

At least half of the world's 6000 languages are currently on the path to extinction, a situation that is unprecedented in the history of humankind (Krauss 1992). Over the last two decades, language loss has become a major concern for linguists, applied anthropologists, and indigenous peoples (Walsh 2005). Numerous articles have been written, local and international meetings held, specialized documentation, and revitalization programs established and research projects carried out to deal with this critical issue. The crisis affecting the world's linguistic diversity has been compared to the growing threats to the world's biodiversity (Krauss 1992), and represents a loss not only to scientific inquiry "but also in relation to the class of human activities belonging to the realms of culture and art" (Hale 1992:35) since language is so inextricably tied to these areas of human endeavor. While some researchers see the changes as part of a natural linguistic evolution that originated with the beginnings of food production (Mufwene 2004), most agree that the causes of this drastic shift have everything to do with the social, political, and economic upheavals of the last five centuries of colonial (and linguistic) domination.

The circumstances that have led to the present language mortality known to us range from outright genocide, social or economic or habitat destruction, displacement, demographic submersion, language suppression in forced assimilation or assimilatory education, to electronic media bombardment, especially television, an incalculably lethal new weapon (which I have called "cultural nerve gas"). [Krauss 1992:6]

In the case of the Kumeyaay, the causes of language loss include all of the above factors. The breakdown of intergenerational language transmission has led UNESCO's (2003) Ad hoc Expert Group on Endangered Languages to develop a ranking system for determining the "vitality or endangerment" of languages in which it provides the following

more detailed definition of the concept of a moribund language (although it does not use the term) as point number three of its seven point system:

Definitively endangered (3): The language is no longer being learned as the mother tongue by children in the home. The youngest speakers are thus of the *parental generation*. At this stage, parents may still speak their language to their children, but their children do not typically respond in the language. [UNESCO 2003:8]

The process of “contraction and death” of languages as part of the crisis facing world linguistic diversity has been well documented (Crystal 2000; Dorian 1992; Hale 1992; Krauss 1992). Age differentials in the intergenerational transmission of language along with other specific methodologies for determining the condition of a language have been developed (UNESCO 2003; Walsh 2005). Social factors and theoretical approaches in modern linguistic anthropology (Duranti 1997) provide useful background for understanding the state of the discipline including theoretical approaches and current methodologies. Applied linguists and anthropologists from around the world have documented the successes and challenges of revitalization initiatives for endangered language (Fishman 1991; Hinton and Hale 1994; Hinton and Watahomigie 2001).

Over the last two centuries, Kumeyaay has shifted from being the dominant language spoken in the region to being an endangered language of a marginalized ethnic group. Given the tragic loss of population due to introduced diseases, the expropriation of indigenous territory and forced changes in culture, the persistence of Kumeyaay language in the northern part of the peninsula is quite remarkable. During this period, some of the forces that have been influencing the native language include the imposition of Spanish as the dominant language of Mexico, pervasive racism against indigenous peoples and cultures that leads to abandonment of the language, demographic movements away from rural communities with concentrations of speakers to towns and cities, and intergenerational isolation leading to the lack of transmission of the language during critical stages of child development. As Mikhail Bakhtin noted, these forces push hard toward the extinction of the languages by driving speakers toward adopting a unified linguistic identity (Duranti 1997).

In contrast, other forces push toward language diversity, differentiation, and revitalization. A revaluation of indigenous identity and pride in indigenous heritage may help motivate children to learn and speak their native language. Programs and projects designed to

document and revitalize the languages support efforts aimed toward curriculum development and long-term language preservation (Hinton and Hale 1994). Economic benefits provided to speakers who teach classes or participate in language documentation programs confirm that indigenous languages continue to have pragmatic value in modern economic systems. Binational collaborations between U.S. and Mexican tribes, organizations, and academic institutions serve to promote forces leading to revitalization (Wilken 2008a).

Although Kumeyaay in Baja California has a larger group of speakers than Kumeyaay in Alta California, where only a handful of speakers remain, the observed demographic trend is troubling. While many young Kumeyaay understand the language, they are “passive speakers” who, when spoken to in Kumeyaay will respond in Spanish. This generation of passive speakers could represent the end of the line of intergenerational transmission of the indigenous language, as speakers adopt the dominant Spanish language rather than their heritage language. However, because they have a basic understanding of the language, they are also in a position to respond positively to language revitalization efforts (Hinton and Watahomigie 2001). In either case, the state of the language reinforces the need for efforts aimed at documentation and curriculum development.

Ethnobotanical methodology stresses the importance of documentation in native speakers’ original languages when possible (Martin 1995). Today few plant specialists who are also speakers of indigenous languages are able to transmit ethnobotanical information in its original form. For the collection of data such as native plant names and taxonomies, terms related to plant structure, environment, toponyms, and many other aspects of the cultural context of plants, language is crucial. Linguistic analysis in ethnobotany may include analyzing the meanings and structures of plant names, detecting cognates, and articulating classification systems (Martin 1995).

The documentation of ethnobotanical data in native languages serves the multiple purposes of preserving valuable botanical, cultural, and linguistic information that may be useful not only for research but also as part of projects promoting community development and cultural revitalization. Linguists working on language renewal may base language lessons on traditional activities such as plant gathering and processing, manufacture of traditional arts from plant resources, or the preparation of plant foods (Hinton and Hale

1994). Community ecotourism development may also call for use of native languages, particularly in relation to names of plants, animals, and places (Shackel and Chambers 2004).

The focus of the linguistic work for this study has been on gathering documentation on the use of over 50 plants, including native nomenclature. Information regarding plant use has been documented in both Kumeyaay and Spanish so that researchers will be able to use it for purposes of linguistic, anthropological, and biological analysis in the future. The Kumeyaay have expressed interest in having access to the information, especially since many of the cultural authorities interviewed are elderly or live in remote communities. Plant names and variant names have also been documented as data for the analysis of the relationships between distinct Kumeyaay language varieties, and between Kumeyaay and other related languages. Linguistic documentation materials have also been incorporated into the design of the Tecate Community Museum as a means of strengthening Kumeyaay identity in the region. The Kumeyaay names are used as part of a descriptive guide to the Kumeyaay Ethnobotanical Gardens, and videos in the Kumeyaay language featuring acorn and pinyon gathering and other ethnobotanical activities permeate the exhibit space with the sound of the indigenous language, while Spanish or English subtitles allow viewers to understand the meaning of the words they are hearing.

One of the outcomes of the DEL project was the development of an orthography for the Kumeyaay language that would be simple enough for non-linguists to use and would make sense to people who were used to Spanish orthography. I have created a key to facilitate pronunciation by English speakers of the words used in this thesis, using example words suggested by Cline (2008), Field (personal communication), Hinton and Watahomigie (1984), and Hohenthal (2001) (see Table 2). This orthographic system has been used to spell Kumeyaay plant names, including their many variants.

Table 2. Baja California Kumeyaay Orthography

LETTER	ENGLISH PRONOUNCIATION
a	as in <u>b</u> ark
aa	as in f <u>a</u> ther
e	as in m <u>u</u> tt
i	as in <u>b</u> ee <u>t</u>

ii	as in <u>be</u> ad
u	as in <u>loo</u> t
uu	as in <u>le</u> wd
ch	as in <u>ch</u> urch

(table continues)

Table 2. (continued)

LETTER	ENGLISH PRONOUNCIATION
j	<u>h</u> ot (often harsher than the English “h”)
jw	as in <u>w</u> hat (but harsher than in English)
k	as in <u>k</u> ick
kw	as in <u>q</u> uick
l	as in <u>l</u> ean
lh	this phoneme has no English equivalent, it is a breathy “l”
ly	as in <u>milli</u> on
lhy	similar to “lh” but with an added “ly” sound
m	as in <u>m</u> other
n	as in <u>n</u> eat
ñ	as in <u>piny</u> on
p	as in <u>p</u> in
q	similar to <u>coo</u> k, but pronounced farther back in the throat
r	like the trilled “r” in Spanish <i>señ<u>o</u>ra</i>
s	as in <u>s</u> oap
sh	as in <u>sh</u> ip
t	as in <u>pelt</u> , a softer sound than in English
tt	between the sound of “t” as in <u>pat</u> and “ch”
w	as in <u>w</u> ater
‘	a catch in the throat, as in the sound that separates the two syllables of the exclamation Oh_oh!

CHAPTER 7

RESULTS: NATIVE PLANTS AND THEIR ETHNOBOTANICAL USES

In this section, I synthesize information from interviews with 15 Kumeyaay Indian cultural consultants of five Kumeyaay or Ko'alh communities and one consultant from the binational (U.S.–Mexican) region about past and present uses of 47 native plants, situating the information in the context of existing archaeological, historical, ethnographic and botanical studies of plants that have been conducted in the Baja California and California regions. I begin by reviewing this literature. I explain how I have organized the data for the presentation of each plant, including the system I have developed for citing and referencing the audio and video recordings from field interviews with Kumeyaay consultants. I then present the synthesized results by plant genus and species.

ETHNOBOTANICAL SOURCES

The ethnobotanical works of anthropologists or biologists who have documented the knowledge and traditions of the Kumeyaay, or neighboring indigenous groups whose territory shares environments similar to those of the Kumeyaay, inform the present study. During the 1960s, Florence Shippek (1991) conducted ethnobotanical work with Kumeyaay Delfina Cuero; her descriptions included native plants from coastal areas and from both sides of the U.S.–Mexican border. In 1972, anthropologist Lowell John Bean and Cahuilla Katherine Siva Saubel (1987) first published a study of Cahuilla ethnobotany. Although outside of the study area, the Cahuilla geographical, biological, and cultural region shares much in common with the Kumeyaay region, in particular the inland and desert areas. Almstedt (1977) synthesized historical information and field data to examine Diegueño approaches to healing, including both shamanistic and ethnobotanical practices. Almstedt conducted much of her fieldwork in southern Diegueño communities just north of the study area. Hedges (1986) explored the ethnobotany of the Santa Ysabel Diegueño, northern relatives of the Baja California Kumeyaay. Biologists Edna Cortés Rodríguez (1988, 1994)

and Carlos Alberto Cano Bracamontes (1990) of the Autonomous University of Baja California inventoried medicinal plants in collaboration with native consultants in several of Baja California's Kumeyaay and Paipai indigenous communities. Hinshaw (2000) conducted field work on the relationships between ethnobotany and archaeology in the Paipai Indian community of Santa Catarina with Ko'alh and Paipai speakers. Recently, several medical anthropologists have conducted studies with contemporary Yuman populations that include data on current ethnobotanical practices; these works document the impacts of diabetes (Kornylo 2005) and stress (Fleuriet 2007; Longstreth 2006). Jan Timbrook (2007), Curator of Ethnography at Santa Barbara Natural History Museum compiled a comprehensive ethnobotany of southern California's Chumash people, much of it based on her many years of work with the ethnographic and linguistic notes of J.P. Harrington in the museum's collection, and included comparative data from other California Indian groups.

PRESENTATION OF THE DATA

I list plants in alphabetical order by genera and species, followed by the name of the plant family (in parenthesis) to which they belong. All botanical names and classifications follow Lightner (2011), unless otherwise indicated. Lightner's 2011 guide, "San Diego County Native Plants," while focusing on flora north of the border, recognizes that the floristic bioregion extends beyond the U.S.-Mexican border, and provides the most up-to-date information available about plant species of the binational region. The "Baja California Plant Field Guide" (Roberts 1989) also contains useful information and is used here to round out the botanical descriptions, particularly in relation to floristic communities that extend further south into the peninsula. However given the major changes in botanical systematics over the last two decades, particularly with the advent of genetically based classification systems, Lightner's recently published guide takes precedence in this study as the taxonomic frame of reference. English common name(s) and Spanish common name(s) are based on the author's field experience and are occasionally corroborated with Cortés Rodríguez (1988), Lightner (2011), Roberts (1989), or Timbrook (2007). I have translated all texts from documents, recordings and field interviews in Spanish.

I have rendered the spelling for Kumeyaay words as pronounced by consultants interviewed in this project according to the description of phonemes presented in Table 2 (see

Chapter 6). Kumeyaay plant names reflect the results of ongoing fieldwork and my attempt to use the orthography of a writing system that has only recently been developed. Some Kumeyaay speakers have learned to use this system or have learned other orthographic systems for expressing the Kumeyaay language in written form, and wherever possible I have asked them to write their versions of plant names, but phonemes that are not generally used in Spanish may be difficult for them to detect, particularly sounds like glottal stops, double or single vowels, or “ch” and “sh”. In some cases the speakers have learned different orthographic systems or have invented their own; these have been adjusted to conform to the system described in Chapter 6. Thus the spellings presented to express Kumeyaay names represent an amalgamation of what I have heard and in some case, spellings suggested by the speakers themselves. Kumeyaay plant names often vary by region; the name in Kumeyaay is followed by an acronym that indicates the community or region of the variant usage, as listed in Table 3. Where different consultants in the same community provided more than one pronunciation of a plant name, the acronym of the community is followed by the initials of the consultants who gave the variant usages (see Table 4). The Kumeyaay plant name(s) presented in the heading for each plant description represents the most widely accepted usage.

Table 3. Acronyms Used to Indicate Kumeyaay Communities or Regions

Community or Region	Acronym
La Huerta	LAH
San José de la Zorra	SJZ
Juntas de Nejí	NEJ
Peña Blanca	PBA
Santa Catarina (Ko’alh)	SCK
Binational Region	BNR

Spellings for words taken from other works such as Hohenthal (2001), Hinton (1975), or Hedges (1986) have not been changed and reflect the original orthography used by the researcher. This may lead to the appearance of widely diverging pronunciations when the difference is actually in the orthography. For example, the spellings for the Kumeyaay word

Table 4. Kumeyaay Consultant Initials

Kumeyaay Consultant	Community	Initials
Teodora Cuero Robles	LAH	TCR
Jobita Aldama Machado	LAH	JAM
Zeferina Aldama Cuero	LAH	ZAC
Joséfinu Muñoz Aldama	LAH	JMA
Mario Aldama Cuero	LAH	
Celia Silva Espinoza	SJZ	CSE
Virginia Melendrez Silva	SJZ	VMS
Norma Meza Calles	NEJ	NMC
Emilia Meza Calles	NEJ	EMC
Aurora Meza Calles	NEJ	AMC
Petra Mata	NEJ	PMX
Joséfinu López Meza	PBA	JLM
Jon Meza Cuero	BNR	JMC
Margarita Castro Albañez	SCK	MCA
Teresa Castro Albañez	SCK	TCA
Tirsa Castro Flores	SCK	TCF

for pine nuts are listed as follows: *juiu* (LAH); *juiyu* (SCK); *jiub* (Cortés Rodríguez 1988); *xwuiu* (Hohenthal 2001); *hwíw* (Hinton 1975); *‘ehwiiw* (Hedges 1986). Although the actual pronunciation probably varies little, the orthographic systems that have been developed for use by native speakers and lay readers, intentionally avoiding the use of International Phonetic Alphabet symbols for phonemes that do not exist in Spanish or English, have not been standardized across the U.S.–Mexican Kumeyaay region, nor in the corresponding literature. Standardization turns out to be a more difficult job than it appears because letters in English and Spanish orthography (such as “j”, “x”, and “h”) do not represent the same phonemes in both languages.

FIELD RECORDINGS: CITATIONS AND REFERENCES

Interviews with Kumeyaay consultants have been preserved as digital audio recordings (AR), video recordings (VR), and field notes. Text citations use the last names (paternal and maternal) of the interviewees, the year of the interview, and the letters AR or VR to indicate the type of recording. The citations point to more detailed reference entries that are listed in the Field Recordings section (see Appendix B). Each field recording reference provides information about the interview, including an interview file code, to facilitate access to the recording. Multiple recordings may exist for the same year; those recordings will be differentiated by a lower case letter in chronological order, for example: (Cuero Robles 2010a).

FIELD NOTES

I have cited field notes in text with the last name of the interviewee, the year of the interview, and, if material is quoted, the page number of the quote. These point to entries in the full reference section that include the full name of the interviewee, the year of the interview, the name of the interviewer, brief identifying information, the day of the interview, and the location where the field notes may be consulted.

All audio and video interviews and field notes are on file at the archives of the Cuchuma Library of Corredor Histórico Carem A.C. in Tecate, Baja California. Full reference information is located in the Field Recordings section (see Appendix B).

NATIVE PLANTS AND THEIR USES

For each plant, I present botanical, English, Spanish, and Kumeyaay nomenclature, including variant Kumeyaay terms for plants from different communities and regions. I provide brief botanical descriptions of the type of habitat in which the plant is found and its general range, as well as photographs to accompany each entry to assist in identification. Kumeyaay consultants discussed a wide variety of uses for many plants; for this qualitative study I report the most commonly agreed upon uses, along with information that effectively illustrates processes of cultural persistence or transformation, as well as historical and prehistoric usage. Quotes from Kumeyaay consultants, gleaned from audio and video

interviews, bring their voices into the text, and their anecdotes enliven the plant descriptions with vivid detail.

***Adenostoma fasciculatum* (Rosaceae)**

English: chamise, greasewood; Spanish: *chamizo prieto*, *vara prieta*. Kumeyaay variants include: *iy pshii* (LAH:TCR; NEJ); *iipsi* (SCK); *iipshi* (Hinton 1975); *i.ipshí* (Cortés Rodríguez 1988); *ipxi'* (Spier 1923) (see Figure 4).



Figure 4. *Adenostoma fasciculatum*.

A primary component of chaparral vegetation through much of the Kumeyaay region, chamise is a rugged shrub from the Rose family (Lightner 2011) sometimes called “greasewood” due to the flammable oils in its leaves. While this quality makes it excellent as kindling, the Kumeyaay also value the tough burl as firewood because it makes long lasting coals (Cuero Robles 2011).

Throughout northern Baja California and southern California, native peoples often constructed arrows with detachable hardwood points; the Kumeyaay made these from chamise (Campbell 1999; Spier 1923). They embedded the wooden points by pressure or with the help of pinyon pitch into the pithy center of a main shaft made from arrowweed

(*Pluchea sericea*), California sunflower (*Helianthus californica*), or mulefat (*Baccharis salicifolia*) (Campbell 1999). According to Jon Meza, the Kumeyaay fire hardened these points: “The wood is heated over coals and it gets hard as iron. They had to know what they were doing, they were specialists, like blacksmiths” (Meza Cuero 2011:5).

Adenostoma sparsifolium (Rosaceae)

English: red shank; Spanish: *chamizo colorado*. Kumeyaay variants include: *jpu’ulh* (LAH); *jup’uulh* (SCK); *iy jepuulh* (NEJ); *hpúll*, *hpu’úull* (Hinton 1975) (see Figure 5).



Figure 5. Adenostoma sparsifolium.

Red shank forms a dominant part of the chaparral landscapes of arid, granitic plateaus from 600 to 1500 meters (Lightner 2011; Minnich and Franco Vizcaíno 1998), often mixing with pinyon forests of the Sierra Juárez. The striking red bark, delicate and lacy leaves, and tree-like structure make it one of the most picturesque shrubs of the Kumeyaay region’s higher elevations.

Native peoples of northern Baja California and southern California have long used the plant as a building material and for firewood (Bean and Saubel 1987; Hinton 1975); it is also well suited for fence posts because it lasts many years in the ground (Cuero Robles 2011). Kumeyaay living in areas where the plant is found at higher elevations still use it as medicine. For rheumatism, they boil the leaves and inhale the vapor (Meza Calles and Meza Calles 2011). For a toothache, the Kumeyaay take a hot infusion of the leaves and stems, holding it in the mouth to rinse the tooth, then repeating the process as many times as

necessary to relieve pain (Cuero Robles 2011; Meza Calles and Meza Calles 2011). They also use the tea for colic (Hinton 1975) or diarrhea (Cuero Robles 2011).

Agave deserti (Agavaceae)

English: desert agave; Spanish: *agave*, *maguey*, *mescal*. Kumeyaay variants include: *me'ellh* (LAH; BNR); *ma'alh* (SCK); *'emally* (Hedges 1986); *ema'l* (Spier 1923); (see Figure 6).



Figure 6. Teresa Castro Albañez harvests *Agave deserti*.

Agave shawii (Agavaceae)

English: coastal or Shaw's agave; Spanish: *agave*, *mescal*, or *maguey de la costa*. Kumeyaay variants include: *me'ellh* (LAH:TCR); *ma'alh* (SJZ); *ma'alh jas'ilh* (SCK); *me'elh jas'ilh ruii kiyak* (*maguey que hay en la orilla del mar*) (BNR) (See Figure 7).

Two species of agave grow in northern Baja California: the desert agave (*Agave desertii*) of the mountains and deserts, and the coastal agave (*Agave shawii*) that abounds in the coastal scrub habitats of the littoral regions. Spanish speakers may refer to either of these species as “*maguey*” or “*mescal*.” In the past, Kumeyaay traveled to the desert (Hedges 1986;



Figure 7. Agave shawii.

Shipek 1991) and to the coast for this valuable resource (Meigs 1935), however the demographic shift of Kumeyaay populations away from the deserts and coasts as they sought the safety of permanent springs in inland valleys (see Chapter 4) has limited interaction with agave populations over the last century. Currently in the study area, only the Ko’alh speakers of the Santa Catarina Paipai community regularly use agave, extracting the fiber as a material for artisanal production of string, nets, and sandals (Campbell 1999; Spier 1923), but no longer using it as an ongoing food resource.

Archaeological, historical, and ethnographic records of the broader region provide important context for the reconstruction of aboriginal uses of agave as food and as fiber for cordage in the Kumeyaay region. Throughout the peninsula, archaeologists have recorded agave-roasting pits, including sites in southern Baja California (Ritter 2006), central Baja California (Des Lauriers 2006), and northern Baja California (Moore 2006).

Historical documents provide vivid depictions of agave use in northern Baja California from the time of the first contact between native groups and non-Indians. In the fall of 1602, Father Antonio de la Ascención of the Sebastiano Vizcaíno expedition described agave use by the native inhabitants of the San Quintín area: “These Indians trade with those inland, bringing in exchange for fish, mescal and other things to eat, cords for fishing, well

made and twisted like twine, and net bags very well and carefully woven of fine thread and neatly twisted” (Wagner 1929:226).

Over a century and a half later in 1769, the expeditions of Franciscan fathers Serra and Crespí through northern Baja California found native peoples eating agave. Like many of the missionaries working in the peninsula, Father Juan Crespí referred to agave as the “daily bread” of the Indians. Crespí describes what was probably desert agave (given the inland location of the party and the time of year) as it was prepared and used by the Kiliwa, the southern neighbors of the Kumeyaay:

We came suddenly, descending a hill, upon a ranchería of some ten huts where they were barbecuing mescal plants.... Our neophytes...brought four large loaves of ground-up roasted mescal; as they handed them to me they reported meeting a dozen heathens on the hill who had given them these.... I must confess it is a delicious, sweet preserve. This is the wretched heathens’ daily bread. [Crosby 2003:69]

Dominican Father Luis Sales, who worked among the Yuman peoples of the northern peninsula, wrote in his *Observations on California 1772–1790* that “among the fruit bearing plants or trees which abound in this land the *mescal* should take the first place” (Sales 1956:14). He compares the roasted hearts to the best sweetened quinces, and mentions the use of fibers to make sandals as well as women’s skirts.

Ethnographic accounts provide more detailed information about the harvesting, processing, and consumption of agave, data that could prove invaluable for archaeological excavations of agave roasting pits, calculations of environmental carrying capacity, reconstructions of seasonal mobility patterns, and studies of environmental interactions. Meigs reports that certain plant foods were of outstanding importance to the Kiliwa and of these, “At the head of the list unquestionably is the mescal plant” (Meigs 1939:22). Meigs (1939), Hicks (1963), and Owen and Michelsen (1994) all describe in varying detail the construction and use of the agave roasting pits. Hicks’s (1963) extensive description of agave includes a biological summary, patterns of distribution, processing techniques, population abundance, seasonal availability and duration, reliability, storage, and depletion. This last topic includes a brief discussion of how human utilization of the plant, whose primary mode of reproduction is asexual, could potentially affect plant populations.

The impact of humans on agave populations, and that of agave populations on humans are important issues in understanding the ecology of the region. Aschmann's work in the Central Desert of the peninsula points out this interdependence. He proposes that the availability of agave "set an upper limit on density of [human] population" (1959:79). The constant harvest of plants just as they reached sexual maturity must have had a major impact on the agave population. Agaves became scarce in areas around permanent sources of water and also around the mission sites; Aschmann (1959) feels that these populations were overexploited and were not able to recover. However Hicks (1963) points out that agave populations are actually able to reproduce both sexually (through seed production) and asexually (through clones that form around the base of the plant), giving their population greater resilience. Since only some of the few flowering plants were considered viable for harvesting, the remaining clones of different sizes were probably able to replace those harvested (Hicks 1963). One way to test these hypotheses would be to work with living populations who still roast agave and study harvesting techniques, caloric economy, and other aspects of human–agave interactions.

A few Native Baja Californians still know how to roast agave for food, although the laborious process is rarely undertaken in the current century. As part of an ethnoarchaeology workshop held in the Paipai community of Santa Catarina in 2000, Ko'alh speaker Andrés Albaláñez carried out the entire process with the help of a group of students. Albaláñez showed how he selected the agave heads for roasting, used a digging stick to extract them, constructed the pit, gathered firewood and stones that would serve as heating elements in the earthen oven, selected an appropriate site in an area where all the necessary resources converged, managed the fire, covered the pit with sand, and uncovered the cooked delicacy at the appropriate time (after two days), all of which generally coincided with the published ethnographic accounts (Bean and Saubel 1987; Hicks 1963). Albaláñez was able to provide answers to questions that had not been asked by previous researchers, such as the amount of time that a harvested agave can be stored before being used, details in the selection and construction of the site, the amount and preferred type of firewood that is used, the reasons for the placement of the stones used as heating elements, division of labor, the location of previous roasting pits in the area, and preferred methods for eating the cooked material. Future studies might benefit from exploring more closely the long-term effects of agave

extraction on agave populations, use of GIS to map agave habitat and its correlation with prehistoric and historical human settlements and high-use areas, and caloric measurements.

The importance of agave in the diet of Native Baja Californians may have been a significant contributing factor in the high incidence of dental attrition found in human skeletal remains throughout the peninsula (Sánchez García and Rosales-López 2008b). Like hunting and gathering people from around the world, Native Baja Californians suffered from a variety of dental pathologies and direct trauma to the teeth related to a diet high in vegetable fibers, grit in stone-ground or wild harvested foods, malnutrition, age, heredity, sex, oral environment, and use of teeth as tools, among others (Lambert and Walker 1991; Pilloud 2006; Sánchez García and Rosales-López 2008a, 2008b). Each of these different factors results in distinct patterns of tooth wear and pathologies, and to complicate matters further, there are usually a variety of interactions between various factors (Sánchez García and Rosales-López 2008b).

Noble (1973) notes that like other skeletal materials from central and southern Baja California, northern Baja California specimens show great wear and attrition, with some teeth worn to the pulp chamber. While most plant foods required some form of processing, the most common being stone grinding, others, such as agave, which is pit roasted, contained large amounts of fiber which is extracted in the mouth, using the teeth as strainers. The resulting mass of fiber, or “quid,” is sometimes found in archaeological sites. Teeth may also have been used for the production of agave fiber for string, in the manufacture of tools or basketry materials, to clean or soften hides or sinew, or to hold objects, among other things, any of which might lead to attrition (Sánchez García and Rosales-López, 2008b).

Along with its great value as source of food, agave also provided fiber that could be extracted to make cordage, sandals, bowstrings, belts, and other items that were indispensable for mobile hunter-gatherers (Michelsen 1970b). Fragments of cordage and netting, though perishable, have occasionally been found in association with archaeological sites of the Comundú and Las Palmas archaeological complexes in the central and southern peninsula (Noble 1973). Historical sources often remark on the high quality of the cordage and nets made from the material. In his 1602 visit to Bahía San Quintín (just south of the study area), Vizcaíno noted that native fishermen “fished with hooks that seemed to be spines

of some tree and lines of maguey fiber twisted and twined better than ours....” (Mathes 1992:156).

While passing through what is now Rosarito, Father Crespí met Kumeyaay people with “nets of all colors” (Crespí 2001:243) which might suggest that some of the nets were made from milkweed (*Asclepias* spp.); Spier (1923) notes that the fiber of this plant could yield brownish or white cordage. Dominican Father Luis Sales, who worked in the missions of northern Baja California, described indigenous women carrying their household in a fiber net on their backs as they moved in their annual round:

Their household valuables can be reduced to a small carrying bag made from fiber string for seeds, a bit of wild tobacco along with a clay pipe, some pieces of flaked stone for arrow points and some bones for working them, some bird feathers for adornment, a juncus basket for gathering seeds, two sticks for making fire (which they easily produce by rubbing them quickly against each other), a bow and arrow, a stick about two feet long for hunting rabbits, and if it is a fisherman, some cords and hooks.” [Sales 2003:81–82]

The making of agave fiber cordage, nets, sandals, and other items, activities reported for the Southern Diegueño by Spier in 1923, is carried on today by a few remaining Ko’alh-speaking women in the Paipai community of Santa Catarina, where in 1966, Michelsen (1970a) documented the manufacture of Z-twist two-ply cord by Petra Higuera. Higuera used her own hand-made hammock-style carrying net with tumpline to gather agave leaves for processing. Two generations later, a handful of Ko’alh-speaking Paipai women still produce agave fiber products that they sell as handcrafts, as well as teaching their traditional skills to Indian and non-Indian students throughout the Yuman region (Wilken 2008a). Nets, once valuable trade items as evidenced by the exchanges between Father Crespí and Native Baja Californians, continue to have economic and cultural value, as today’s indigenous artisans adapt them to their changing world (Wilken-Robertson 2004c).

Ambrosia monogyra **(Formerly Hymenoclea monogyra) (Asteraceae)**

English: Desert Fragrance, Burro Bush; Spanish: *romerillo*. Kumeyaay variants include: *iy uka* (NEJ; LAH:TCR); *wakaa* (SJZ); *jtaasaa* (LAH:JAM); *oká* (Hinton 1975) (See Figure 8).



Figure 8. *Ambrosia monogyra*.

Desert fragrance is a member of the sunflower family that grows along creeks, dry washes, and disturbed areas below 600 meters (Lightner 2011), often growing in large stands where it emits a peculiar aroma that evokes sweaty horses and the earthy, pungent scent of an arroyo. When dry, the fine leaves are highly flammable, a quality that has made them a favorite for use as tinder with a fire drill. A little pouch with the leaves in it might be carried and used to light cigarettes of wild tobacco. To control dandruff or oily hair, consultants used a tea made from the leaves, being careful not to get it on the face because it is extremely bitter (Meza Calles and Meza Calles 2011). Kumeyaay consultants reported using the plant as a remedy for foul-smelling feet. They made it into an infusion to wash the feet, or they put the tender leaves of the plant directly into the shoes. (Silva Espinoza and Melendrez Silva 2010). For horses and cows having problems giving birth, a tea is made and given to the animals. (Aldama Machado et al. 2010a).

***Anemopsis californica* (Saururaceae)**

English: Yerba Mansa, Swamp Root; Spanish: *hierba del manso*, *hierba mansa*. Kumeyaay variants include: *kurrui* (LAH; SJZ); *jumruui* (BNR); *furrui* (NEJ) *chipañ*, *chpañ* (SCK); *j.ruii* (Cano Bracamontes 1990); *curruui*, *cujrrui* (Cortés Rodríguez 1988) (see Figure 9).

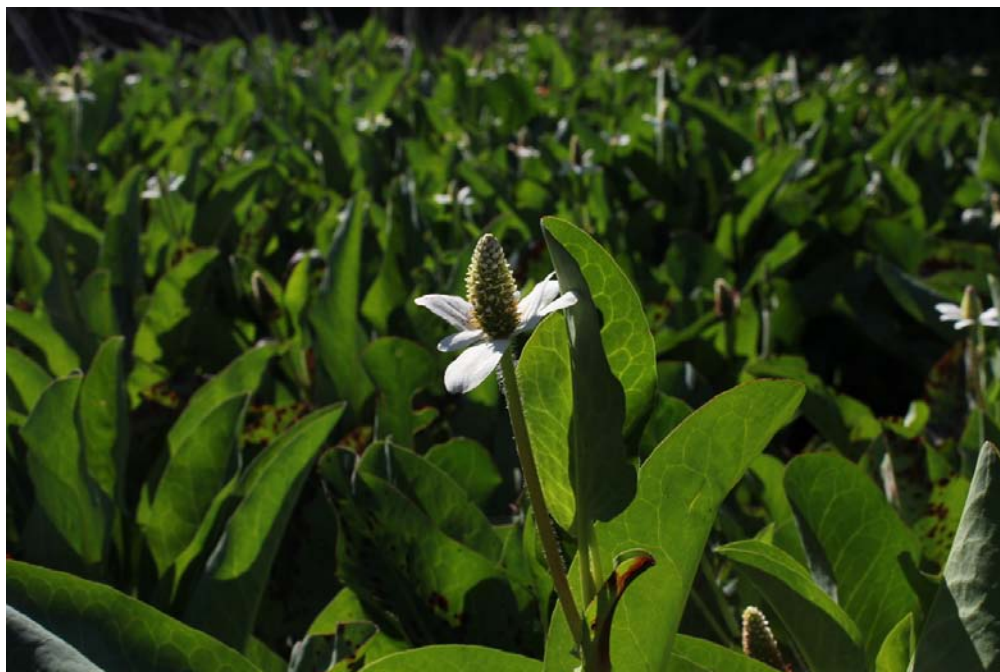


Figure 9. *Anemopsis californica*.

Yerba Mansa is common in wet swampy areas from the coast to the desert. The low growing plant forms colonies from rhizomes, its large elliptical, green to purple leaves, showy flower spikes (Lightner 2011, Roberts 1989), and deep woody scent making it easy to identify. The single species from the Lizard's-tail family in Baja California, native peoples from throughout the Californias greatly appreciate this versatile plant for its many medicinal applications. As Jon Meza Cuero explains, "Many people use this herb, it is widely recognized" (2011:3).

Root, leaf, and flower all have antiseptic properties. For wounds or infected sores, the Kumeyaay make a tea from the leaves or root to wash the affected area. They also apply the leaves directly after heating them enough to soften them. For internal wounds or bruises they take an infusion of Yerba Mansa. The leaf acts like an anesthesia, deadening feeling in the mouth, while the root does not. Women report using the root made into a tea for menstrual discomfort. For bathing to relieve muscular pain, the Kumeyaay make a decoction of the root by boiling it until it has the color of cinnamon tea. Every part of the plant is useful; Kumeyaay mothers report that even the flowers can be boiled and used in many of the same ways for children, since it is milder. Emilia Meza reports that when she was a girl, she would get headaches from spending too much time out in the sun, so her mother would put the fresh

leaves on her forehead and she would go to sleep. When she awoke, the leaves were dried up and her headache was gone (Meza Calles and Meza Calles 2011).

As a boy, Jon Meza Cuero used yerba mansa to treat an infection in his ear that was caused by a tick that he removed. His father instructed him to make a tea from the herb and wash his ear with it, which cured it. For an infection that will not heal, Kumeyaay place the fresh leaves directly on the sore as a poultice, or dry the leaves, pulverize them and then sprinkle the powder on the infected area (Meza Cuero 2011). A decoction serves as a mouth rinse for a toothache (Castro et al. 2010).

For digestive disorders, the Kumeyaay make a tea from the pounded root, as it cleans out the stomach. For this purpose, they may drink a mild infusion in place of water throughout the day (Melendrez Silva and Silva Espinoza 2010); they also recommend this for curing a cold. Cortés Rodríguez (1988) reports that Kumeyaay who played the traditional gambling game known as peon might place a small piece of the root in a pouch for good luck. The Chumash used the herb as part of ritual purification in preparation for the handling of a powerful substance used in ceremony (Timbrook 2007).

The herb's curative properties are also useful for treating animals. The wide variety of applications and efficacy of the herb have made it a favorite of native peoples, and Timbrook suggests that "humans have intentionally spread yerba mansa, and large patches have become established in new locations" (2004:31).

Arctostaphylos sp. (Ericaceae)

English: manzanita; Spanish: *manzanita*. Kumeyaay variants include: *jusilh* (LAH, SCK); *josilh* (NEH, BNR); *hw'silly* (Hinton 1975); *hesill* (Hedges 1986) (see Figure 10).

One of the most attractive shrubs of chaparral habitat, Manzanita's smooth, deep red bark, urn-shaped flowers, and berries that look like tiny apples give this member of the Heath family a striking appearance in the often arid landscapes of the Kumeyaay region. Several different species of Manzanita grow in northern Baja California (Roberts 1989), at least two of which are recognized by the Kumeyaay. Determination of species may be difficult because some species hybridize; botanists count chromosomes for speciation (Lightner 2011).

Throughout the Californias native peoples used the fruit to make a drink (Anderson 2005; Bean and Saubel 1987; Timbrook 2007); many Kumeyaay still gather the fruits for this



Figure 10. Teodora Cuero Robles harvests *Arctostaphylos*.

purpose. Delfina Cuero remembered gathering manzanita berries in Pacific Beach, near Mission Bay in San Diego, to make a drink like “Kool-aid” (Shipek 1986:31). The Kumeyaay also use the plant as medicine and for firewood. Kumeyaay distinguish between the varieties whose fruit can be eaten by humans, and those eaten only by coyotes. According to Teodora Cuero Robles (2011) of La Huerta, *jusilh* refers only to the type of manzanita that can be made into a drink, while *jumsur* is the variety with light-colored leaves that is eaten by coyotes. In Nejí the “coyote” variety is called *jam’soor* (Meza Calles and Meza Calles 2011) while in San José de la Zorra it is called *jattpa jusilh*, literally “coyote manzanita” (Melendrez Silva and Silva Espinoza 2010:VR). This variety, *Arctostaphylos glauca*, has blue-gray leaves and large, sticky, and spherical berries and may grow up to four or five meters tall, with a tree-like appearance (Lightner 2011).

Kumeyaay consultants generically called the varieties used to make a drink *jusilh* or *josilh*. In San José de la Zorra, the name is *jusilh tr’aar* (Melendrez Silva and Silva Espinoza 2010); other specific names for distinct varieties may still exist in communities where

various species are encountered and are still used by the Kumeyaay. Even before the berries ripen in summer, Ko'alh speaking consultants of Santa Catarina eat manzanita flowers, which they report as tasting sweet (Castro et al. 2010). Jon Meza Cuero remembers gathering manzanita seeds with his grandmother when he was a boy:

My grandmother would make a drink from manzanita. We would go out to gather the seeds, we hit the bushes with sticks, the seeds would fall and we would gather lots of them, we would be out there all day long. We would gather them up in one of those *El Rosal* flour sacks and bring them home. Then she would moisten them to grind the seeds, letting them soak a bit, and then she would pound them (*shumwaal* in Kumeyaay) to soften them up. You just have to separate the seeds, not crush them. Then you put it in a clay pot, so that it will turn out more delicious, you add honey and wait a little while for it to get sweeter and more concentrated. Once it's ready you add more water to it, depending on how many people there are and how sweet you want it. [Meza Cuero 2011:2]

Consultants from Nejí reported that they dried and saved seeds gathered in the summer for use in the winter. Once the fruits are lightly pounded on a metate, they are added to water with sugar or honey, then the seeds sink to the bottom and they can enjoy the drink. Kumeyaay consultants of Nejí pointed out that *jossilh* grows abundantly in the Jacumé and El Hongo areas, but in many places it has disappeared. Native Baja Californians have long used manzanita as a firewood because it burns hot and evenly, leaving good coals, however commercial demand for firewood in recent years has resulted in overexploitation of manzanita populations (Meza Calles and Meza Calles 2011).

The seeds are also considered medicinal. According to Ko'alh speaking consultants, once they are ripe, they can be boiled and made into a tea which they drink in place of daily water for urinary infections (Castro et al. 2010).

***Artemisia californica* (Asteraceae)**

English: coastal sagebrush; Spanish: *romerillo*. Kumeyaay variants include: *cham'pilh* (NEH); *chimpilh* (SJZ); *Chemajpilj* (Cano Bracamontes 1990) (see Figure 11).

Colonies of coastal sagebrush, belonging to the Sunflower family, form a familiar part of coastal sage scrub communities throughout the California Floristic Province from southern California into northern Baja California, although they are not true sages, which belong to the Mint family (Lightner 2011).



Figure 11. *Artemisia californica*.

The Kumeyaay use this aromatic herb for a number of medicinal applications. They make the leaves and stems of the plant into an infusion to wash sores or wounds, or they may dry the leaves, pulverize them, and sprinkle the powder on. They mix the bitter tea with salvia for fevers or cold (Silva Espinoza and Melendrez Silva 2010). A cup of tea taken daily may temporarily relieve pain related to the gall bladder. For digestive problems, including a bloated feeling in the stomach, vomiting, or diarrhea, the Kumeyaay also use the bitter tea (Meza Calles and Meza Calles 2011).

Virginia Melendrez recalled an effective remedy that her mother Celia Silva Espinoza made for her to remove a tick lodged in her ear:

When I was a little girl, a tick crawled into my ear and it swelled up in there. My mother cured me with this plant. She took a bunch and pounded it, then cooked it until it was very strong and thick. Then she put a drop in my ear. In a little while she put in another drop in and I could feel the tick starting to crawl out. It was so big and ugly! But that's why I have faith in this plant. [Silva Espinoza and Melendrez Silva 2010:VR]

It can be burned as incense or to remove spiders from inside the house (Meza Calles and Meza Calles 2011). It can also be used to cure infections in animals (Meza Cuero 2011).

***Artemisia tridentata* (Asteraceae)**

English: big sagebrush, basin sagebrush; Spanish: *chamizo blanco*, *hierba del borrego*. Kumeyaay variants include: *kpijau* (LAH); *kup'hau* (SCK); *pajau* (NEJ); *hpáaw*, *pháaw*, *kapháaw* (Hinton 1975) (see Figure 12).



Figure 12. *Artemisia tridentata*.

The distinctive silvery-blue foliage and pleasant aroma of big sagebrush have made it a popular icon of Western lore in the greater desert Southwest, where the 1 to 3 meter shrub is commonly found from 500 to 3000 meters in rangeland and mountains. In the Kumeyaay region, it grows in interior scrub vegetation, chaparral, and on forest edges. Like California sagebrush, it is not actually a true sage but belongs to the Sunflower family (Lightner 2011).

Ko'alh consultants reported that the woody stems and trunks, often found in the pinyon forests, are considered a preferred firewood for heating green pinecones to open them. The consultants noted that it works quickly and the pine nuts taste good. The Kumeyaay use the tea for treating a stomach ache or a cold (Hinton 1975). Teodora Cuero rolls the fresh leaves into a little ball and inserts it in the ear to relieve an earache (Cuero Robles 2011). Consultants also use the tea for washing sores and for sore muscles (Meza Calles and Meza Calles 2011). The Cahuilla gathered sagebrush seeds in late summer, parched them, and ground them to make a meal that they ate as a pinole-like mush (Bean and Saubel 1987).

Many Kumeyaay report burning big sagebrush as incense. In ancient times, the Paipai purified themselves with the smoke of the plant by tossing the fresh leaves on a bed of coals, then standing over it and drawing the smoke over them (Benito Peralta, personal communication). Teodora Cuero Robles recalls the use of the plant for ritual purification:

When a relative died, they would mix up water and white clay and add *kpijau* [big sagebrush] and other herbs and with this they would bathe us from head to toe, with this mud, and very early in the morning they would bathe us with clean water to get all the clay off and so that the spirit would not remain, it would go away. They broke up lots of the branches and they would throw them on the coals so that lots of smoke would come out, and there they would bathe us in the smoke, the whole family. [Cuero Robles 2011:1]

Today, consultants burn big sagebrush in the same way as white sage; it is sometimes called *salvia india* (Indian sage) because of its frequent use by Native Baja Californians (Meza Calles and Meza Calles 2011).

Baccharis salicifolia (Asteraceae)

English: mule-fat; Spanish: *guatamote*. Kumeyaay variants include: *jatamuwal* (SCK); *tamoot* (NEJ); *tamwáal* (Hinton 1975); *jmushi*, *jamushí* (Cortés Rodríguez 1988); *jmushi* (Cano Bracamontes 1990); *hamuzi* (Hohenthal 2001) (see Figure 13).

Mule-fat is commonly grows in arroyos, ravines, and wet places below 1200 meters, with foliage that looks similar to the native willows (*Salix sp.*) often found growing in the same habitat (Lightner 2011); thus the species name *salicifolia* refers to its willow-like foliage. However, unlike willow, Mule-fat does not lose its leaves in the winter, making it a useful food for livestock when there is little else available.

Native peoples of the peninsula and throughout southern California have found uses for every part of the plant. Inhabitants of the southern peninsula used the fresh shoots to make a decoction for bathing injured limbs in order to restore movement (Barco 1973; Clavigero 1937). Today, Kumeyaay and Paipai artisans use the long, straight stems of mule-fat for making arrow-shafts, often combined with a detachable wood point made from chamise (see *Adenostoma fasciculatum*). The Kumeyaay have used the stems as construction material for making brush walls, fire drills (Hohenthal 2001), and a variety of traps, including fish traps (Timbrook 2007) and bird traps.



Figure 13. *Baccharis salicifolia*.

Consultants recommended a hair wash made from an infusion of the leaves for cleaning, conditioning, and stimulating growth of the hair (Cano Bracamontes 1990). They combine the infusion with soap and use it daily to control dandruff or fungal infections of the scalp that cause hair loss, to remove parasites, and to make the hair look nice (Meza Calles and Meza Calles 2011). Teodora Cuero made the root into a soap by pounding it on a metate, then putting it into a bucket with enough water to cover it and allowing it to soak overnight. She mixed this liquid with the tea from the leaves and used the mixture to wash hair. Once the hair is rinsed thoroughly, it will look and feel very clean (Cuero Robles 2011). Among the Cahuilla, the plant has also been used as a preventative for baldness (Bean and Saubel 1987).

Consultants treat fungal infections with a tea made from the leaves. They wash the skin with a tea made from the leaves to heal skin infections. They treat vaginal infections with a wash made from the tea (Meza Calles et al. 2010); the Cahuilla also used a decoction of the leaves and stems as a female hygienic agent (Bean and Saubel 1987).

***Brahea armata* (Arecaceae)**

English: Mexican blue palm; Spanish: *palma azul*, *palma ceniza*. Kumeyaay variants include: *muy kuaw* (LAH); *jawal* (SCK) (see Figure 14).



Figure 14. *Brahea armata*.

Along the base of the precipitous eastern escarpment of the Sierra Juárez and the San Pedro Martir, fan palm oases mark the locations of arroyos that cascade down from these northern peninsular mountain ranges and reach the parched sands of the Sonoran Desert region of northeastern Baja California (Minnich and Franco Vizcaíno 1998). These extraordinary habitats have long held great importance for native peoples of the region, as evidenced by abundant petroglyphs and pictographs, archaeological sites, and oral tradition of both desert and mountain groups (Alvarez de Williams 2004; Ritter 1991; Serrano González 2008). In Baja California's oases, two types of fan palm often coexist: the majestic *Washingtonia filifera* (California Fan Palm) and the striking *Brahea armata* (Blue Palm) (Franco Vizcaíno 2009), an endemic tree of the northern peninsula with silvery-blue leaves.

Both types of palms provided food and construction materials for native peoples of the region.

Orcutt, a nurseryman from southern California who collected palm seeds in Kumeyaay and Kiliwa territory in the 1880s reported that “the abundant fruit of the *Erythea* [later reclassified as *Brahea*] was sought and eaten eagerly by the local Indians as soon as it ripened. A single spathe of *Erythea* may carry as much as forty pounds of fruit....” (Aschmann 1959:85).

Teodora Cuero remembers many details about the palm fruit, and the special trips that were made from La Huerta, over the Sierra Juárez and down to the desert to gather the fruits:

In the past, men would make a special trip down to the desert to bring back the fruits of the palm. When they get ripe, they fall. The one with small seeds is called *muy casira* and the one with the large fruits we call *muy kuaw*. The larger one can be thrown on the coals so it cooks a bit and then we eat it. If they are still green, they can be roasted to make them sweeter and better. They bring back a whole bunch and when they run out, they go back and get more. [Cuero Robles 2010b:VR]

Although Cuero had not visited the palm oases, she recalled the landscape as though she had been there. She described an abandoned Indian village of palm-thatched huts that used to exist in the Canyon de Guadalupe until someone burned the whole thing down (Teodora Cuero, personal communication). The landscape also attracted the Kumeyaay because of the healing waters found there; as Cuero remembers: “If someone is sick when they go [for palm seeds], they bathe in the hot springs during the two or three days that they are there and they come back in good health” (Cuero Robles 2010b:VR).

***Brickellia californica* (Asteraceae)**

English: California brickelbush; Spanish: *yerba de la vaca*. Kumeyaay variants include: *samalh jkuak* (LAH); *samalh kuak* (SCK; NEJ); *sa'máll hwak* (Hinton 1975); *samalj coac* (Cortés Rodríguez 1988) (Figure 15).

California Brickelbush grows throughout much of the Kumeyaay region, from coastal scrub, through chaparral habitat, and up to the sierras below 1500 meters (Lightner 2011). This member of the Sunflower family often grows around rocks and road cuts or other disturbed areas, with soft green, heart-shaped leaves that taste extremely bitter. The

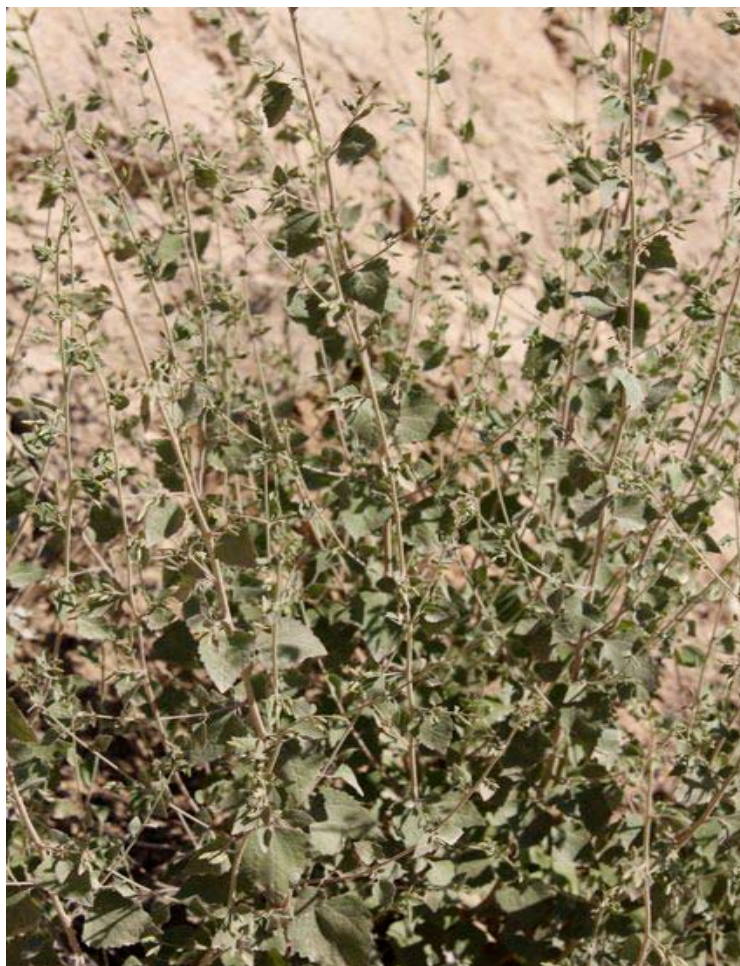


Figure 15. *Brickellia californica*.

Kumeyaay regard the plant as a highly effective medicine for cutting a fever, and for respiratory and stomach problems. Jon Meza Cuero explains a number of uses for the herb:

This is a really good medicine, for infections of the belly, the stomach. You make a cup of tea and drink it in the morning and in the evening. When a person has a bloated feeling in the stomach, the *sobadores* [traditional massage healers] give them this, and it loosens up whatever is stuck. You can also drink the tea for fever, achy body and flu. It is very bitter. You can bathe in it when you have skin problems or something like measles, or when you have *hervor de sangre* [boiling of the blood] which causes pimples, spots or swelling on the skin. You cut the leaf when it is strongest, during the time of the full moon, or at any time if it is an emergency, just enough to make a bitter tea with a few leaves. [Meza Cuero, 2011:4]

Consultants from Nejí, San José de la Zorra and La Huerta described similar uses (Cortés Rodríguez 1988; Hinton 1975). Ko'alh speakers of Santa Catarina explained that

Brickelbush is good to combine with elderberry flowers, using only the white stems, because the leaves are too bitter. The tea when made with elderberry flower is good for a cold, or also for a backache or headache. Kumeyaay consultants from Nejí said that in the past if someone seemed to be dying, they would be given a glass of Brickelbush tea, and if did not kill them, it might revive them (Meza Calles and Meza Calles 2011).

Chamaesyce sp. (Euphorbiaceae)

English: rattlesnake spurge; Spanish: *golondrina*. Kumeyaay variants include: *mat jnak* (LAH:TCR; SJZ); *matt jnak* (SCK); *matt yiu* (NEJ); *mat jnac*, *mat nñiú* (Cortés Rodríguez 1988) (see Figure 16).



Figure 16. Chamaesyce sp.

A member of the wide-ranging Euphorbia family, Rattlesnake spurge has both annual and perennial forms that create a thin green mat with tiny white flowers growing close to the ground. Two distinct Kumeyaay names given for the plant describe its habit: *mat jnak* means “earth necklace” and *mat yiu* means “earth eyes” because the little flowers look like eyes. The Kumeyaay use an infusion made from the leaves of the plant for curing sores (Silva Espinoza and Melendrez Silva 2010) and to relieve the pain from the bites and stings of insects such as ants, bees, and scorpions. The Kumeyaay sometimes apply the milky fluid directly to the affected area (Meza Calles and Meza Calles 2011), however this may be

harmful to the skin (Timbrook 2007). The common name is derived from folk beliefs about the plant being made into an infusion to cure rattlesnake bites (Heizer and Elsasser 1980); according to Delfina Cuero, a tea of the plant was given to a boy who had been bitten by a rattlesnake bite (Shipek 1991).

***Dichelostemma capitatum* (Thermidaceae)**

English: blue dicks or wild hyacinth; Spanish: *jacinto silvestre*, *cacomite*, *coquito*.
Kumeyaay variants include: *melkikup* (LAH); mish'aalhy (NEJ) (see Figure 17).



Figure 17. *Dichelostemma capitatum*. Image given to author by Deborah Small

Blue-violet clusters of flowers nodding atop tall stems in springtime fields of Baja and Alta California mark buried treasure—corms or “Indian potatoes” that have long been an important food resource for native peoples in all the areas where they grow (Anderson 2005). Blue dicks, a member of the Brodiaea family, and related to other geophytes like mariposa lilies (*Calochortus spp.*), provide an example of indigenous environmental interactions that raises questions about the extent to which Native Californians used traditional environmental knowledge to manage the plant populations from which they gathered, or the extent to which

they simply foraged for whatever was available. Anderson (2005) points out that in the process of harvesting blue dicks, Native Californians often took only the larger corms, detaching “cormlets” that formed around their base. These “babies” (Anderson 2005: 299) as some Indians referred to them, developed more quickly once detached from the mother corm, and may have benefitted from the aeration of the soil by the digging and tilling process. If gathered after the flowers had gone to seed, digging might have encouraged the growth of seeds that had fallen to the surface of the soil (Anderson 2005). Traditional pyrodiversity management (Lightfoot and Parrish 2009) involved setting intentional fires to increase the plant’s populations, since *Dichelesthoma* is a “fire follower,” coming back in greater numbers after a burn. In certain areas such as the Channel Islands, large quantities of the corms were gathered and roasted (Timbrook 2007), and throughout California researchers have found evidence of it in archaeological sites (Lightfoot and Parrish 2009).

The Kumeyaay only occasionally gather the corms today. Teodora Cuero Robles recalls how “we used to eat it a lot, we would go to where it grew and there we would be, digging it up and eating it raw” (2011:2). Kumeyaay consultants from Nejí remembered that as children, they were not allowed to eat the corms; they were told that if they did, their hair would fall out. Only elderly people could eat it, since they didn’t have to worry about their hair (Meza Calles and Meza Calles 2011).

Dudleya sp. (Crassulaceae)

English: live forever; Spanish: *siempreviva*. Kumeyaay variants include: milhka’mey [wide-leaf]; milh kajmila [narrow-leaf] (LAH); *awi mielh* (SCK) (see Figure 18).

From colonies growing on rocky, coastal cliffs to occasional individuals with bright red inflorescences reaching up through chaparral vegetation, the succulent live-forevers stand out in the dry landscapes of the Kumeyaay region. These members of Stonecrop family come in different shapes and forms, including large, silvery-white or green rosettes with lanceolate leaves, blue-green rosettes with thicker, more rounded leaves, and oddly twisted, pencil thin “lady finger” dudleyas that spring into action after winter rains and then seem to disappear under the summer sun (Lightner 2011; Roberts 1989).

Throughout the Kumeyaay region, people chewed the tender leaves to alleviate thirst. The inflorescences, when first coming up, are sweet, juicy and edible. Teodora Cuero



Figure 18. Dudleya sp.

reported pounding the root of the plant and soaking it in water; this wash was used for tightening up the gums (Cuero Robles 2010b). Hedges (1986) noted that the Diegueño harvested the leaves to treat calluses and corns, and boiled the root whole to make a decoction for asthma.

***Ephedra californica* (Ephedraceae)**

English: Indian tea, miner's tea, Mormon tea; Spanish: *canutillo*. Kumeyaay variants include: *jpiip* (SCK); *jpip* (Cortés Rodríguez 1988); *mii'aaq* (NEJ); *hpiip* (Hinton 1975); *hukpip*, *xakpip* (Hohenthal 2001) (Figure 19).

Ephedra, like its relatives the conifers, is a gymnosperm, an ancient type of plant that far predates flowering plants in the geologic record. Like firs, *Ephedra* has branches with joints and tiny seed cones. This broom-like shrub is made up mostly of twiggy stems, and grows throughout the Kumeyaay region, from the coast to the deserts (Lightner 2011).

Native peoples, miners, and other immigrants brewed *Ephedra* stems to make a pleasant tasting, wine-colored tea which has been popular in all of the areas where it grows. The tea also has important medicinal qualities; Native Californians have considered it an effective remedy for kidney and urinary system disorders, for sexually transmitted diseases,



Figure 19. *Ephedra californica*.

and for purifying the blood (Bean and Saubel 1987; Cortés Rodríguez 1988; Roberts 1989).

According to Jon Meza Cuero:

It's the best thing for cleaning the kidneys. You make a tea and drink it instead of water. You can make a gallon, and in place of water you drink this. If you just drink it once, that's good, but if you drink it for one or two weeks, that's much better. When you urinate, something like ash or lime will come out, because things have been plugged up inside. That's why something like sand will come out. [2011:5–6]

A variant of the Kumeyaay name for *Ephedra* from Nejí, “*mii'aaq*,” literally means “foot bones” in Kumeyaay, probably referring to the many jointed stems. Nejí consultants warned that the tea should not be taken for more than two or three weeks, as it can “thin the blood” (Meza Calles and Meza Calles 2011:VR); this was also reported among the Cahuilla (Bean and Saubel 1987). However Cortés Rodríguez (1988) reported that a Kumeyaay consultant recommended taking a mild infusion in place of water for a month.

Bundles of *Ephedra* have been reported in cave caches in Chumash territory (Timbrook 2007), suggesting the importance of the plant in prehistoric times. Native Californians reported gathering and grinding the seeds of *Ephedra* to make a pinole or mush (Bean and Saubel 1987; Meigs 1939; Owen and Michelsen 1994; Roberts 1989), however consultants interviewed for the current study did not mention this usage.

Eriodictyon trichocalyx or crassifolium
(Boraginaceae)

English: yerba santa, mountain balm; Spanish: *yerba santa*, *rama santa*. Kumeyaay variants include: *samalh jlhuy* (LAH); *samalh jpilh* (SJZ; SCK); *muka jepilh* (NEH) *pja.a* (Cano Bracamontes 1990); *kujuá* (Cortés Rodríguez 1988); *sa'máll llupnúup* (Hinton 1975) (see Figure 20).



Figure 20. Eriodictyon trichocalyx.

Two species (and several subspecies) of yerba santa grow in different parts of the coastal scrub, chaparral, mountain, and desert transition habitats of the Kumeyaay region: *E. trichocalyx* with darker, shiny, sometimes sticky leaves, and *E. crassifolium* with lighter, felt-textured leaves. Both varieties have been employed medicinally, generally in similar ways. Throughout the Californias, native peoples have used the plant for treating colds, sore throats, and relieving congestion, as well as for aches and pains, and as a general tonic (Bean and Saubel 1987; Cortés Rodríguez 1988; Hedges 1986; Owen 1962; Timbrook 2007). Hinton (1975) reports that a covered olla containing the plant was found in the Sierra Juárez, which suggests that the plant was a valued resource. It was highly regarded by the Spanish and other settlers who gave it the name of *yerba santa* (holy herb). Kumeyaay names refer either to the sticky quality of the leaf (*jpilh*) or its sweet aroma (*jlhuy* = perfume).

For respiratory disorders, consultants recommend an infusion taken with honey (Melendrez Silva and Silva Espinoza 2010). Teodora Cuero Robles (2010a) makes a decoction with a handful of leaves and stems boiled in about three cups of water. She drinks this three times a day for a cold while symptoms persist. For pain in the chest or back from excessive coughing, the Kumeyaay pressed yerba santa leaves directly on the chest and left there for a while until the pain subsided. Consultants also used the tea to loosen phlegm; it can be taken before going to bed (Meza Calles and Meza Calles 2011).

For sore joints, the Kumeyaay cook the leaves and apply them as a poultice directly on the affected area, covering them with a piece of cloth (Melendrez Silva and Silva Espinoza 2010). Joséfina López Meza recommended chewing the raw leaf to calm a dry throat, and she shared the following anecdote as an example of its efficacy:

I remember one time when I was coming from visiting my sister in Cerro Azul and I picked some [yerba santa], I have that funny habit that I'm always picking these things. There was a plant there so I picked some, and then I got on the bus and there was a lady there who couldn't stop coughing, no, no, no, she couldn't even talk because of the cough, so I gave her some leaves and I told her to chew on them and swallow the saliva and that would get rid of the cough, and that did it, she didn't cough at all on the rest of the trip. [2004:11]

Doña Joséfina uses the sticky-leaf variety to bandage a cut. She uses the raw leaf directly when out in the field, or she heat the leaves on a stove, presses them onto the wound, and leaves them there to help with healing (López Meza 2004).

***Eriogonum fasciculatum* (Polygonaceae)**

English: California buckwheat or flat-top buckwheat. Spanish: *valeriana*. Kumeyaay variants include: *jm'ilh* (LAH:TCR; BNR; SJZ); *ja'milh* (LH:JAM); *iy jamilh* (NEH); *chimilijuur* (SCK); *jamilj* (Cortés Rodríguez 1988); *hm'illy* (Hinton 1975) (see Figure 21).

A common sight in scrub and chaparral up to 2000 meters, California Buckwheat forms mounds up to one meter tall that flower profusely in summer, turning from white, to pink, to deep rusty red as the season progresses (Lightner 2011). *Eriogonum* spp. belong to the Buckwheat family and are distantly related to the Eurasian crop plant, common buckwheat (*Fagopyrum esculentum*) (Hickman 1993). However, the seed of California buckwheat has not been described as a food by any of the Kumeyaay consultants or in any of



Figure 21. Teodora Cuero Robles gathers the flowers of *Eriogonum fasciculatum*.

the literature reviewed for this study, except for Bean and Saubel (1987) who simply reported that the Cahuilla gathered and ate the seeds.

Medicinal uses for the plant, in contrast, are widespread and generally focus on digestive disorders. For diarrhea and stomach upset, the Kumeyaay use both the roots (Cortés Rodríguez 1988) and the flowers. They use fresh roots for diarrhea, pounding them on a metate and then cooking them until they turn the reddish color of cinnamon tea (Melendrez Silva and Silva Espinoza 2010). According to Jon Meza Cuero, “This is very good for nausea, you use the root, you make a tea and you drink it in the morning and in the afternoon. With this and a *sobada* (healing massage) of the stomach you cure the infection of the belly. You only cut a part of the root, so that the plant will keep growing” (Meza Cuero 2011:4).

Teodora Cuero Robles used California buckwheat flowers for heart troubles: “It’s good for when your heart is pounding in your chest. I used to have this problem and I cured myself just by using this plant. You gather the flowers and boil them in a pot of water to

make a tea. Drink a cup when you feel your heart pounding, then take it in the morning and the evening until you feel better” (Cuero Robles 2011:1).

Consultants from Nejí use the leaves and flowers to calm the nerves or to sleep. They relieve swollen feet by submerging them in a bucket of California buckwheat tea (Meza Calles and Meza Calles 2011). Celia Silva Espinoza of San José de la Zorra thinks of the changing color of the buckwheat flowers as the signal that her ancestors watched for to mark the beginning of the pinyon season (see *Pinus* spp.) (Melendrez Silva and Silva Espinoza 2010).

Fraxinus parryi (Oleaceae)

English: Chaparral Ash; Spanish: *fresno*. Kumeyaay variants include: *jkwii* (SJZ); *jcui.i* (Cortés Rodríguez 1988); *itup* (Hohenthal 2001); *ixtu’p* (Spier 1923) (see Figure 22).



Figure 22. Fraxinus parryi.

Chaparral ash is a small, deciduous tree endemic to northern Baja California that belongs to the Olive family (Roberts 1989). Groves of the two to six meter trees often occur on hillsides of scrub and chaparral, leafing out after rains, flowering in late spring and dropping their leaves in summer, when the fluttering seeds become conspicuous.

The uses of the ash are little remembered today, although Cortés Rodríguez (1988) documented the preparation of the seeds as food. Her consultant Gloria Castañeda Silva of

San José de la Zorra crushed the seeds and put them in water to reduce their bitterness, then strained them and added to fresh water along with honey or sugar. The resulting drink has an intense blue color. The Chumash and other native peoples of Alta California also made a bluish-colored drink with the stems of related *F. dipetala*, which was said to be “very good medicine for sick people, for it was very cooling” (Timbrook 2007:88).

Celia Silva Espinoza (Doña Gloria’s mother) tells a fascinating story about chaparral ash, which may refer to a greater reliance on insects as food in earlier times. Once in a while after good rains when there were lots of green leaves on the ashes, green “worms” called *me’* in Kumeyaay massed along the leafy stems of the ash. In the past, the people would strip the swarming caterpillars off the stems, cook them, put them on a smooth stone, and crush them to remove the insides. The remaining part was good food like meat, and could be eaten with acorn mush (Silva Espinoza and Melendrez Silva 2010). Doña Celia never actually participated in this activity, but her grandmother told her about it. Owen and Michelsen (1994) also report that the Paipai formerly ate a “worm” called *?mi* that was boiled or roasted in the sand under a hot fire.

The harvesting of insects, a highly nutritious food (Sutton 1988) has been documented among peoples of other parts of Baja California and Alta California. Similar harvests of “army worms” (actually a type of caterpillar from the family *Noctuidae*) have been described for the Pomo (Barrett 1936) as well as in early Jesuit writings on central and southern Baja California. Jesuit Father Francisco Javier Clavigero writes:

These poor Indians find sustenance likewise from two other kinds of grayish worms, which are long and as thick as the little finger and which are found on certain plants after the rains. In order to eat them, they catch them one by one by the head with their two fingers, and with the other two they continue pressing them from the head as far as the other extremity, in order to empty their digestive system. Afterward they roast them and make a long string of those which they wish to keep for further use. [Clavigero 1937:61]

Jesuit missionary Miguel del Barco’s description matches that of Clavigero, and he adds, “The Indians greatly esteemed this food because it provided much sustenance, and for their palate it was soft and oily” (Barco 1973:36). The missionaries were disgusted by the entomophagy of the native peoples and concluded that it must have existed because the Indians had nothing else to eat. After describing the frequent consumption of locusts by Native Baja Californians, Clavigero wrote that they were being diverted from such food by

the “good advice of the missionaries and the experience acquired in 1772, in which a great epidemic attacked the Indians because they ate so many locusts” (1937:65). Given the general aversion of non-Indian cultures toward the consumption of insects, information such as that provided by Doña Celia may have been lost or filtered out over the years; perhaps future archaeological studies will be able to detect the importance of insects in the aboriginal diet.

**Hesperocyparis forbesii (formerly *Cupressus forbesii*)
(Cupressaceae)**

English: Tecate cypress; Spanish: ciprés. Kumeyaay variants include: *shjaar* (BNR) *chjaar* (SJZ) (see Figure 23).



Figure 23. *Hesperocyparis forbesii*.

Tecate cypress grows like a shrub in scrub or chaparral, rarely over ten meters tall. Consultants sometimes confused it with California juniper (*Juniperus californica*); both plants belong to the Cypress family. Although it generally occurs between 450 and 1400

meters (Lightner 2011), Tecate Cypress may also occur sporadically at lower elevations in the Kumeyaay region, near the Pacific coast (Minnich and Franco Vizcaíno 1998).

Jon Meza Cuero explained that the branches were especially good for making bows; these should be cut during the time of the full moon. In order to bend them to shape, the artisan must heat the stave by passing it through a bed of coals (Meza Cuero 2011:5). In San José de la Zorra, consultants boiled the bark and took the decoction two or three times a day to treat a stomach ache or a cold (Silva Espinoza and Melendrez Silva 2010).

Hesperoyucca whipplei (Agavaceae)

English: chaparral yucca or our Lord's candle; Spanish: *lechuguilla*, *quiotte*.

Kumeyaay variants include: *jakulh* (BNR); *akul ñipi jmi* (LH:JAM); *aa'aa* (LAH:TCR) *a'a* (SCK; Hohenthal 2001) (see Figure 24). (Note: *aa'aa* refers to the plant while *akul* or *jakulh* refers to the stalk or *quiotte* in Spanish.)



Figure 24. Hesperoyucca whipplei.

Chaparral Yucca is a member of the Agave family that grows in foothills of northern Baja California from 150 to 1200 meters (Lightner 2011). Native peoples throughout the California Floristic Province, along the Pacific slope of southern California and northern

Baja California, have long used three parts of the chaparral yucca—base, stalk, and flowers—as food. The Chumash cooked the base and stalk using earthen pits with hot stones as well as using the sharp spines of the leaves for piercing and tattooing (Timbrook 2007). Bean and Saubel (1987) report similar uses of chaparral Yucca among the Cahuilla. Diegueño of Santa Ysabel, California, roasted the stalk and also used the fibers of the leaves to start the foundation for coiled baskets (Hedges 1986).

In Baja California, many of these traditional uses for chaparral yucca continue to supplement the economy of indigenous peoples living in rural areas. Based on his 1948–49 field work in Baja California, Hohenthal (2001) reported that the Kumeyaay roasted bases or crowns of Yucca in earth ovens with hot stones, using chamise (*Adenostoma fasciculatum*) as fuel; today the practice of harvesting and roasting the bases is rare. Jon Meza Cuero, who was 9 years old when he met Hohenthal in 1948, described the cooking of the crowns during an interview in 2011: “The stalk can be roasted and also the base where the leaves come out, but they don’t do this [roast the base] so much because it kills the plant and then there aren’t any more. If you leave it there, more plants will come up around it” (Meza Cuero 2011:3). Meza Cuero’s observation regarding the possibility of depletion of the resource was also noted by Hicks, who pointed out that unlike agave, which reproduces itself through both sexual and asexual processes, Chaparral Yucca reproduces primarily from seed: “If only the stalk is taken, the life of the plant will be prolonged, and a new stalk will rise the next year. This is often done today, as the stalk is much more easily cooked than the head” (1963:116–117).

Meza Cuero also noted cultural proscriptions regarding the cooking of the plant. “Not just anyone can light the fire [for the yucca roasting pit] and it can’t be done with just any firewood. There are people who have a ‘sweet hand,’ they are especially good at lighting the fire so that it will turn out right. Ceonothus and chamise are the best firewood for this” (Meza Cuero 2011:3).

As the plant matures, different parts become available for food at different times, extending the seasonal availability of the plant from late March through May, depending on elevation (Hicks 1963). Meza Cuero points out the importance of timing in harvesting the edible portions of the plant:

The flower can be eaten. In springtime there are a lot of yucca stalks with buds ready to bloom, but once they open then the stalk is no longer any good. If you harvest it when the stalk is soft, before it blooms, then you can cook it. You can cook it like a potato, cook it well and then eat it with a tortilla. Or you let it grow up a little more and you can eat it like sugar cane, it tastes real sweet. To cook the flowers, you need to cut them before the buds open, and you gather a whole bunch. When you cook it, you throw off the first water to get rid of the bitterness, then you boil it some more. You can add eggs, meat or vegetables too, it's delicious. [Meza Cuero 2011:3]

Celia Silva Espinoza reported cooking yucca flowers and then drying them on a bundle of deerweed. She would store them and eat them in winter; they are especially good when prepared with wild onions (Melendrez Silva and Silva Espinoza 2010).

Elders of La Huerta described an ancient prohibition against harvesting chaparral yucca from a specific hill west of the community. The "old people" forbade gathering in the area, which would bring bad luck to those who failed to respect the tradition. A variety of frightening apparitions might appear if anyone even went to look at the hill. The violation could also cause excessive cold, freezes, and snow in the region or even the death of a relative. The same elders mentioned that the yuccas tended to bolt earlier in that area, and they discussed whether the proscribed avoidance was designed to keep outsiders from competing with those who lived nearby, but they concluded that if the ancestors advised so strongly against gathering there, they must have had a good reason, and in the past the people would abide by these rules (Aldama Machado et al. 2010b).

Native Baja Californians still prize yucca today, in particular the stalks which can be cut into short lengths and stored until ready to cook. During springtime, it is common to see harvested stalks stashed in native kitchens where they may be roasted in the oven, directly on an outdoor fire, or in a pit lined with coals. Kumeyaay consultants of San José de la Zorra sometimes use lengths of thin split yucca leaves to tie together bundles of sage, and a Kiliwa artisan regularly gathers the black seeds to soak, perforate, and use as beads for jewelry. Paipai artisans make *barrilitos* or honey buckets by cutting off the base of the dried stalk and hollowing it. Although primarily produced today for the native arts market, these makeshift containers were said to come in handy when a gatherer was away from home without a container and found a source of honey or other wild foods (Campbell 1999). Occasionally the dry stalks are used to form walls for sheds, ramadas and other informal structures.

Heteromeles arbutifolia (Rosaceae)

English: toyon, hollywood; Spanish: *fusique*. Kumeyaay variants include: *joshik* (NEJ) *jushik* (SCK; SJZ); *josik* (BNR); *huusik* (LAH:TCR; Hinton 1975) (see Figure 25).



Figure 25. Heteromeles arbutifolia.

This sturdy evergreen shrub or small tree growing two to ten meters high is a member of the Rose family that can be found from the coast up to 1200 meters in the Kumeyaay regions, occurring disjunctly to the Cape Mountains of the southern peninsula and well up into Alta California. Its leathery, deep green leaves with serrated edges and bright red berries in winter have earned it the name hollywood, and its attractive form and easy cultivation as an ornamental have made it a popular plant for native plant gardens. The name “toyon,” also commonly used in English, comes from a Spanish adaptation of the Ohlone Indian word *tottcon* (Timbrook 2007:94). In Baja California the common name in Spanish is *fusique*, which seems to be an adaptation of the original Kumeyaay name *jushik* (Moran 1995).

Native Californians have used toyon for food, medicine and material for making tools, and researchers have recovered remains of toyon berries from archaeological sites in several areas of Alta California (Lightfoot and Parrish 2009). To remove bitterness or astringency, gatherers allow the berries to fully ripen, then they are harvested and exposed to heat. Celia Silva Espinoza explains that certain cultural proscriptions must be followed to ensure a successful berry harvest:

The berries are harvested and put in the sun to mature, but there must not be noise around when they are drying in the sun, otherwise they won't ripen properly. There are two types, one with a red berry and another with an orange berry. They are tasty and sweet, ripening in December. They may also be cooked on coals. The branches are also useful for making bows. [Melendrez Silva and Silva Espinoza 2010:AR].

Some Kumeyaay make the leaves and stems of toyon into a decoction for colds or whooping cough that can be taken hot or diluted and drunk in place of water throughout the day (Meza Calles et al. 2010). The tea also serves as a rinse to treat sores inside the mouth (Meza Calles and Meza Calles 2011).

Juncus acutis (Juncaceae)

English: spiny rush; Spanish: *junco*. Kumeyaay variants include: *Psilj* (SJZ, NEH; Cortés Rodríguez 1988) (see Figure 26).



Figure 26. Juncus acutus (grasslike clumps in foreground).

Spiny rush forms grass-like clumps of cylindrical stems with sharp points, common in creeks and other wetlands from the coast up to 1000 meters (Lightner 2011). To harvest the stems, gatherers usually cut the plant down to just above the roots, an action known as

coppicing that mimics the effect of fire, flood, or being eaten by animals. Usually coppiced plants grow back with long, straight shoots (Anderson 2005). Basketmakers use split stems of spiny rush to form the foundation (or warp) of coil baskets (see *Juncus textilis* below for a discussion of basketry). In the past other materials may also have been used; during his 1948–49 fieldwork, Hohenthal (2001) reported that Kumeyaay basketweavers of the Tecate region used a “tall grass” (most likely deergrass or *Muhlenbergia rigins*) for foundation material and basketbush (*Rhus trilobata*) for the weft. These materials are still used today by weavers north of the border (Farmer 2010).

***Juncus textilis* (Juncaceae)**

English: basket rush; Spanish: *junco*. Kumeyaay variants include: *kuu'nai* (SJZ); *cunai* (Cortés Rodríguez 1988); *kwa'naay* (Hedges 1986) (see Figure 27).



Figure 27. Beatriz Carrillo harvests *Juncus textilis*.

Basket rush grows in riparian zones, often in the shade of oak woodlands. Unlike spiny rush, which grows in dense, rounded clumps, basket rush spreads outward from underground rhizomes to form upright stands of deep green, cylindrical stems up to one and a half meters tall. Toward the base of the stems, the deep green color gives way to a reddish-brown, making this type of juncus particularly useful for creating designs in the weaving of

traditional Kumeyaay coil baskets (Farmer 2010) Basket rush is also a stronger material than spiny rush; weavers split the stem lengthwise into several parts and it still retains great tensile strength. These two qualities—color and strength—make basket rush a highly valued material for Kumeyaay basketmakers, who use it as the *hilo* (weaver strand), also referred to as weft (Farmer 2010) in the production of basketry. Currently a growing number of Kumeyaay artisans of San José de la Zorra have revived this traditional art in response to a strong local and international market for the baskets as art objects, resulting in increased use and knowledge of *Juncus textilis* and *J. acutus* (Rivera Medina 2000).

Weavers gather the stems around the time of the full moon. Basketweaver Beatriz Carrillo explains the reason for this resource scheduling: “The moon makes a big difference because if we gather when the moon is new, the stems break too easily. When we split the stems to prepare the material, it breaks off instead of splitting along the whole length of the stem” (Carrillo Vega 2011:VR). The sewing strand is also more likely to break when it is pulled tight while wrapping around the foundation bundle (Virginia Melendrez, personal communication). Gatherers harvest each stem individually, gently pulling them upward until they detach from the root. Areas regularly gathered in this way tend to look well kept, and weavers feel that the process stimulates the growth of the plant (Wilken-Robertson 2004a). However growing commercial demand for juncus basketry has led to overexploitation of *juncus textilis* stands near the community, so weavers have to travel farther to acquire their materials. Recently, men from within and outside the community have begun to harvest juncus as a specialized economic activity, and weavers frequently purchase their materials through them rather than doing the harvesting themselves. Community members and advocates from outside the community have proposed and started projects to propagate *Juncus textilis* in the community over the years (Rivera Medina 2000), but so far they have not been successful, primarily due to a lack of continuity in the projects.

Weavers dry juncus stems in the sun, taking care to bring them indoors at night to avoid exposure to moisture in the air, which can cause the growth of a discoloring mold, affecting both the look and the strength of the material (Carrillo Vega 2011). Once dried, they split the juncus and remove the inner pith with the help of a knife or razor blade (Melendrez Silva 2010). Before metal tools were available, Chumash weavers (who also work with basket rush) accomplished this by using the sharpened edge of a clamshell

(Timbrook 2007). Weavers dye some of the split stems by winding them into hoops and submersing them for about a month in buckets of a dank, odorous liquid. The recipe for this natural dye varies from weaver to weaver, but some of the common ingredients include oak bark, soot from inside a wood-burning stove, rusty nails, and black earth from nearby creeks (Melendrez Silva 2010). The resulting dyed material provides the basketmakers with deep black weaver strands that contrast beautifully with the natural yellow color of the main shaft of the juncus stem and the reddish brown color of the stem base (Farmer 2010).

A weaver starts a basket by tying a length of split juncus into a knot, using one end of the knot as the beginning of the foundation or *ayulh* (tail), then sewing stitches of the flexible *Juncus textilis* strands into it by perforating the incipient foundation with an awl. As she slowly spirals outward, she continues to add split *Juncus acutus* rods to maintain a uniform thickness for the foundation, while also stitching the weaver through openings made with the awl, building on the previous rounds (see Figure 28).



Figure 28. Weaving a juncus basket.

To create design elements, weavers use natural brown or dyed black strands, creating geometric or representational patterns (Melendrez Silva 2010). Weavers achieve a variegated

look by using a series of strands that start brown and then fade to yellow. Artists may take weeks or months to complete a full sized basket, however the work may be well rewarded if she is able to sell the item for between \$200 and \$2000 U.S., depending on the overall size of the piece, complexity and attractiveness of the design, fineness and evenness of the stitching, and the integrity of the materials (Virginia Melendrez, personal communication).

Split juncus coil baskets were originally produced for everyday use in much of what is now southern California (Farmer 2010; Timbrook 2007) and throughout the Baja California peninsula. Jesuit Francisco Xavier Clavigero described a highly developed weaving technology among the Cochimí of the central and southern peninsula that fits the description of split juncus coil basketry, although he does not specify the name of the plant used:

The tray, called *batea* by the Spaniards, is round, somewhat deep, and varies in its size; it is usually a foot and a half in diameter. It is made from the twigs of a certain plant, flexible as the willow after they have flattened it and cut it lengthwise. They make it in a spiral form, beginning in the center, and fasten it strongly with strips of the same material. The spirals are held together so closely and the tray is so solid that it holds water without even a drop being able to get out. [Clavigero 1937:98]

In the late 1800s, collectors began buying baskets from the remaining populations of indigenous peoples in the areas where Franciscan and Dominican missions had existed in southern California and northern Baja California; this type of basketry has become known as “Mission Indian” style, although the technology predates the mission period and the tribal groups and basketry traditions are actually much more diverse than the name suggests (Wyckoff 2001). The Baja California basketry tradition forms part of this cultural continuum, and in recent years designs and techniques from north of the relatively recent U.S.–Mexican border have informed the work of the Kumeyaay basketmakers of San José de la Zorra. The basketry revival has resulted in the revitalization of an ancient technological and artistic tradition of the Californias. However, the sustainability of the practice (in particular the increased amounts of juncus being harvested) in response to the current commercial demand deserves further study (Rivera Medina 2000).

***Juniperus californica* (Cupressaceae)**

English: California juniper; Spanish: guata. Kumeyaay variants include: *iy sha* (LAH:TCR; NEJ); *chaa* (LH:JAM); *ii'ur* (SCK); *shá* (Hinton 1975) (see Figure 29).



Figure 29. *Juniperus californica*.

California juniper is an evergreen shrub or small tree three to five meters tall. Rugged trunks, twisted branches, fragrant foliage and blue to purple “berries” (seed cones) give this member of the Cypress family a striking profile where it grows in the high desert landscapes of Baja and Alta California (Lightner 2011; Roberts 1989). The Spanish name *guata* for California juniper comes from the Luiseño word for juniper *wa'aat* (Timbrook 2007).

In all the areas where it grows, it has served as food, medicine and construction material. Ko'alh speakers of the Paipai community explained that they gather the berries in summer once they are ripe, break them up in a metate, and remove the seeds. They mix the remaining meal with water to make a refreshing drink (Owen and Michelsen 1994). The Kiliwa to the south also ate the berry, crushing and boiling it (Meigs 1939). The Cahuilla (Bean and Saubel 1987), the Chumash and many other Native Californians used the seed for food, grinding it into a meal, soaking or boiling it to make a mush or a drink, sometimes making it into a cake for later consumption (Timbrook 2007).

Native Baja Californians consider Juniper bark a highly effective medicine to cleanse the kidneys, the liver, and the urinary system. They boil the bark until it takes on the color of cinnamon tea (Cuero Robles 2011) and drink it in place of water until the symptoms subside.

Jon Meza Cuero remembers his father making the tea to drink “just for the good taste of it” (Meza Cuero 2011:5).

Kumeyaay consultants consider Juniper branches one of the best materials for fence posts because they last a long time in the ground. For communities like La Huerta and Santa Catarina, harvesting juniper branches has represented an important source of income, since they have good-sized populations of the plant within their territory. Native Baja Californians and biologists have promoted managed extraction of selected juniper branches as a sustainable method of utilizing available natural resources to provide income for these indigenous communities (Wilken-Robertson 2004a, 2004c).

***Lonicera subspicata* (Caprifoliaceae)**

English: honeysuckle; Spanish: *moronel*. Kumeyaay variants include: *kuak uyulh* (LAH:TCR); *eelhpitt* (LAH:JAM); *kuak nuyulh* (SCK); *coacnuylj* (Cortés Rodríguez 1988); *mellkaa* (Hedges 1986) (see Figure 30).



Figure 30. *Lonicera subspicata*.

Wild honeysuckle often grows in the shade of oaks, vining up over neighboring shrubs or forming mounds. Its name *kuak uyulh* means “deer plays in there with its antlers” and consultants thought that this name might refer to the way that bucks can rub their antlers in the mounds of vines to help shed velvet from their antlers (Cuero Robles 2010a:VR).

Throughout the Californias, native people boil honeysuckle leaves and stems to make a wash for wounds and sores (Cuero Robles 2010a; Hedges 1986; Owen and Michelsen 1994; Timbrook 2007).

Malosma laurina (Anacardiaceae)

English: laurel sumac; Spanish: *lentisco*. Kumeyaay variants include: *juaalh Kumiai* (NEJ); *juaalh* (SJZ; SCK); *joalj* (Cano Bracamontes 1990; Cortés Rodríguez 1988) (see Figure 31).



Figure 31. Malosma laurina.

Laurel sumac, a common evergreen shrub up to five meters tall with a spicy aroma can be found on cismontane slopes, in scrub and in chaparral, from the Cape Region of the southern Baja California peninsula through Santa Barbara, California. It is sensitive to cold so it usually grows below 1000 meters (Roberts 1989); above that, its cousin *Rhus ovata* (sugar bush) is likely to be found in the same niche. In Kumeyaay folk taxonomies, laurel sumac is considered to be so closely related to sugar bush that they share the name: *juaalh* (or a similar variant). When pressed on the difference between the two, some speakers differentiate by calling laurel sumac *juaalh Kumiai* (the word *Kumiai* referring to the coast or to the west), and sugar bush *juaalh nyak* (the word *nyak* refers to the east), which aptly describes the general distribution of each. Chumash taxonomies also group the two plants

together along with *Rhus integrifolia* (lemonadeberry); all of them are related members of the Sumac family, along with cashews and mangos (Dale 2000).

Throughout the Kumeyaay region, consultants consider both laurel sumac and sugar bush to have a strong effect on a woman's reproductive system. They use the new growth of laurel sumac to make a tea for women who are about to give birth, to help move the process along quickly. They also pound the root (*kwashma*) of the plant and make it into a tea to be given to a woman after she has given birth, to help clean everything out and to ensure that all the placenta has been expelled (Silva Espinoza and Melendrez Silva 2010).

To clean the eyes, Celia Silva Espinoza recommended an infusion made with a mixture of laurel sumac leaves, holly leaf cherry (*Prunus ilicifolia*) leaves, and California buckwheat (*Eriogonum fasciculatum*) flowers (Silva Espinoza and Melendrez Silva 2010). The Chumash ate the raw berries of laurel sumac by pounding them and drying them in the sun (Timbrook 2007).

Opuntia spp. (Cactaceae)

English: prickly pear; Spanish: *nopal bronco*. Kumeyaay variants include: *jpaa jentil* (LAH); *jpa* (SCK; BNR); *xapa* (Hohenthal 2001); '*ehpaa* (Hedges 1986) (see Figure 32).

A number of species of prickly pear are widely distributed throughout the study area, including many with sweet and edible fruits, seeds, and pads, and some with dry fruits that are eaten like a vegetable. These members of the Cactus family (Lightner 2011) protect their succulent bounty by heavily arming themselves with obvious spines as well as the more insidious glochids—minute, bristly filaments that must be breached before fruits or pads may be consumed (Timbrook 2007).

While botanists recognize at least seven to nine species of *platyopuntia* (the subgenus to which the various prickly pear cacti belong) in the peninsular region (Lightner 2011; Roberts 1989), local indigenous taxonomies recognize many more. Anthropologists Michelsen and Owen (1994), who worked with the neighboring Paipai and Ko'alh speaking peoples at Santa Catarina, list thirteen varieties of the fruit and mention that their native consultants believed that there were twenty or more specific varieties. Norma Meza Calles and Petra Mata of Nejí mention just a few of the many types they know: "*jpakshaash* is a



Figure 32. *Opuntia* sp.

variety that is very sweet but doesn't have many spines; "*tepajaa* is another very sweet type; *jpataat* has a lot of spines, but it's also sweet;" *jpañer* is a red fruit that is very sweet and doesn't have many seeds, it is found in the Calabazas and Tecolote areas (Meza Calles and Mata 2010:AR).

Native peoples have developed a number of ingenious ways to harvest, process, and consume the seedy but refreshing fruits, which generally ripen by late summer (although the exact timing can change depending on the elevation at which the plants grow) (Hicks 1963). Certain flowering plants such as tarweed (*Deinandra fasciculata* or *churupu* in Kumeyaay) that have naturally sticky leaves often grow conveniently near *Opuntias* and gatherers bunch them into little whiskbrooms to clean off the prickly pears, making them easier to handle. Harvesters may also rub them in grass or sand to remove most of the glochids. To pick them from the plant and handle them, they fashion a highly specialized utensil from the leaf of a Mohave Yucca (*Yucca schidigera* or *sha'aa* in Kumeyaay) by cutting off a leaf, removing

the spiny tip and then folding the leaf in half to form sturdy tongs (Hicks 1963). Gatherers use the tongs to twist off the prickly pears and place them in a special open-weave agave fiber bag called a *chukwa*; once full they shake it to remove the spines (Aldama Machado et al. 2010b; Owen and Michelsen 1994).

Gatherers would consume some of the fruit immediately, eating the pulp with or without seeds, or making it into a drink, or processing some for later use (Meza Calles and Meza Calles 2011). Hicks explains how gatherers processed both fruit and seed: “The fruit may be eaten fresh, or it may be cut or broken open, dried for about five days in the sun, and stored. Sometimes the juice was squeezed out and drunk, and only the seeds were dried. Dried seeds, or seeds and dried pulp together, can be ground into meal and either eaten as *atol* [mush] or made into cakes” (1963:124).

Although people throughout Mexico eat the jointed stems (or cactus pads), the Kumeyaay do not seem to have used them as a major food resource in the past (Hicks 1963). Contemporary Kumeyaay consider it useful as a way of controlling diabetes, and also apply it directly to swollen areas and wounds (Longstreth 2006; Roberts 1989). In Nejí, in order to remove a deep sliver, Aurora and Emilia Meza split open an *Opuntia* pad, heated it up and then placed it over the sliver; this is said to “suck out” the sliver (Meza Calles and Meza Calles 2011).

Hedges (1986) suggests that there may be an association between prickly pear and archaeological sites. Both archaeology and botany could benefit by working closely with Kumeyaay consultants whose traditional knowledge of the resource is based on many generations of environmental interactions. Studies to further document Kumeyaay folk taxonomies of *Opuntia* populations, including Kumeyaay knowledge of plant distribution and ecology; the possibility of working with consultants as they select, gather, process, and consume the fruit, the analysis of the genetics of the existing populations; and the use of geographic information systems to detect anthropogenic patterns in plant distribution could all greatly enhance our understanding of the long-term relationships between humans and the “natural” landscape.

Peritoma arborea (formerly Isomeris arborea)
(Cleomaceae)

English: bladderpod, stinkweed; Spanish: *ejotillo*, *quelite*, *flor de ruda*, *ruda del monte*. Kumeyaay variants include: *pshaash* (LAH:TCR); *pshaalh* (LAH:JAM); *pchaalh* (BNR); *pshalj* (Cortés Rodríguez 1988); *psháll* (Hinton 1975) (see Figure 33).



Figure 33. Peritoma arborea.

In spite of its less than glamorous name, the Kumeyaay highly value bladderpod or stinkweed as a nutritious and tasty food (Hinton 1975). From coastal cliffs, up through chaparral and down to low desert, from central Baja California to central Alta California, this shrub's distinctive showy yellow flowers and "conspicuous, strongly-inflated green pods" (Roberts 1989:148) make it easy to identify. Although the Cahuilla reportedly ate the seeds (Bean and Saubel 1987), in Baja California the Kumeyaay relish the flowers as a fresh vegetable, which they still occasionally prepare even though the process is time consuming (Cuero Robles and Aldama Cuero 2010).

The main bloom is in springtime; however the plant may flower throughout the year (Lightner 2011). Harvesters nip off the flower heads with thumb and forefinger, avoiding the leaves, which make the food bitter (Cuero Robles and Aldama Cuero 2010). The flowers and buds must boil for many hours, and more boiling water must be added occasionally. Some consultants recommend putting it on the stove in the evening with some big pieces of firewood and cooking it all night long. Because of the plant's bitterness, after it first boils,

consultants recommended discarding the liquid and adding new boiling water to continue the cooking process. Once the bitterness is gone, the cook drains the remaining mass, then takes it out and squeezes it by hand to remove more water, making it into a ball. This can then be eaten plain or stewed up with onions, tomatoes, peppers, or other condiments; either way the Kumeyaay usually eat it with mush or tortillas (Aldama Machado et al. 2010b; Cuero Robles and Aldama Cuero 2010; Meza Cuero 2011).

***Pinus monophylla*, *Pinus quadrifolia* (Pinaceae)**

English: four-leaf pinyon and single-leaf pinyon; Spanish: *piñón*. Kumeyaay variants include: *juiu* (LAH); *juiyu* (SCK); *jiub* (Cortés Rodríguez 1988); *xwuiu* (Hohenthal 2001); *hwíiw* (Hinton 1975); *ehwíiw* (Hedges 1986) (see Figure 34).

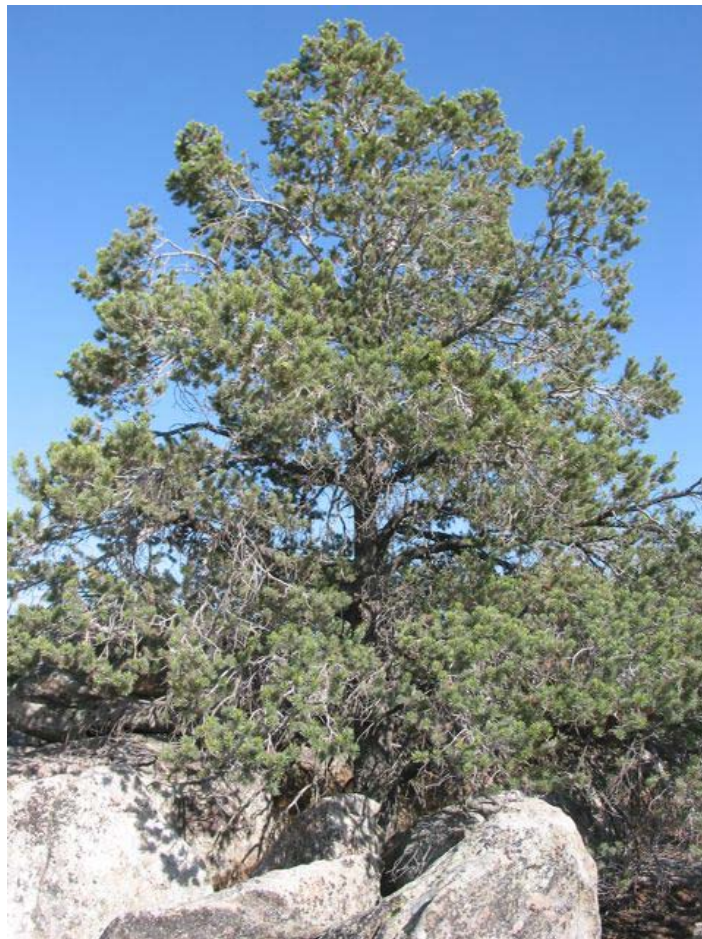


Figure 34. *Pinus* sp.

The Sierra Juárez is home to several members of the Pine family, including two which have played a crucial role in the Kumeyaay economy: four-leaf and single-leaf pinyon. Although there is overlap between their ranges, the four-leaf pinyon tends to grow in chamise and red shank chaparral along the western flank of the Sierra Juárez, while single-leaf pinyons become increasingly prominent along the dryer desert transition of the eastern escarpment (Lightner 2011; Minnich and Franco Vizcaíno 1998).

Researchers often mention pinyon as one of the most important foods of Native Baja Californians (Goldbaum 1984; Hicks 1963; Roberts 1989). In late summer, the Kumeyaay, their neighbors the Ko'alh and the Paipai, regularly traveled to the great stands of pinyon to gather this highly prized and oil rich food (Hicks 1963; Michelsen and Michelsen 1979). According to Celia Silva Espinoza, when the flowers of the California Buckwheat turn from white to red, it signals that the time has come to head up to the mountains for the pine nut harvest; as she explains: "It's like our Indian calendar" (Melendrez Silva and Silva Espinoza 2010:AR). Some Cucapá families also made a weeklong journey from the Colorado River desert to join the Kumeyaay in the harvest (Kelly 1977).

Since seed production varies from year to year, runners or scouts went beforehand to find out if there would be a good crop, and to determine the locations of the trees with the most seeds (Elena Ibañez, personal communication; Owen and Michelsen 1994). Joséfina López of Peña Blanca remembers: "When it was pinyon harvest time, everyone would get together in a wooden wagon and go up to the mountains, staying there for weeks at a time. They would bring back many sacks of pine nuts, enough for everyone here to eat" (López Meza 2004:6).

Teodora Cuero first went to gather pine nuts with her family as a little girl in the 1920s. Her family group made the trip on foot, with a burro or mule to carry supplies, leaving every year in mid-August. Like other native elders of the region, she distinctly remembers the timing and the places through which her family moved on the pinyon pilgrimage:

When it was time to go to the pine-nut harvest, we had to leave on August 15 on the dot. Even if the sun was already setting, we would leave and go sleep on the other side of the hill. And then in the morning we would take off again. This was our custom; we had to leave La Huerta on the fifteenth. The next day we would arrive and then my father would get to work: climbing up into the trees, cutting off the pine cones, roasting them and then we would all take out the pine nuts. Roasting them is the most delicious way to eat them. Then since there were lots of

other pine nut gatherers, the nuts would run out and we would move on to another place. [Wilken 2008b:6]

Teresa and Margarita Castro remember the specific route their family group always took on the way to the stands of pinyon in the Sierra Juárez. They would go with their parents by horseback, camping at traditional stopping places along the way, and arriving on the third day at Campo Nacional south of Laguna Hanson. (Castro et al. 2010). Anthropologist Ralph Michelsen documented one of the Castro family trips in 1962, including a photo of consultant Teresa Castro as a young woman, winnowing pinyon seeds (Michelsen and Michelsen 1979).

At the beginning of the season, before the cones open, *piñoneros* (pine nut gatherers) twist off the green cones and throw them to the ground; people below collect them and take them to where they are heated in a fire pit. Sagebrush (*Artemisia tridentata*) is one of the preferred fuels used in the heating process. Once the cones heat up and begin to open, the gatherers remove them and put them on a tarp, where they beat them with sticks or shake them by hand to make the seeds fall out (Michelsen and Michelsen 1979). Later in the season, pine cones still up in the trees begin to open, and some of the seeds eventually fall to the ground where they can be gathered. The harvesters climb up into the trees where there are ripe, open cones and shake the branches, bringing down a rain of pine nuts. While this process is less complicated than gathering the green or unopened cones, birds or rodents may reach the seeds first, diminishing the available resource for humans (Hohenthal 2001).

The Kumeyaay eat pine nuts raw but more often they are pan-roasted, then eaten individually. Some elders remember how to grind the seeds on a metate and make them into a *pinole* (Campbell 1999; Meigs 1939), especially for people who lack teeth (Castro et al. 2010). Among the Cahuilla, pinyon was ground and made into a drink or a mush (Bean and Saubel 1987). The Paipai traded pine nuts for agricultural items with peoples of the Colorado River desert region, or with merchants in exchange for provisions such as flour and sugar (Benito Peralta, personal communication).

As a highly prized resource for the Kumeyaay, it is not surprising to find cultural proscriptions and references to them in oral tradition. According to Teodora Cuero, her ancestors told her “not to go breaking the branches of the pines, not to play there, nor to climb up on any small tree, they said that they were almost just like humans; ‘They are

watching us, they are taking care of us, they give us our food. Don't go around damaging them, don't be shouting, none of that,' they would say" (Wilken-Robertson 2004b:49).

During his 1948–49 fieldwork, Hohenthal (2001) recorded a story about a rock formation at *Agua Hechicera* (*Ha 'kusiyaí*) that resembled an open sack of pine nuts. According to his consultant María Osuna of the Kumeyaay settlement of Manteca, there was a big dance where a sack of shelled pine nuts was set on a rock for the guests to eat. When an uninvited guest thrust his hand in the sack, it turned to stone. The presence of pine nuts as an enviable food for invited guests at a social event, proscriptions to protect the pinyon trees, and the use of pine nuts as a trade item all suggest the high value placed on this resource.

Today, access to pine nuts is increasingly problematic. Changes in land tenure, governmental regulations and even drug trafficking have affected the Indians' ability to harvest this traditional resource (Wilken-Robertson 2004a). Teresa Castro explains why she no longer goes to gather pine nuts: "In the past everything was open, but not today, now everything is fenced off, the ejido owners won't give permission to pass. We can't go gather pine nuts or sweet acorns" (Castro et al. 2010:AR). However in spite of restricted access, some families from La Huerta and Santa Catarina still travel up to the mountains to gather. At 90 years of age, Teodora Cuero continues to make the trek to the pinyon stands of the sierra that she has visited since her childhood, where gathering pine nuts is secondary to her desire to rekindle her connection with a landscape drenched in a lifetime of memories (Wilken 2008b). She remembers this landscape as a place where native people from throughout the region came together, not only to acquire valuable food resources, but also for socializing, singing, and dancing. Cuero tells of the cave where her family often stayed in the pinyon groves:

There is a cave, it is quite beautiful, and the Cucapás (who we always called the "*rianos*" or river people) would come and camp there and eat pine nuts, sweet acorns, and such. So that's why it's called the Cave of the River People.... I love to go there, it's a little cave right on the plain, on the edge of the road that goes down to the desert. Sometimes we would stay there and I thought that I might hear some little sound, some little something, but I didn't hear anything.... Every year we go at pinyon time. I don't stop going to the mountains, whether there are pine nuts or not, so that I can remember.... In the evenings we would all get together in the cave. There were Indian singers from Cucapá and we all danced a lot. I was just a girl, only seven or eight years old. [Wilken 2008b:6]

In spite of the difficulties in gaining access, the Kumeyaay continue to value pine nuts as a useful economic resource, both through direct consumption as well as through their sale in the local cash economy. During seasons of good pinyon production, gatherers from La Huerta and Santa Catarina as well as *mestizo* ranchers offer local pine nuts for sale. In 2010, I received an email from an indigenous teacher advertising unshelled pine nuts for sale at approximately \$20 a kilo, complete with a cell phone number provided for interested buyers (Anonymous, personal communication).

Platanus racemosa (Platanaceae)

English: California sycamore; Spanish: *aliso*. Kumeyaay variants include: *jperacha* (LAH:TCR); *jadpich'aa* (SCK); *persha* (BNR); *prsha* (Cortés Rodríguez 1988); *hperch'á*, *hameche'á*, *pe'che'á* (Hinton 1975); *ehpuull* (Hedges 1986) (see Figure 35).

The majestic California Sycamore is one of the few large native trees found in riparian habitat near the coast and at elevations below 1200 meters. This member of the Sycamore family grows to 25 meters, often with multiple trunks and a broad canopy made up of large lobed, bright green leaves (Lightner 2011; Roberts 1989), turning from yellow and orange to brown in the fall. Franciscans Crespí and Serra described groves of sycamores and oaks in the streams and valleys they crossed on their 1769 trek through northern Baja California (Crespí 2001; Minnich and Franco Vizcaíno 1998).

The Kumeyaay use sycamore branches for the construction of traditional house frames and ramadas (Cortés Rodríguez 1988). Jon Meza Cuero recommends a tea made from the bark as healthful and good tasting (Meza Cuero 2011); consultants in La Huerta use it as a tonic for the blood (Hinton 1975). An edible fungus grows on the lower part of the trunk (Meza Cuero 2011).

Sycamores are susceptible to mistletoe (*Phoradendron macrophyllum*), a parasitic plant (Lightner 2011), and large clumps of it sometimes become visible when the tree loses its leaves in winter. According to Jon Meza Cuero (2011), the mistletoe of the sycamore can be used to dye hair. He cuts a bunch and puts it into water for eight days; the more it ferments the better. The resulting liquid makes a strong black hair coloring. After washing hair, the liquid is applied, then a towel is wrapped around the head and it is left on overnight. In the morning it is rinsed, and the hair remains a deep black color.



Figure 35. *Platanus racemosa*.

***Pluchea sericea* (Asteraceae)**

English: arrowweed; Spanish: *cachanilla*. Kumeyaay variants include: *Tamu* (BNR); *ta'mu* (NEJ); *jta'mu* (SJZ) (see Figure 36).

Thickets of silvery arrowweed up to four meters tall are common along streams and washes at elevations up to 1000 meters. This member of the Sunflower family has pink composite flower heads and long, straight stems and leaves that have made it useful as material for construction and tools. Many native groups of southern California's desert areas used it to make arrows, although Kumeyaay craftsmen more commonly make arrow mainshafts from mulefat or other materials (Bean and Saubel 1987; Campbell 1999). The



Figure 36. *Pluchea sericea* cut for construction of ramada.

Kumeyaay use the pliable, leafy branches to form walls or roofing material in traditional houses, ramadas, windbreaks, fences, little cages, traps, and other structures (Bean and Saubel 1987; Meza Calles and Meza Calles 2011).

The Kumeyaay built a traditional ramada and historical period rectangular house as part of the permanent exhibit of the Tecate Community Museum in 2011 using arrowweed for the roof of the ramada and the walls of the house. The construction supervisor, Julian Cuero of Nejí, choose arrowweed rather than willow (which is also commonly used) because it was more easily accessible in his community, so he was accustomed to working with the material.

The Cahuilla gathered the roots of young plants for roasting and eating; this provided a constant source of food (Bean and Saubel 1987). Jon Meza Cuero recalls that his relatives used the tea and a compress of the leaves for livestock when they had stomach problems, infections or fever. They could cook the leaves and then tie them onto the stomach; the tea was also given to the animals to drink (Meza Cuero 2011).

***Populus fremontii* (Salicaceae)**

English: western cottonwood; Spanish: *alamo*. Kumeyaay variants include: *ja'a*, *jei'aa* (SCK; NEJ); *h'á* (Hinton 1975); *jalampuulaamp* (Hedges 1986) (see Figure 37).



Figure 37. *Populus fremonti*.

Common in waterways of the Kumeyaay region and in much of northwestern Mexico and the southwestern United States, cottonwood is a large, 12 to 20 meter deciduous tree with a broad crown that provides valuable shade in arid regions. An important Kumeyaay settlement—part of the indigenous community of Nejí—is named *Ja’a* for the many cottonwoods that grow there. Delfina Cuero lived in *Ja’a* and the great Kumeyaay leader Jatñil of the mishquish clan is said to be buried there (Gamble and Wilken-Robertson 2008).

Kumeyaay have used cottonwood for construction material, medicine and clothing, and also in food preparation. The long, straight branches are useful as frameworks for houses and ramadas (Castro et al. 2010; Hohenthal 2001); these were used in the construction of the traditional Kumeyaay house and ramada at the Tecate Community Museum in 2011. For a sprain or bruise, consultants recommended an infusion made from the leaves, which they used to soak the affected area. They also used just the heated leaves as a poultice to calm and relieve pain and swelling. (Castro et al. 2010; Hinton 1975). Native Baja Californians removed the soft inner bark from dead cottonwood trees to make women’s skirts. A few Ko’alh speaking artisans still make bark skirts in Santa Catarina, tying long strips of soft bark fiber with cordage made from desert agave (Alvarez de Williams 1993). Cottonwood makes good firewood, and consultants use the ash from the bark to mix with corn when making tortillas. (Castro et al. 2010).

***Prunus ilicifolia* (Rosaceae)**

English: holly-leaf cherry; Spanish: *islaya*. Kumeyaay variants include: *jkay* (LAH:TCR; NEH; SCK); *hcai*, *ajcai* (Cortés Rodríguez 1988); *hkay* (Hinton 1975); *hakay* (Hohenthal 2001); *etut* (Hedges 1986) (see Figure 38).



Figure 38. Teodora Cuero Robles harvests islaya fruits.

Holly-leaf cherry is a large evergreen shrub with glossy, dark green leaves, the toothed edges of which give it the look of holly. The plant belongs to the genus *Prunus* which includes important fruit-crops such as cherries, almonds, apricots, peaches, and plums (Roberts 1989); this native *Prunus* has likewise been economically significant for native peoples in all the areas where it grows—chaparral, woodlands, and desert transition habitats from northern California to the Sierra de la Giganta in Baja California Sur (Lightner 2011; Roberts 1989; Timbrook 2007).

Among the southern Diegueño, “wild plum” bushes were considered the property of specific clan groups (*shimul*) (Spier 1923). Spier’s Kumeyaay consultant Jim McCarty elaborated on this relationship special relationship between humans and plants: “the wild plum bushes near his house told him that someone had died. He was sitting nearby, when the bush came down and whispered to him. He had his back to it so that he did not see it. Bushes

were once people; that is why they talk. These plum bushes are his property; they are supposed to tell him” (Spier 1923:312).

Kumeyaay enjoy the sweet fruit of the wild plum or cherry, but the more important food is the inner kernel or seed, which must be carefully processed to remove the hydrocyanic acid that naturally occurs in the seed (Timbrook 2007). Some Kumeyaay consultants knew that the seed could be made into a mush but preferred not to prepare it because “it is a harsh food” (Hinton 1975:217) while others spoke enthusiastically of the mush as one of their favorite traditional foods. According to Jon Meza Cuero:

The mush is delicious and creamy, but if you’re not used to it, you get a headache. We would gather the fruit and eat it [the outer sweet flesh], then we would save the seeds. We dried it and it would last for years. When we were ready to make the mush, we would pound it and remove the seeds, one by one. Then we would grind it, leach it like you do acorns, put it into a pot with lukewarm water and boil it to make the mush. It can be eaten with honey or with salt, depending on how you like it. You can’t eat too much because it will give you a headache. [Meza Cuero 2011:2]

Fortunately for those who ate too much mush, the Kumeyaay made the leaves of *islaya* into an infusion to calm a headache (Cortés Rodríguez 1988). They also used them for a cough or an eyewash (Silva Espinoza and Melendrez Silva 2010).

***Quercus agrifolia* (Fagaceae)**

English: coast live oak; Spanish: *encino*. Kumeyaay variants include: *sñaw* (LAH; SJZ); *siñao* (SCK); *señao* (Cortés Rodríguez 1988); *‘esnyaaw* (Hedges 1986); *isnyau* (Spier 1923) (see Figure 39).

The majestic coast live oak grows 10–25 meters high, colonizing coastal valleys and foothills below 900 meters. Twisted, massive trunks and branches form broad crowns of dark green leaves that persist on the tree throughout the year. Coast live oaks produce large quantities of acorns (*sñaw n’uur*) most years; these are eagerly consumed by humans, birds, squirrels, insects, and other animals. Woodland forests of coast live oak have been a key component in the diversified hunting and gathering economies of Native Californians for thousands of years (Gallegos et al. 2002). Today each of the Kumeyaay communities is located in or near coast live oak woodlands, usually in association with areas of bedrock mortars. Some Kumeyaay still harvest and prepare acorns as a helpful supplement to their



Figure 39. *Quercus agrifolia* with milling feature.

diet, as a food that symbolically embodies their identity as Indians, and occasionally as a food sold to non-Indians at events.

Hicks questioned the reliability of acorns as a food crop, pointing out that every few years the acorns of *Quercus agrifolia* “either fail to form on the trees or rot on the trees before they are mature” (Hicks 1963:131); some of his Paipai consultants suggested that acorn crop failure occurs about once every three years. However consultants from Nejí interviewed for this study felt that although not every tree has acorns every year, when they do not produce in one area there might be many in another area. According to Norma Meza, “They say that when there aren’t any in Nejí, there are plenty in Plateros, and when there aren’t any in Plateros, there are plenty in Nejí. Each place has a different climate, although they are close to each other” (Meza Calles and Mata 2010:AR). Meza’s perceptive observations of variations in acorn production describes the irregular cycles of many species of oaks, which may produce abundantly in some years and hardly at all in others; furthermore different oak species may respond differently to environmental conditions, leading to distinct cycles of acorn production, and the possibility of generally having a crop from at least one of the species (Gamble 2005).

Some years the crop might be affected by wasps that cut off the acorns when they are still green, causing them to fall before they ripen. In the past, some Kumeyaay people believed that this was caused by the envy of others, by “bad vibrations” (Meza Calles and Mata 2010:AR).

In San José de la Zorra, a Kumeyaay village located under an oak woodland, Celia Silva Espinoza and her daughter Virginia Melendrez Silva make acorn mush every year as an addition to a diet that otherwise consists primarily of foods purchased in the nearby Guadalupe Valley. Their explanation of the gathering and preparation of acorn mush parallels that of other consultants, and is rich with detail. Doña Celia spoke in Kumeyaay and Virginia translated into Spanish. According to Doña Celia, in October the acorns are just getting ripe and gatherers hit them with a stick to make them fall down. In November the acorns come down more easily, and by December they are falling on their own. They must dry the acorns for about ten days in the sun and open air before storing them. Doña Virginia remembered how her grandmother Vicenta would make a granary frame with four larger branch posts in the corners and four smaller ones in between. She would put *carrizo* (reeds) down along the bottom, then she would use deerweed (*higuata* in Spanish) all around the sides to make the walls, tying it all together with willow shoots, similar to those used to weave willow baskets. If it rained, the water would pass right through, it didn’t affect the acorns. The granary would hold about 20 gunnysacks of acorns. They could dry the acorns and hold them in this manner before storing them away for a longer period of time (Melendrez Silva and Silva Espinoza 2010). Spier (1923) describes this type of granary among the Southern Diegueño, calling it a *sihumikwi’l*; Hohenthal (2001) also describes platform granaries called *sihumiki:l*.

Doña Celia explained that acorns should be well dried before they can pound them (*tutuu*) to open them. The Kumeyaay do this on a *jpi* or grinding rock, using a handstone to break open the acorns. Once they open them, they remove the shells, a process called *sñaw stakk*. They then further dry the kernels in the open air, which causes the fine reddish film around them to start peeling off. They must remove all of this film since it causes bitterness. They rub the kernels between their hands, a process called *shmol*, to loosen this paper-thin outer layer. Then they winnow them using a *sawil* (basket tray). Next they grind the cleaned acorn kernels (*sñaw kutu*) in a mortar (*jmuu*). Doña Celia points out that as they are ground in

the mortar, the grinder should not sweep the pieces back in with her fingers, she should only use a little broom made from a toyon branch to sweep the overspill back into the mortar, otherwise the water will not drain through the meal properly during the leaching process (Melendrez Silva and Silva Espinoza 2010). Today many Kumeyaay use a hand-cranked meat grinder or a blender to turn the cleaned acorns into meal.

Once they have ground the meal to an even, fine grain, they can leach it (*sñaw seiy*). They place the meal on a piece of fabric that drains easily but holds in the grains, preferably something like a fairly open-weave muslin cloth. They then pour lukewarm water through the mixture until the bitterness is removed. Cultural proscriptions call for only one person to be in charge of this process, otherwise it may turn out bitter. Others should not watch as the water is passed through the meal, since it comes out yellow, looking like urine, and this can cause embarrassment for the meal itself, leading to poor drainage and unsuccessful leaching. Doña Virginia mentioned that she sometimes saves this tannin-rich liquid for use in dying juncus (Melendrez Silva and Silva Espinoza 2010).

Once they leach the meal it acquires the consistency of a paste. They remove some of the paste using a *sha'uun*, a special stick made from palm, and add it to a pot of boiling water. Once it boils and thickens, the mush is ready to eat. The Kumeyaay especially enjoyed mush when eaten together with rabbit, venison or other meat. The prepared meal could be kept for several days if it was not eaten first (Melendrez Silva and Silva Espinoza 2010).

During the acorn season, the whole family would gather every day, working morning and evening to process acorns. Some would crack open the acorns and remove the kernels. Others would remove the paper-thin red skin from the outside of the kernel. Still others would grind the cleaned kernels in bedrock mortars, using manos that were hidden nearby (Cuero Robles 2010a). Teodora Cuero Robles recalls an ancient method of leaching used throughout the Californias:

Since they were gathering near a creek, there would be water nearby. In those days they didn't have cloth like we do today, so they would pile up a bunch of sand and make a hole in the middle, and there they would place the ground acorn meal. They would leach and leach and leach, and once they got the bitterness out they would put it into a pot, cleaning off all the residue first. They would make the mush right there. [Cuero Robles 2010a:VR]

This method was also described by Doña Teodora's great aunt Delfina Cuero (Shipek 1991:30–31).

The Kumeyaay gathered acorns intensely in November and December, and if there was a good harvest, the acorns might last for a year. But since it was such an important food and was eaten daily, it did not always last that long. Teodora Cuero Robles mentioned that some Kumeyaay toast and grind the acorns to make a drink like coffee (Cuero Robles 2010a).

The Kumeyaay used oak branches in house construction and the dried stems to make *cañuelas*, a traditional hand game (Cortés Rodríguez 1988). Consultants pointed out many practical uses for the bark of the oak. They use the red inner bark to clean the stomach, for sores and for injuries. They boil the fresh red inner bark to make a dye for fabric, giving it a brown or purplish brown color. They also use it to make a black dye for juncus, along with other ingredients (see *Juncus textilis*) (Melendrez Silva and Silva Espinoza 2010).

Quercus chrysolepis (Fagaceae)

English: canyon live oak; Spanish: *encino roble*. Kumeyaay variants include: *juil* (LAH:TCR); *juilh* (LAH:JAM); *ju'ilh* (SCK); *hw'illy* (Hinton 1975); *kwi'i:l* (Hohenthal 2001) (see Figure 40).

Canyon live oak is found in mixed forests of the mountain and desert transition areas of Alta and Baja California (Lightner 2011). In the Sierra Juárez it often grows in association with pinyon forests, where the acorns ripen in late summer, at approximately the same time as pine nuts. The sweet acorn is less bitter than the Live Oak acorn, so it can be eaten directly from the shell or made into a mush with only minimal leaching. Ko'alh speaker Teresa Castro notes that “the mush has oil in it, it is very tasty” (Castro et al. 2010:AR). Recently, access to traditional gathering areas has been limited as new owners of the land deny access and the impact of drug trafficking sets certain areas off limits. An important source of sweet acorns near Santa Catarina is now fenced off by a Mexican army detachment that has established a home base for ongoing patrols of the mountains. Local native people have been warned not to go near the area because it is used by the troops stationed there for target practice (Castro et al. 2010).



Figure 40. *Quercus chrysolepis*.

Consultants from Nejí only tasted sweet acorns as a novelty they occasionally encountered when they were young. Norma Meza recalls: “When we were kids, our uncle who was a cowboy up in the mountains would carry them in his pockets; he would give them to us like peanuts. We wondered if they would make a good mush, since they wouldn’t need a lot of leaching, but they don’t grow around here, he would bring it from far away” (Meza Calles and Mata 2010:AR).

Ko’alh speakers and other Paipai, as well as the Kumeyaay of La Huerta still gather Canyon Live Oak acorns, since these higher elevation communities retain stronger ties with the nearby mountain and desert vegetative resources. The Kumeyaay of Nejí, Necua, and San José de la Zorra may no longer be familiar with sweet acorns; however the consumption of bitter live oak acorns, in spite of its more complicated processing requirements, continues to be important in those communities.

***Quercus* spp. (Fagaceae)**

English: scrub oak; Spanish: *encinillo*. Kumeyaay variants include: *juap* (LAH; SJZ); *joap* (Cortés Rodríguez 1988); *jupsao* (SCK) (see Figure 41).



Figure 41. Quercus sp.

Scrub oaks come in a wide variety of shapes and sizes, growing up to five meters in coastal and foothill chaparral, often forming dense thickets (Lightner 2011; Roberts 1989). Scrub oaks may produce many acorns, but in the Kumeyaay region, as in most areas of the Californias, native people did not prefer them (Bean and Saubel 1987; Timbrook 2007). Norma Meza Calles explains: “The acorns could be made into mush, but it is not as appetizing as live oak acorns. Some years there are lots of *juap* acorns, but it is not a favorite. When there isn’t anything else, we eat it” (Meza Calles and Mata 2010:AR).

The Kumeyaay do favor the hard wood of scrub oak for firewood and construction material (Cortés Rodríguez 1988), fashioning it into all manner of tools, such as clubs and throwing sticks. Kumeyaay craftspeople cut the wood during the time of the full moon to ensure maximum strength. They heated the cut wood in a bed of coals to make it easier to bend, then shaped it by bending it around rocks (Aldama Machado et al. 2010a).

Scrub oaks often host gall wasps, resulting in the formation of golf ball-sized galls. The Kumeyaay squeezed the liquid from a freshly cut gall and applied it directly on sores. Children also made the galls into toys. Celia Silva Espinoza remembered fashioning the oak galls into toy cows when she was a child: “We didn’t have any toys, so we made them out of these [oak galls] by adding legs, head and horns” (Melendrez Silva and Silva Espinoza 2010:AR).

Rhamnus crocea or ilicifolia (Rhamnaceae)

English: spiny or holly-leaf redberry; Spanish: *yerba del oso*. Kumeyaay: *jtut* (BNR; SJZ; NEJ) (see Figure 42).



Figure 42. Rhamnus crocea.

Redberry is an evergreen shrub common in chaparral and woodlands with tooth-edged leaves and shiny red, edible berries (Roberts 1989). Consultants from Nejí found the whole subject of *jtut* to be quite hilarious, and Kumeyaay Norma Meza eventually told this story:

Long ago when people would move from place to place, there was a young girl who lived with her parents. One day when she was out walking by herself, she ran into a very, very old man and she became his girlfriend. When she became pregnant, her parents asked her how it could have happened if there were no men around, and she told them that it was because she had eaten too many of those *jtut* (redberries). Of course it was because of the old man, but her parents believed her. That's why they used to tell us not to eat it or we might get pregnant. So we never ate it or used it for medicine or anything. We would even avoid walking close to it. [Meza Calles et al. 2010:AR]

Several Kumeyaay elders mentioned that when the fruit is ripe it may be eaten, but the mockingbird (*shawilawa*) also likes to eat these, especially when it has babies (Melendrez Silva and Silva Espinoza 2010). Delfina Cuero also mentioned the berries as good food for a pet mockingbird (Shipek 1991).

***Rhus ovata* (Anacardiaceae)**

English: sugar bush; Spanish: *mangle*. Kumeyaay variants include: *jualh* (LAH:TCR;NEJ); *juatlh* (SCK); *juaalh sii'*; *juaalh nyak* (BNR); *joalj* (Cortés Rodríguez 1988) (see Figure 43).



Figure 43. *Rhus ovata*.

Sugar bush is an evergreen shrub that forms rounded mounds of shiny, yellow-green leaves, its vibrant color standing out in the dry chaparral of summer. Hardier than its relative laurel sumac, sugar bush grows throughout much of the Kumeyaay region up to 1500 meters. In the fall, it produces sticky red fruits covered with a sweet sugary coating that gives the plant its name (Lightner 2011; Roberts 1989).

The Kumeyaay have used sugar bush for food, medicine, firewood and construction material. Like other native peoples of southern California and northern Baja California, the Kumeyaay ate the berries (Bean and Saubel 1987; Cortés Rodríguez 1988; Timbrook 2007). Some methods involved cooking the seeds; according to Celia Silva Espinoza: “We eat the fruit when it is ripe. We toast it, grind it and eat it like pinole. The seeds ripen in the fall, it gets very red” (Melendrez Silva and Silva Espinoza 2010:AR). Others make it into a tangy drink. Aurora Meza Calles explains: “A kind of sugar forms on the fruits. People would shake it off and eat it; they would make it into a drink. It has a sweet and sour taste” (Meza Calles and Meza Calles 2011:VR).

The plant can also be used medicinally, and like laurel sumac, it has a strong effect on women's reproductive systems. Jon Meza Cuero explains:

This is a medicine that women use to help them give birth quickly. When a woman goes into labor, they give her this; it works like an anesthetic, so they don't feel the pain. You cut the leaves and the stems and make a tea, it should be made fairly strong. It can also be helpful for animals. There are many herbs that are good for people that can also be good for animals. [Meza Cuero 2011:6]

Consultants often mention the veterinary uses of native plants, particularly in relation to colic (*empacho* in Spanish) and for problems related to giving birth (Meza Calles and Meza Calles 2011; Meza Cuero 2011; Melendrez Silva and Silva Espinoza 2010). For these purposes, the Kumeyaay make an infusion from the leaves and give it to the animal to drink.

Salix sp. (Salicaceae)

English: willow; Spanish: *sauce*. Kumeyaay variants include: *ayau* (LAH:TCR; SCK, SJZ); *a'yao* (BNR, LAH:JAM); *'aiyau* (Spier 1923); *ahiyao* (Hohenthal 2001) (see Figure 44).

In most of Baja California's arroyos, willow trees commonly occupy center stage, growing directly in streambeds or close enough that their roots can take advantage of surface or subsurface waters. Seven willow species grow in Baja California, they are deciduous shrubs and trees from 5 to 20 meters tall (Lightner 2011; Roberts 1989) that the Kumeyaay have used for construction and basketry material, medicine, food, and clothing. Kumeyaay refer to most willows generically as *ayau* except for the arroyo willow, a shrubbier plant with gray-green leaves called *jalasí* in Kumeyaay. This description refers to those varieties known as *ayau* unless otherwise indicated.

Kumeyaay employ willow branches as material for the construction of houses and ramadas, and in the manufacture of bows and cradleboards (Castro et al. 2010; Campbell 1999; Hohenthal 2001). In prehistoric times, the Kumeyaay probably built dome-shaped homes made from willow or whatever local materials were available in the different ecosystems through which they moved as they hunted, gathered, and fished (Hohenthal 2001). During the historical period, the Kumeyaay began to build rectangular houses and often made frames from willow or cottonwood (*Populus fremontii*) branches. They made walls from leafy branches of willow, mulefat (*Baccharis salicifolia*), arrowweed (*Pluchea*



Figure 44. *Salix* sp.

sericia), and deerweed (*Acmispon* spp.), sometimes binding these with strips of Mohave yucca leaf (*Yucca schidigera*), and thatching with tule (*Schoenoplectus* spp.), cat-tails (*Typha* sp.), or nolina (*Nolina* sp.) (Campbell 1999; Hohenthal 2001). Jon Meza Cuero remembers using willow to build houses as a boy: “We use willow for traditional houses and ramadas; we cut it during the full moon so that it will last a long time. I made willow houses at Los Coches with Cristóbal Regino. Sometimes they would put mud on them, so they would last longer. There used to be people who knew how to plaster with mud and it looked beautiful (Meza Cuero 2011:1).

Some Kumeyaay still use dry willow bark (along with cottonwood (*Populus fremontii*), elderberry (*Sambucus nigra*), juniper (*Juniperus californica*) and other plants to make traditional skirts, and the willow leaves and flexible shoots to make willow granaries

(*chiquin*). Based on fieldwork with Southern Diegueño near Campo, California, (just north of the U.S.–Mexican border), Spier (1923) described the making of a willow granary basket (or *cikwi'n* as he wrote the Kumeyaay word) that resembled a huge bird's nest. Spier mentioned that the Southern Diegueño usually made the basket from “*halasí*” willow (arroyo willow or *jalasí*), using the green leafy twigs to form the coils. Hedges (1986) also noted the use of arroyo willow for the construction of acorn storage baskets in the Diegueño reservation of Santa Ysabel. Contemporary artisans of San José de la Zorra (and more recently San Antonio Necua) use both *a'yau* and *jalasí* to make granary baskets, usually much smaller than the originals, as art objects for sale to tourists and collectors. Consultants from San José de la Zorra explained that the manufacture of willow granary baskets was a fairly recent tradition brought by Rosa Mata of Nejí, who often visited after one of her grandsons married into the community about thirty years ago (Melendrez Silva and Silva Espinoza 2010).

Whether the granary basket represents the introduction of a tradition more representative of indigenous culture from farther north, or the revival of a local tradition that had been lost, is unclear. Kumeyaay basketweaver Gloria Castañeda Silva claimed to have seen an ancient willow basket granary that “turned into dust when we touched it” in a cave not far from the community (Castañeda Silva, personal communication). Teodora Cuero Robles also recalls seeing willow granaries in her community (La Huerta) that were used to store dried acorns. “It could rain and thunder, but the acorns stayed dry in there” (2010a:VR). Perhaps future research will uncover additional evidence to better understand the evolution and distribution of basketry technology in the Kumeyaay region.

Kumeyaay use willow to treat headaches and other body pains (Meza Cuero 2011). The name of salicylic acid, an active ingredient in aspirin, originates from the Latin root *salic* meaning “willow” (Costello 1991:1185) since the compound was first isolated from a willow species (Bean and Saubel 1987). Jon Meza Cuero remembers using it as a child: “It's good for headaches. You take the green bark (the outside layer) and make a tea by boiling it until it turns the color of cinnamon tea. When I was a kid my grandmother used to give it to me” (Meza Cuero 2011:1).

Willow flower clusters, also known as catkins (Roberts 1989), can be cooked and eaten. They have a honey-like, though slightly bitter flavor (Melendrez Silva and Silva Espinoza 2010).

***Salvia apiana* (Lamiaceae)**

English: white sage; Spanish: salvia blanca, salvia orejona. Kumeyaay variants include: *lhtaay* (LAH; BNR); *shiltay*, *shlhtay* (SCK); *pilhhtaiy* (NEJ); *jtai*, *shljtai* (Cortés Rodríguez 1988); *lltáy* (Hinton 1975); *pellytaay* (Hedges 1986) (see Figure 45).



Figure 45. *Salvia apiana*.

Whorls of ashen blue-green leaves and a pungent herbal aroma make white sage stand out in scrub and chaparral landscapes of Baja and Alta California. This shrub of the Mint family produces tall inflorescences in spring with many tiny, oily seeds that were once commonly eaten raw, toasted, or ground into a *pinole* meal by Native Californians in the areas where the plant grows (Hedges 1986; Lightfoot and Parrish 2009; Owen and Michelsen 1994; Spier 1923). When the flower stalks first start to rise, the Kumeyaay peeled them and ate them fresh (Hedges 1986; Meza Calles and Meza Calles 2011; Meza Cuero 2011).

Kumeyaay use white sage medicinally to treat respiratory problems and rheumatism. To relieve nasal congestion, consultants reported that the fresh leaves can be held close to the nose and smelled. For colds, coughs, and reducing phlegm, they would make the leaves or roots into an infusion, sometimes in combination with other herbs such as yerba santa, and take them as needed (Cano Bracamontes 1990; Cortés Rodríguez 1988; Hedges 1986; Hinton 1975). The infusion is used as a tonic for the blood (Hedges 1986), to induce sleep (Meza Calles and Meza Calles 2011), and for reducing rheumatism or body pains (Cortés Rodríguez

1988; Meza Cuero 2011), in which case the infusion may also be rubbed directly on the affected area.

Jon Meza Cuero notes that the flowers can be smoked, which he did when he was young. Gloria Castañeda Silva also remembers smoking sage flowers with her brothers and sisters as a child, because “they had heard that the adults used to do it” (Cortés Rodríguez 1988:46). She said that it just made them feel seasick.

White sage and other herbs play an important role in ritual purification and healing. Waterman (1910) described a girls’ coming of age ceremony in which a thick bed of white sage and other herbs was placed on top of hot rocks to create a fragrant steam. The girls lie on the herbs, and more sage and a rabbit-skin blanket are put on top of them; this process continues for several days. Jon Meza Cuero recalls a similar healing process with white sage:

The healers in the past would cure with this herb. They had a special place where they would lay down the sick person. They would heat up the rock, then put a bed of sage branches and have the person lie there. They would also rub a salve made from sage and lard on the body. They cover them up and leave them there until the next day, then they come out healed. It opens all of the pores and the herb sucks out the infection. [Meza Cuero 2011: 2–3]

Today many Kumeyaay continue to use the herb for ritual purification. Sage leaves may be burned to cleanse or bless places, people, objects, or events. They often burn bundles of dried sage leaves in contemporary ceremonial contexts, such as the opening of a community gathering, and many artisans offer them along with their wares. Some consultants recommended putting a fresh sprig under the pillow to enhance sleep and reduce nightmares (Meza Calles and Meza Calles 2011) or after the death of a relative to keep away bad spirits (Cortés Rodríguez 1988).

Salvia Carduacea (Lamiaceae)

English: thistle chia; Spanish: chia. Kumeyaay variants include: *mulh’amulh* (Hedges 1986); *pshilhtay* (LAH) (see Figure 46).

Thistle sage, with its showy lavender blossoms often occurring in clusters or growing in masses on sandy flats, especially after fires, is more conspicuous than the smaller and more discrete “true” chia, *Salvia colombariae*. However of these two types of chia used by the Kumeyaay, thistle chia was not the preferred variety (Cuero Robles and Aldama Cuero



Figure 46. *Salvia carduacea*.

2010:VR). The same was true among other native Californians (Bean and Saubel 1987; Timbrook 2007). Gathering and preparation is the same as *Salvia colombariae*.

***Salvia colombariae* (Lamiaceae)**

English: chia; Spanish: chia. Kumeyaay variants include: *pshilh* (LAH:TCR) *pshilh* (Cortés Rodríguez 1988); *mulh'amulh* (Hedges 1986) *awol* (Hohenthal 2001) (see Figure 47).

Chia grows in scrub and chaparral from the central Baja California deserts through the southwestern United States and Sonora (Roberts 1989). Native peoples of the Californias greatly valued the small but highly nutritious seed, collecting it in late spring or early summer, using seed beaters and baskets (Bean and Saubel 1987; Hedges 1986; Hicks 1963; Lightfoot and Parish 2009; Timbrook 2007). Native Californians were aware that chia responds well to fire and they regularly burned areas to encourage the greater growth of the plant (Anderson 2005; Bean and Saubel 1987).

The Kumeyaay would eat the seeds raw and they were especially useful when traveling, as a small amount could be carried to provide sustenance on the journey (Hedges 1986). Native Californians also parched, ground, and mixed the seed with water (Hicks 1963;



Figure 47. *Salvia columbariae*.

Owen and Michelsen 1994; Timbrook 2007). Teodora Cuero Robles often gathered chia seed when she was younger; she vividly describes the details:

This plant is often found in areas that have burned. The seeds mature and can be gathered in May. One gathers early in the morning. The plants are collected and put onto something like a tarp, where they can be beaten so that the seeds fall out. Then the seeds can be separated from the chaff and winnowed to further clean them. They are toasted in a pan or piece of a clay pot with a very smooth surface, ground and made into a drink with honey, whisking it to make it foamy. In the old days people would use cloth flour sacks to collect the seeds. The seeds are also considered good medicine for cleaning out the stomach and intestines. [Cuero Robles and Aldama Cuero 2010:VR]

Doña Teodora sometimes prepares this drink at home or for special events. In recent years she has found it easier to use a store-bought cultivated variety chia that is widely available in Mexico.

Sambucus nigra (formerly *Sambucus mexicana*)
(**Adoxaceae**)

English: blue elderberry; Spanish: *sauco*. Kumeyaay variants include: *jp'elh* (BNR; LAH:TCR); *kop'eelh* (SJZ); *kuup'alh* (SCK); *kapalj* (Cano Bracamontes 1990); *copelj*, *kpalj* (Cortés Rodríguez 1988); *kupall* (Hedges 1986) (see Figure 48).



Figure 48. *Sambucus nigra*.

Elderberry is a deciduous tree three to ten meters tall that occurs along streams and drainages from coast to mountains below 1800 meters. Cream-colored flowers in flat-topped clusters appear from April through October, followed by blue, purple, or whitish berries. Elderberry is a favorite medicinal plant for many of the Kumeyaay consultants, and not surprisingly, *Sambucus spp.* remains have been recovered from archaeological sites throughout California (Lightfoot and Parrish 2009). In San Diego County, archaeologists have noted the presence of elderberry at ancient village sites in areas outside of their normal range, suggesting that Kumeyaay might have planted or transplanted them (Carrico 2008), or inadvertently transported the seeds to their habitation areas.

The Kumeyaay gather elderberry flowers (*tekpe'eelh*) and hang them up to dry for later use as a medicine to treat colds, coughs, and flu. Many consultants recommend the

infusion to cut a fever, particularly for children. They sometimes mix white sage with it to make it more effective (Melendrez Silva and Silva Espinoza 2010).

Consultants noted that the fresh leaves serve as a laxative; this may also be administered to animals (Meza Cuero 2011). For swollen feet, Ko'alh consultants recommended soaking them in an infusion of elderberry leaves; they also apply the cooked leaves as a compress (Castro Albáñez et al. 2010). Researchers have also reported these uses among other California Indian groups (Bean and Saubel 1987; Lightfoot and Parrish 2009; Timbrook 2007).

The Kumeyaay eat the fruits when ripe or make it into a drink. There are two varieties, one with a white fruit (*kup'eelh umshaap*) and one with a purple fruit (*kup'eelh ñir*) (Melendrez Silva and Silva Espinoza 2010). Jon Meza Cuero describes some of the ways that the drink can be prepared:

The fruit is very tasty, you can make a good wine from it. When it is ripe in summer and the fruit turns dark, you pick it, grind it up and put it into a clay pot, leaving it to ferment for about eight or ten days, depending on how strong you want it. You can also make a fruit drink from it; you add honey. Some people might get diarrhea from it if they're not used to it. It's good for the young people to learn about these things, but they have to test it. That's how the people in the past tested things out long ago, that's how they learned. [Meza Cuero 2011:1]

Native peoples of southern California often dried the berries to store for later use (Bean and Saubel 1987; Timbrook 2007). Today many consultants still use elderberry flowers for medicine but no longer use the fruit. According to Tirsá Flores Castro, “We don't make the drink anymore, we all drink sodas” (Castro Albáñez et al. 2010:AR).

***Simmondsia chinensis* (Simmondsiaceae)**

English: jojoba; Spanish: *jojoba*. Kumeyaay variants include: *kshuu* (LAH:TCR); *kushu* (Hohenthal 2001) *x.chiu* (Cano Bracamontes 1990) (see Figure 49).

Jojoba is an evergreen shrub that grows in arid desert lands below 1500 meters, ranging from the southwestern United States and Sonora through the Baja California peninsula. The sole species in the Jojoba family, it is a familiar part of Kumeyaay landscapes from the coast to the desert, where its leathery, grey-green leaves often turn to a bright orange during times of drought stress. Female plants produce a seed that contains an oily substance that is actually an indigestible liquid wax (Felger and Moser 1991).



Figure 49. *Simmondsia chinensis*.

Historical and ethnographic literature describes native peoples using the seed for both food and medicinal properties (Aschmann 1959; Barco 1973; Clavigero 1937; Hicks 1963). Jojoba seeds may be edible, tasty and widely available, but as a food they may also lead to digestive complications, and possibly the expenditure of more calories than they provide, a curious paradox that has led to a number of contradictory references regarding the use of jojoba as a food.

Barco's 18th century report based on thirty years of living in Baja California dedicates a significant amount of space (compared to other plants) to jojoba, most of it describing the plant's medicinal properties. He clearly states that, "The [Native] Californians, in their heathen state, did not utilize jojoba in any way. Not for medicine, because they were unfamiliar with its virtues, nor for food...." (Barco 1973:97). He discusses the native peoples' aversion to eating the nut, because they believed it caused vomiting, which they equated with a loss of sustenance and fatal disease. Barco mentions that the oil pressed from the seeds is quite tasty and sometimes was used on salads when olive oil was not available. "However," he continues, "a very peculiar thing has been observed, and it is that, without having been digested by the stomach, it is passed out through the bowels just as it was received" (Barco 1973:98). Barco further reports that this phenomenon was verified by soldiers accompanying Jesuit Father Fernando Consag on one of his expeditions when they

only had jojoba oil to cook their fish. They soon found that their clothes were soiled with the oil, which to their surprise slipped out when they were unaware of it (Barco 1973).

In spite of Barco's denial of jojoba having been a food of Native Baja Californians, Aschmann (1959: 90) asserts that "The eating of seeds, both raw and toasted, is regularly reported in the mission sources" citing chroniclers who had never been to the peninsula; but he then continues: "...and their medicinal value is emphasized." He points out that the indigestible liquid wax they contain could act as purgative when taken in quantities (1959:90). Ethnographic reports often imply, vaguely, that people in the past or from another place ate jojoba (offering very few details) but that currently, no one does. Meigs, in his ethnography on the Kiliwa, left a telling question mark in his description of jojoba: "Small bush. Oily seed eaten as pinole (?). Ripens irregularly all year" (1939:9). Owen and Michelsen noted that jojoba "is eaten by Indians to the north of Santa Catarina but it seems to be ignored by Catarinense" (Owen and Michelsen 1994:6–40). Kumeyaay María Emes Boronda of San Antonio Necua told a biologist that "no one uses it today, but in the past the seed was eaten" (Cano Bracamontes 1990:28). No mention of the plant as food is made in Spier (1923), Hohenthal (2001), Cortés Rodríguez (1988), or Hedges (1986). Among the Seri of Sonora, jojoba is considered an emergency food: "it doesn't hurt you, but it isn't really food" (Felger and Moser 1991:365).

In contrast, references by native peoples to Jojoba's medicinal uses agree in many ways. Barco lists ten "Virtues of Jojoba" that were published in 1749 in Mexico City with the approval of the Court of Royal Physicians; these include the use of jojoba as a dressing on wounds, and as an aid in childbirth. The Kumeyaay and Paipai roasted jojoba nuts and applied the exudated oil to heal stubborn sores (Cortés Rodríguez 1994; Hohenthal 2001). Teodora Cuero Robles describes other ways to use the jojoba nuts:

The seed was gathered when it ripens in August and roasted until black, then squeezed in a cloth until oil came out. This oil was good for the hair and helped it stay black. The seeds were also good medicine for pregnant women when they had problems with placenta after giving birth. Eating three seeds would help expel the placenta. [Cuero Robles and Aldama Cuero 2010:VR]

The Seri Indians also toasted and ground jojoba nuts to treat sores. They rubbed ground jojoba seeds into the scalp to encourage luxuriant growth of the hair (Felger and Moser 1991).

Washingtonia filifera (Arecaceae)

English: California fan palm; Spanish: *palma*. Kumeyaay variants include: *muy kasira* (LAH:TCR); ja'wal (SCK) (see Figure 50).



Figure 50. Washingtonia filifera.
Image given to author by Rose
Ramírez.

California fan palms populate desert canyons with consistent streams or seeps from Bahía de Los Angeles north to the deserts of southern California and Arizona (Roberts 1989). In the Kumeyaay region, the stately palms grow along the eastern escarpment of the Sierra Juárez, forming oases, sometimes in association with *Brahea armata*. The stout-trunked palm may live for 200 years and grow up to 25 meters high, with a crown of large fan-shaped leaves above and a thick shag of dried leaves below. Fruit stalks extend up to 6 meters with clusters of small dates hanging down beyond the leaf crown (Lightner 2011; Roberts 1989).

Washingtonia filifera seeds are gathered from late summer to early autumn, consumed immediately or dried and stored for later use. Trees may have over a dozen fruit clusters, each of which might weigh 5 to 20 pounds (Bean and Saubel 1987). Teodora Cuero

Robles recalls the preparation of the seeds: “The palm with the small fruits we call *muy kasira*. You don’t cook it, you just eat it as is. You put it in the metate and break it up, just to get the seeds out, then you mix the outer covering with water, you strain it and you have a refreshing drink. I also used to drink it when I was a little girl, it’s sweet and delicious” (Cuero Robles 2010b:VR).

The Paipai also prepared the dates as a drink. They used the dry flower stalk of *Yucca whipplei*, to which they attached a wooden hook, to harvest the clusters of fruit (Owen and Michelsen 1994).

From the Cochimí territory of central Baja California to the Cahuilla territory of Palm Springs, California, native peoples used palm leaves and stems for walls or thatching for homes and ramadas (Aschmann 1959). At San José de la Zorra, a village relatively close to the Pacific coast and far from the stands of native palms, Kumeyaay elder Celia Silva Espinoza described a special stirring stick for acorn mush made from a palm stem (Melendrez Silva and Silva Espinoza 2010).

***Yucca schidigera* (Agavaceae)**

English: Mohave yucca, Spanish dagger or Spanish bayonet; Spanish: *palmilla*, *dátil*. Kumeyaay variants include: *sha’aa* (LH); *sha*, *shaa* (SCK; BNR); *sa’a* (Spier 1923) (see Figure 51).



Figure 51. *Yucca schidigera*.

Mohave yucca forms jagged clusters of tough, dagger-like leaves on woody trunks one to five meters tall. Cream-colored flowers with a purple tinge appear at the tips of leafy branches in late spring, forming oblong, fleshy, light green seed capsules in summer. Mohave yucca occurs below 1500 meters on dry slopes, in desert washes and in coastal scrub from northern Baja California through southern California, Nevada, and Arizona (Lightner 2011; Roberts 1989).

Kumeyaay and neighboring indigenous peoples have used this multipurpose plant for food, fiber, and soap. The Kiliwa gathered the “highly prized, sweet, date-like fruit” (Meigs 1939:25) in July, using a hooked stick to gather the large clusters of fruit where it grew high over the spiky leaves. The seedpods may be prepared in a variety of ways, but because they are “somewhat puckery to the taste” (Bean and Saubel 1987:151) some sort of heat treatment or post-harvest ripening process is usually carried out. Among the Cahuilla they were roasted directly on coals (Bean and Saubel 1987). The Paipai cut the seed pods open and spread them out to dry; these were then boiled in a clay pot, dried again, ground on a metate, and rehydrated for eating. They also placed them in a brush-covered pit where they were allowed to ripen for about three days, then removed and dried in the sun for another day before slicing them open. The pods could be sun-dried and stored for long periods (Hicks 1963). Ko’alh speaker Teresa Castro Albañez still prepares a sweet drink from the seedpods for her family (Campbell 1999).

The yucca trunk contains saponins that native peoples of Baja and Alta California have used to make soap. The Kumeyaay especially like to use it for washing their hair and clothes (Campbell 1999). According to Don Jon: “My grandmother used this to wash my clothes. You have to pound it first, then put it in a clay pot with some water and leave it for a while. It’s like liquid soap, very strong. My grandmother would wash on a rock by the water” (Meza Cuero 2011:4).

When lashings were needed for a house, ramada, or other structure, Kumeyaay tore the tough yucca leaves into strips and used them as bindings (Campbell 1999; Hohenthal 2001; Spier 1923). The Kumeyaay extracted fibers from the leaves by roasting them in a pit; these can be twisted into cordage to make strong nets, bowstrings, and other items, although Spier (1923) asserted that the Kumeyaay used only agave for this purpose. The dried trunks contain a fibrous material that can be made into sandals (Campbell 1999). The Paipai and

Ko'alh speaking potters of Santa Catarina prefer these trunks for firing pottery (Wilken-Robertson 1987).

The harvest of yucca trunks has gained new economic importance for the Kumeyaay, Paipai, and Kiliwa Indians over the last two decades, due to demand for the natural saponins and other substances that can be extracted from them. If properly managed, the harvest of these non-timber forest resources can provide a sustainable source of income for native peoples of the region (Wilken 2004c).

CHAPTER 8

DISCUSSION

How can Kumeyaay ethnobotanical knowledge collected in the 21st century make new contributions to an understanding of diachronic human–plant interactions in the study area? By situating the ethnographic data in the context of previous archaeological, historical, ethnographic, and linguistic studies, patterns emerge to suggest that contemporary Kumeyaay knowledge of plant usage clearly links the Kumeyaay to prehistoric, historical, and present cultural processes, both regionally and extra-regionally. But how does this demonstrate new contributions?

One way this has been shown is through the confirmation of wider patterns of plant use reported by ethnographers in other areas of the Californias with similar vegetation. This reiterates some of the ways the Kumeyaay share in regional cultural patterns that cross major linguistic boundaries (e.g. the Cahuilla and other Uto-Aztecan languages of southern California) (Campbell 1999; Golla 2007). For example, the Cahuilla report uses of agave, mulefat, Indian tea, chaparral yucca, juniper, pinyon, and palms (Bean and Saubel 1987) that match those of the Kumeyaay. Among the Chumash, the magical uses of yerba mansa differ from those of the Kumeyaay, but suggest that the plant may have been associated with magical as well as practical medicinal uses throughout the Californias. The Chumash also used acorns, chaparral yucca, juniper berries, sage, and toyon in ways very similar to those described by the Kumeyaay, and in some cases have similar plant taxonomies (Timbrook 2007). Ethnographic materials collected among the Santa Ysabel Diegueño in 1966 showed many comparable uses to those south of the border. However, in some cases significant additional material was recorded among Baja California's Kumeyaay 45 years later. The gathering of what were probably army worms from chaparral ash for food, as remembered by elder Celia Silva Espinoza, confirms ethnographically that the Kumeyaay made good use of entomological resources in a way that is documented for groups of Alta California (Barrett 1936; Sutton 1988) and further south in the peninsula (Barco 1973; Clavigero 1937). Thus, results confirm that many human–plant interactions described by contemporary Kumeyaay

cultural consultants fit into wider regional patterns of indigenous plant use and conceptualization.

Another pattern is the Kumeyaay remembrance or continued use of specific native plants that suggest some continuity with prehistoric plant uses documented in the archaeological record of the Kumeyaay region (Rogers 1945; Warren 1968). The ongoing importance of acorns and the physical proximity of today's Kumeyaay communities to coastal live oak woodlands link the Kumeyaay with intensive use of the resource, possibly as far back as the Middle Holocene (Gallegos et al. 2002). The continued gathering, processing and consumption of other seeds such as sage, chia, manzanita, palm, juniper, prickly pear, pine nuts, holly-leaf cherry, laurel sumac, and sugar bush, as well the use of chaparral yucca stalks, Mohave yucca pods, and elderberry fruits for food, and the use of agave leaves for fiber suggest continuity from prehistoric subsistence patterns (Lightfoot and Parish 2009) that have also been observed historically (Crespí 2001; Wagner 1929) and ethnographically (Hohenthal 2001; Owen and Michelsen 1994).

Certain plants that were used prehistorically or historically have completely fallen from use. Desert agave is only used regularly by some Ko'alh speakers who live in the high desert areas where the plant grows, and although some of the other Kumeyaay consultants remembered indigenous names for desert and coastal agave varieties, none have continued to use the plant into the present. This clearly contrasts with archaeological evidence and historical documents, which emphasize the importance of both types of agave for native peoples of the region. I suggest several possible explanations for this: agave may never have been as important for the ancestors of the surviving Kumeyaay communities as it was for other Native Baja Californians; lack of ready access for over a century may have led to the loss of knowledge about agave; and the substitution of modern foods and fibers may have erased the knowledge of agave use. The last two points may reflect a trend seen throughout the interviews with the Kumeyaay: consultants generally interacted with, and knew most about the plants growing in their immediate region, and in particular those plants that continue to have economic or symbolic value for them, but knew little or nothing about those growing outside of their region. In spite of this limitation, with the accumulated knowledge of all the Kumeyaay consultants, information was provided about all of the major land-use areas of Kumeyaay territory because the physical location of today's communities comprises

a variety of ecosystems, including coastal scrub (San José de la Zorra); scrub and chaparral (San Antonio Necua and Nejí); upland chaparral (La Huerta); upland chaparral, forest and desert transition (Santa Catarina); and riparian woodland habitat (all of the communities). Knowledge of coastal vegetation and desert vegetation was generally limited, but some elders still had some memory of previous indigenous usage in both areas.

Some of the plant uses and stories recorded for this study have not been reported outside the region and provide new or more detailed information about the interactions between plants and people, in particular their social and symbolic meanings. For example, the social significance of the pine nut harvest transcends the economic importance of the resource. For elders like Teodora Cuero, the Sierra pinyon groves and associated features such as the Cave of the River People are cultural landscapes that continue to reinforce her indigenous identity, as they are replete with memories of singing, dancing, and gathering with friends and relations from the desert region outside of Kumeyaay territory (Wilken 2008b). Consultants mentioned various ways of managing resources, such as the use of only the north-growing roots of wild buckwheat; using only the stalk of the chaparral yucca rather than the whole plant to ensure ongoing production; and the use of prescribed burns to manipulate the environment. Stories of plants involve cultural proscriptions that suggest the ideational importance of plants and places. Redberries are edible but should be avoided by girls; a haunted hill full of chaparral yucca is off limits to gatherers; toyon berries should be collected in silence; and certain plants should only be harvested around the time of the full moon, to ensure their strength. Certain people were recognized for their “sweet hand” when preparing chaparral yucca stalks; others were specialists “like blacksmiths” who knew how to harden wood point in the coals. All of these ideas suggest a culture in which the physical and symbolic qualities of plants and associated landscapes inherited from centuries of environmental interactions informed behavior and belief systems, as evidenced in oral tradition referring to plants as being like people, walking, talking, and providing for the Kumeyaay.

How do the linguistic data generated in this research contribute to an understanding of human–plant interactions? Indigenous plant names can be analyzed in a variety of ways that may be useful to researchers (Martin 1995). The names themselves may describe the appearance or a quality of the plant, e.g. “earth eyes” or “foot bones.” Sometimes parts of the

name tell about what category a plant belongs to, such as *iiy*, which means “branch” or “wood” and usually refers to larger plants, while *samalh* refers to herbaceous plants. The plant names documented for this study also demonstrate both differences and similarities: differences between distinct dialects of Kumeyaay that exist in the region, and similarities within the overall region. Most of the differences are minor. For example a glottal stop might be dropped or a vowel might change from “o” to “u,” however it is usually possible to detect a cognate that applies in most cases (Martin 1995). In a few cases completely different words exist from one community to the next, e.g. Yerba Santa: *samalh jlhuy* (LAH); *samalh jpilh* (SJZ; SCK); *muka jepilh* (NEH) *pja.a* (Cano Bracamontes 1990); *kujuá* (Cortés Rodríguez 1988); *sa’máll llupnúup* (Hinton 1975). This linguistic diversity might reflect different ways of describing or classifying distinct species or subspecies, of which there are several in the region; it could result from misidentification of a plant; or it could signal Kumeyaay dialect diversity.

Many Kumeyaay plant names from Baja California are similar to those recorded for the Diegueño of Santa Ysabel in Alta California; although in some cases only Nejí, the northernmost Kumeyaay community, has a similar plant name as Santa Ysabel. Most of the Ko’alh plant names are identical or nearly the same as those from some of the Kumeyaay dialects, suggesting the close relationship of these language varieties. These data will be useful for future linguistic research since they can be used to help determine the relationships between the different Kumeyaay dialects, as well as to make comparisons with plant names from other parts of the Yuman region in order to analyze the historical relationships between Kumeyaay and other Yuman languages and the peoples.

Although the Kumeyaay may have lost much of the most detailed, nuanced knowledge of the environment as indigenous lifeways have been curtailed over the last two centuries, nonetheless much traditional environmental knowledge remains. For plants such as prickly pear, Kumeyaay folk taxonomies recognize greater species diversity than current scientific knowledge (Lightner 2011; Roberts 1989). Owen and Michelsen (1994) noted that their Paipai and Ko’alh consultants could identify over 20 different varieties, although they questioned whether they were distinct species or simply morphological variations based on environmental factors. Further consultation with Kumeyaay consultants could greatly enrich anthropological and biological studies of the region.

CHAPTER 9

APPLICATIONS

In this section I will explore how materials resulting from the research presented in this thesis have been applied in ways that support Kumeyaay efforts aimed at cultural and linguistic revitalization in the northern Baja California region. I will consider how applied anthropology and applied ethnobotany can serve to encourage indigenous heritage development, and I will present, as examples, some of the products I created in collaboration with Kumeyaay community members.

I have proposed that the ethnographic and bibliographic information that has been assembled and synthesized for the present study contributes new materials for future research on native peoples and plants in the region, but how can this information be applied to benefit the people studied? Applied anthropology seeks to use “anthropological knowledge, methodology, and theoretical approaches to address societal problems and issues” (Kedia and van Willigen 2005:1). It creates anthropology in use through pragmatic engagement to address social problems and the cultural structures through which they are produced and maintained (Rylko-Bauer et al. 2006). The tension between theory-generating academic anthropology and practicing applied anthropology has led to the development of the concept of *praxis*, involving a constant feedback between theory and practice, and in which engagement in social processes may lead to the empowerment of people with whom anthropologists work (Ervin 2005; McDonald 2002).

Applied ethnobotany uses the knowledge, methods, and theory developed through the discipline to benefit local peoples and encourage conservation of the resources studied.

According to a UNESCO working paper on the subject, applied ethnobotany draws on:

both personal (including traditional) and scientific forms of knowledge, allowing comparisons and integration for the benefits of conservation and sustainable development. In the past, ethnobotanical studies have all too often been just academic exercises or have served only external interests, with the results benefiting neither local people nor conservation. Our approach is cross-disciplinary, participatory, and geared towards local problem-solving. [Hamilton et al. 2003:3]

In the course of this project, I have sought to apply these concepts through an internship and volunteer work with the Tecate Community Museum. This meant becoming embedded in social processes that included ongoing interactions with Kumeyaay community members, local community organization members, graphic designers, construction workers, linguists, and funders. One of the first activities of this process, drawing on concepts of participatory research (Ervin 2005) was the organization of a special workshop with members of the Tecate area Kumeyaay community to discuss their perspectives and priorities regarding the design and content of the Kumeyaay phase of the Tecate Community Museum. The group came up with a list of specific priorities and voted on them (see Table 5). The priority which received the most votes called for ensuring that the museum would serve to instill respect for Kumeyaay cultural and natural heritage. Elder Joséfina López Meza, who proposed the item, explained that it was important as a way to reduce the discrimination against Indians by informing the public about the existence and contributions of Kumeyaay culture and territory (López Meza, personal communication).

Participatory community involvement in decision-making processes related to heritage development makes possible the inclusion of subordinated views of minority groups in arenas that are otherwise controlled by dominant groups who hold power (Little 2007; Shackel and Chambers 2004). This is particularly important to indigenous groups like the Kumeyaay whose culture has been contracting under the pressure of dominant Mexican culture, since “Heritage is necessary for sustaining local identity and a sense of place, especially by those communities and locales that are threatened by transformations in the global economy” (Shackel and Chambers 2004:10).

The Kumeyaay continued their involvement in the museum throughout its completion in June of 2011. Part of the collaborative project involved creating native plant gardens around the museum, integrating two traditional Kumeyaay structures—a historical period-style house and a shade roof—into the grounds, and creating signage for the museum. Through my internship I was able to create the following products, based on the application of the materials developed through my thesis project.

The Museum’s ethnobotanical gardens (see Figure 52) feature native plants used by the Kumeyaay for food, medicine, tools, and construction. Signage based on information that has been generated through this thesis project will be placed next to each plant and will

Table 5. Kumeyaay Priorities for Tecate Community Museum

In general, what should a museum on the indigenous culture and history of the Tecate region be like? What are some of the specific things that should be included?	Votes
Instill respect for the territory—sacred sites, environment, cultures and customs	12
Provide accurate information	7
All the history of the native region of Baja California	6
Kumiai should participate in the design and implementation	6
Biographies of ancestors who have passed on	4
Take into account the handcrafts and cultural histories of the region	3
Trips to communities so people can know what they're really like	3
A special program for native youth	2
Preserve Kumiai histories, songs and language	2
It should be a living museum with people that belong to the culture	1
Gathering histories, objects and photos of our ancestors, in a good place that is appropriate for a museum	0
History, photography, and objects that show the reality of the times	0

include Kumeyaay, botanical, Spanish and English names. A booklet with descriptions of the uses of each plant based on the results section of this thesis will be available through the museum.

Kumeyaay Julián Cuero supervised the construction of the traditional Kumeyaay ramada and a house built in the style of the historical period (see Figure 53); both structures were incorporated into the ethnobotanical gardens. Cuero and his crew constructed the structures entirely from native plants; they are designed to be used for workshops on native culture (basketmaking, acorn processing, singing, etc.) that will be taught by the Kumeyaay. The Kumeyaay are furnishing the inside of the house as part of the museum's interpretive exhibits.



Figure 52. Ethnobotanical gardens and ramada at Kumeyaay Museum.



Figure 53. Traditional Kumeyaay historical period arrowweed house.

Interactive museum signage (Appendix C) includes ethnobotanical information from this thesis in English or Spanish. Part of the exhibit explores Kumeyaay interactions with the environment in three major life-zones of the territory—coast, foothills, and mountains. The interactive signage allows visitors to explore each of the life-zones, including habitats and selected plants representative of the area. They can also activate videos narrated by the Kumeyaay in the native language (with Spanish or English subtitles) discussing ethnobotany, traditional arts and mythology.

The examples presented here demonstrate mechanisms by which the materials generated through the research presented in this thesis have been applied to support Kumeyaay efforts to instill respect for their cultural heritage. These collaborative, applied efforts form one small part of a larger process of Kumeyaay cultural and linguistic revitalization in the northern Baja California region (Wilken 2008b).

CHAPTER 10

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

In this study I have taken a qualitative, holistic approach to explore the question of how contemporary ethnobotanical knowledge found among Baja California's Kumeyaay Indians can make new contributions to an understanding of diachronic human–plant interactions, and how this knowledge can inform Kumeyaay cultural and linguistic revitalization. I have reviewed archaeological, historical, ethnographic, linguistic, and botanical studies that refer to human–plant interactions of the Kumeyaay region to provide a context for ethnographic materials. I synthesize information from interviews with 15 Kumeyaay Indian cultural consultants of five Kumeyaay or Ko'alh communities and one consultant from the binational (U.S.–Mexican) region about past and present uses of 47 native plants. For each plant, I present botanical, English, Spanish, and Kumeyaay nomenclature, including variant Kumeyaay terms for plants from different communities and regions. I provide brief botanical descriptions of the type of habitat in which the plant is found and its general range, as well as photographs to accompany each entry to assist in plant identification. I have given some examples of how this ethnobotanical information has been applied through its incorporation in museum exhibits that respond to Kumeyaay priorities for revitalization.

The results of this study confirm that contemporary Kumeyaay knowledge of plant usage clearly links the Kumeyaay to prehistoric, historical, and present cultural processes, both locally and extra-regionally. The Kumeyaay continue to use specific native plants that are documented in the archaeological record of the Kumeyaay region. Ethnographic field materials reveal new information about the social and symbolic meanings of plants in Kumeyaay life. Native speakers' linguistic expertise in ethnobotanical nomenclature demonstrates both similarities in cognates as well as dialect diversity across the Kumeyaay and Ko'alh region.

The Kumeyaay consultants' descriptions of plants and their uses presented here represent only a small part of their broad knowledge of their environment, their culture, their language, and the long history of interaction with the ideational landscapes they have inherited from their Kumeyaay ancestors. Time constraints did not allow me to conduct more detailed interviews on each plant in the field, documenting the minutia of scheduling, harvesting, processing, storage, dosage, and consumption; nor was I able to collect cultural information for every plant. Nonetheless, I found a significant level of ethnobotanical expertise among consultants, and I am sure that Kumeyaay consultants have knowledge of many other plants and much additional ethnoecological data, far beyond the scope of this study.

Future research into the region's ethnoecology would greatly benefit by creating interdisciplinary teams including Kumeyaay cultural consultants, anthropologists, biologists, and linguists collaborating in projects designed for both scientific documentation and application of results in ways that aid local communities and promote conservation. Kumeyaay knowledge of each one of the plants described here (and many others that were not included due to the limited scope of this study) can be further investigated by conducting field research documenting their identification, selection, harvesting, processing, and consumption. Interdisciplinary research investigating the impacts of Kumeyaay plant procurement on plant populations, including measurements of energy exchange, could generate data useful for archaeological, biocultural, and biological studies. Kumeyaay cultural consultants, most of them elders, continue to possess a wealth of knowledge through experience and oral tradition, including myths, legends, folktales, histories, and songs that may be lost if they are not documented. The training of younger indigenous students to record the cultural meanings associated with plants and landscapes, Kumeyaay names for plants and places, native taxonomies, ethnozoology, and other ethnoscientific concepts could generate useful data for future studies and represents an opportunity to build capacity for continued research while generating income for community members (Martin 1995). The application of the data generated in these studies may enrich Kumeyaay cultural and linguistic revitalization through their use in local community museums, as manuals or guides for rural people, for use in regional conservation efforts, for sustainable community development, and in the development of teaching curricula.

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APPENDIX A

QUESTIONNAIRE

KUMEYAAY ETHNOBOTANY PROJECT:
PLANT USE OPEN-ENDED QUESTIONNAIRE

I ask the following questions in Spanish. I ask the consultants to respond in both Spanish and Kumeyaay, in whatever order they prefer. The specific questions are only a general guide; consultants are encouraged to relate stories or any additional information they consider relevant.

Name of consultant:

Su nombre:

Date of interview:

Fecha de la entrevista:

Place of interview:

Lugar de la entrevista:

First visit:

- Date of birth (*¿Cuál es su fecha de nacimiento?*):
- Place of birth (*¿Cómo se llama el lugar en donde nació?*):
- Name of parents (*¿Cuáles son los nombres de sus papás?*):
- Places of birth (*¿Dónde nacieron?*):
- Names of maternal grandparents (*¿Cómo se llamaban los papás de su mamá?*):
- Places of birth (*¿Dónde nacieron?*):
- Names of paternal grandparents (*¿Cómo se llamaban los papás de su papá?*):
- Places of birth (*¿Dónde nacieron?*):

Plant questions

First visit: What are some of the plants that you most commonly use? (*Cuales son algunas de las plantas que usted utiliza más seguido?*)

Follow-up visits:

Go through plant list or show examples of plants that grow in the area where the consultant lives.

- What do you call this plant in Kumeyaay? In Spanish? (*¿Cómo se llama la planta en Kumeyaay? ¿Y en español?*)
- Does the Kumeyaay name have other meanings in Kumeyaay? (*¿El nombre en Kumeyaay también tiene otros significados en Kumeyaay?*)
- How do you use this plant? (*¿Cómo se usa la planta?*)
- Where does it grow? (*En dónde crece?*)
- When do you harvest it? (*En qué época se junta la planta?*)
- How do you harvest it? (*¿Cómo se junta la planta?*)
- How do you process it? (*¿Como la preparan?*)
- How do you consume it (e.g. dosage of medicinal tea, serving of food)? (*¿Cómo lo consumen, por ejemplo, cómo la toman o la comen?*)
- Are there stories, beliefs or histories that relate to this plant? (*¿Sabe algunos cuentos, creencias o historias que tienen que ver con esta planta?*)
- Anything else you would like to say about this plant? (*¿Algo más que le gustaría comentar sobre la planta?*)

APPENDIX B

FIELD RECORDINGS: AUDIO AND VIDEO

Each record provides full names of the interviewees, the year of the interview, the name of the interviewer, the date and place of the interview, and where the recordings may be found. All audio and video interviews and field notes are on file at the archives of the Cuchuma Library of Corredor Histórico Carem A.C. in Tecate, Baja California. The recording file name, based on a recording file code, is also included to facilitate the identification of the specific recording to which the citation refers. The recording file code format includes the following information: Year/Mo/Day_ Community_Chronological order of the day's recordings_Interviewee(s)_Media.

Aldama Machado, Jovita, Zeferina Aldama Cuero, and Joséfina Muñoz Aldama

2010a. Interview by Joséfina Muñoz Aldama. Audio-recording. July 27. La Huerta, Baja California. Recording file code: 2010/07/27_LAH_00_JAM,ZAC,JMA__VIDEO. Corredor Histórico CAREM, Tecate, Baja California, Mexico.

2010b. Interview by Joséfina Muñoz Aldama. Audio-recording. August 27. La Huerta, Baja California. Recording file code: 2010/08/27_LAH_00_JAM,ZAC,JMA_AUD. Corredor Histórico CAREM, Tecate, Baja California, Mexico.

Carrillo Vega, Beatriz

2011. Interview by Michael Wilken. Video-recording. August 16. San José de la Zorra, Baja California. Recording file code: 2011/08/16_SJZ_00_BCV_VIDEO. Corredor Histórico CAREM, Tecate, Baja California, Mexico.

Castro Albañez, Margarita, Teresa Castro Albañez, and Tirsia Flores Castro

2010a. Interview by Michael Wilken. Audio-recording. August 22. Santa Catarina, Baja California. Recording file code: 2010/08/22_SCK_03_MCA,TCA,TFC_AUD. Corredor Histórico CAREM, Tecate, Baja California, Mexico.

2010b. Interview by Michael Wilken. Audio-recording. August 22. Santa Catarina, Baja California. Recording file code: 2010/08/22_SCK_04_MCA,TCA,TFC_AUD. Corredor Histórico CAREM, Tecate, Baja California, Mexico.

Cuero Robles, Teodora

2010a. Interview by Michael Wilken. Video-recording. June 28. La Huerta, Baja California. Recording file code: 2010/06/28_LAH_TCR_VIDEO. Corredor Histórico CAREM, Tecate, Baja California, Mexico.

2010b. Interview by Michael Wilken. Video-recording. October 2. La Huerta, Baja California. Recording file code: 2010/10/02_LAH_00_TCR_VIDEO. Corredor Histórico CAREM, Tecate, Baja California, Mexico.

Cuero Robles, Teodora, and Mario Aldama Cuero

2010. Interview by Michael Wilken. Video-recording. April 11. La Huerta, Baja California. Recording file code: 2010/04/11_LAH_01_TCR, MAC_VIDEO. Corredor Histórico CAREM, Tecate, Baja California, Mexico.

Cuero Robles, Teodora, and Josefina Muñoz

2010. Interview by Michael Wilken and Josefina Muñoz. Video-recording. July 24. La Huerta, Baja California. Recording file code: 2010/07/24_LAH_00_TCR,JMA_VIDEO. Corredor Histórico CAREM, Tecate, Baja California, Mexico.

Melendrez Silva, Virginia

2010. Interview by Michael Wilken. Video-recording. July 26. San José de la Zorra, Baja California. Recording file code: 2010/07/26_SJZ_01_VMS_VIDEO. Corredor Histórico CAREM, Tecate, Baja California, Mexico.

Melendrez Silva, Virginia, and Celia Silva Espinoza

2010a. Interview by Michael Wilken. Audio-recording. August 24. San José de la Zorra, Baja California. Recording file code: 2010/08/24_SJZ_06_VMS,CSE_AUD. Corredor Histórico CAREM, Tecate, Baja California, Mexico.

2010b. Interview by Michael Wilken. Audio-recording. August 24. San José de la Zorra, Baja California. Recording file code: 2010/08/24_SJZ_07_VMS,CSE_AUD. Corredor Histórico CAREM, Tecate, Baja California, Mexico.

2010c. Interview by Michael Wilken. Audio-recording. August 24. San José de la Zorra, Baja California. Recording file code: 2010/08/24_SJZ_10_VMS,CSE_AUD. Corredor Histórico CAREM, Tecate, Baja California, Mexico.

2010d. Interview by Michael Wilken. Video-recording. August 24. San José de la Zorra, Baja California. Recording file code: 2010/08/24_SJZ_VMS,CSE_VIDEO. Corredor Histórico CAREM, Tecate, Baja California, Mexico.

Meza Calles, Aurora

2011. Interview by Michael Wilken. Video-recording. Canyon de Manteca, Baja California. Recording file code: 2011/08/25_NEJ_01_AMC, EMC_VIDEO. Corredor Histórico CAREM, Tecate, Baja California, Mexico.

Meza Calles, Aurora, and Emilia Meza Calles

2011. Interview by Michael Wilken. Video-recording. August 25. Tecate, Baja California. Recording file code: 2011/08/25_NEJ_01_AMC, EMC_VIDEO. Corredor Histórico CAREM, Tecate, Baja California, Mexico.

Meza Calles, Norma, and Petra Mata

2010. Interview by Michael Wilken. Audio-recording. September 7. Tecate, Baja California. Recording file code: 2010/09/07_NEJ_04_NMC,PMX_AUD. Corredor Histórico CAREM, Tecate, Baja California, Mexico.

Meza Calles, Norma, Petra Mata, and Aurora Meza Calles

2010. Interview by Michael Wilken. Audio-recording. July 21. Valle de las Palmas, Baja California. Recording file code: 2010/07/21_NEJ_03_NMC,PMX,AMC_AUDIO. Corredor Histórico CAREM, Tecate, Baja California, Mexico.

Silva Espinoza, Celia, and Virginia Melendrez Silva

2010a. Interview by Michael Wilken. Video-recording. July 26. San José de la Zorra, Baja California. Recording file code: 2010/07/26_SJZ_01_CSE,VMS_VIDEO. Corredor Histórico CAREM, Tecate, Baja California, Mexico.

2010b. Interview by Michael Wilken. Video-recording. July 26. San José de la Zorra, Baja California. Recording file code: 2010/07/26_SJZ_02_CSE,VMS_VIDEO. Corredor Histórico CAREM, Tecate, Baja California, Mexico.

APPENDIX C
INTERACTIVE SIGNAGE

KUMIAI LIFE UNDER THE OAKS

In the **habitats** between the coast and the high sierra, we make our **homes** in woodland forests along creeks and river valleys, and in hills cloaked with chaparral and boulders. Great granite **grinding stones** serve as our kitchens, where **families** gather to prepare **acorn porridge** and other traditional foods.

AT THE FOOT OF MOUNT CUCHUMA

In the springtime, we gather greens, bulbs, seeds and many other **plant** foods, and hunt rabbits, birds, and larger **fauna** such as deer and antelope. In the fall, oaks produce acorns, an important food that can be stored for months in willow granaries. We make baskets and pottery to gather, process and store these traditional foods. Boulders and surrounding mountains are alive with the power of **history and legend** passed down from our ancestors.

Habitats • Homes • Grinding stones • Families • Prepare acorn porridge • Plant • Fauna • History and Legend

OUR LIFE UNDER THE OAKS

LOOK AT THE VIDEO CLIP

ESPAÑOL

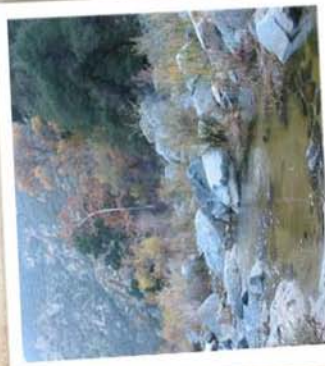
Figure 54. Example of interactive signage using ethnobotanical information: Opening view of foothills life-zone with links.

HABITATS

Chaparral is a community of low growing plants that is well adapted to our arid environment.

Creeks and rivers, also know as **riparian zones**, form part of a watershed that starts in the mountains and leads to the ocean. Most of our region's trees-willows, oaks, cottonwoods, sycamores and elderberries-grow in or around the riparian areas.

Native grasslands once covered large areas where native peoples hunted deer, birds, antelope and other animals. Today grasslands have been lost due to grazing, agriculture, and urbanization.



**Creek near
San Antonio Necua**
Photo courtesy: Mike Wilken



Grassland
Photo courtesy: Mike Wilken



**Oak Woodland
Canyon de Manteca**
Photo courtesy: Mike Wilken



Chaparral, hills of Tecate
Photo courtesy: Mike Wilken



Alamo Canyon, Neji
Photo courtesy: Juan Ramón Valdéz

Figure 55. Example of interactive signage using ethnobotanical information: Habitats of foothills link.

PLANTS FOR EVERY PURPOSE

they must be ground and carefully leached the acorns.

One of our favorite firewoods is **Chamise** or **Greasewood**. We also use it to carve detachable hardwood points for arrows.

We use **Willow** for building houses, weaving baskets, and carving into bows. We tear the soft inner bark into long strands and weave these into skirts worn by women.

We gather the flowers of **Blue Elderberry** for use as medicine to cut a fever or treat a cold. The berries, when completely ripe, turn purple and can be made into a drink.

We burn **White Sage** to cleanse the spirit, and we also use it as medicine for colds.



Coast Live Oak
(*Quercus agrifolia*)
Photo courtesy: Mike Wilken



Chaparral Yucca
(*Hesperoyucca whipplei*)
Photo courtesy: Mike Wilken



Holly-leaf Cherry
(*Prunus ilicifolia*)
Photo courtesy: Mike Wilken



Greasewood
(*Adenostoma fasciculatum*)
Photo courtesy: Mike Wilken



Willow
(*Sambucus Mexicanus*)
Photo courtesy: Mike Wilken



White Sage
(*Salvia apiana*)
Photo courtesy: Mike Wilken

Figure 56. Example of interactive signage using ethnobotanical information: Plants of foothills link (with scrolling).



Figure 57. Example of interactive signage using ethnobotanical information: Oaks and acorns link.