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Tending the Wild

Native American Knowledge
and the Management of
California's Natural Resources

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CHAPTER 2

Gathering, Hunting, and Fishing

I've always wondered why people call plants "wild." We don't think of them that way. They just come up wherever they are, and like us, they are at home in that place.

CLARA JONES SARGOSA, Chukchansi (1990)

California Indians depended deeply and directly on the breadth of the land for their livelihood. Superb natural historians, their knowledge of the natural world was grounded in ancient tradition and encompassed what today we call ornithology, entomology, botany, zoology, ichthyology, ecology, and geology. Through sharp observation, diligent experimentation, and insights from the spirit world, they unlocked the hidden attributes of California's flora and fauna. Evidence of indigenous people's intimate knowledge of the natural world comes from many quarters: the extraordinary array of human uses they assigned to native plants, animals, fungi, algae, and lichens; the active management techniques they used to maintain the health of these myriad species; their awareness of animal and plant behavior in response to harvesting and management; the preparation, cooking, and storage techniques they developed for utilizing native species; the manufacturing processes they devised to make products from plants and animals; the way they manipulated environmental conditions to influence plant properties.

The natural world served as grocery store, pharmacy, and hardware shop. It was the center of each cultural group's existence. Few plants, minerals, fungi, or animals remained unknown or unused, demonstrating how thoroughly the Indians of California had earned their nativeness to the land.

Utilizing California's Vast Flora

In aboriginal California, women were the ethnobotanists, testing, selecting, and tending much of the plant world, and men were the ethnozoologists, applying their intimate knowledge of animal behavior to skillful hunting,

fishing, and fowling. In most regions, vascular plants made up more than half of the diet; fish, fowl, mammals, mollusks, reptiles, amphibians, and insects were an important but smaller component. Because of this dependence on plant foods, women, the main plant harvesters and processors, were instrumental in ensuring the economic survival of their cultures.¹

Of the approximately 6,300 flowering plants, gymnosperms, ferns, and fern allies native to California, hundreds to thousands occurred in each tribal territory, many of which were incorporated into the tribe's ethnobotany.² The vastness of the plant knowledge alone was stressed as early as 1891 by G. H. Harris when he wrote, "A complete history of the foods of the aborigines of North America would fill volumes."³ That California Indians knew the flora intimately is suggested by their recognition and use of the subtlest distinctions in nature. For example, basket weavers among the Luiseño, Cupeño, Chumash, Tongva (Gabrielino), and Kumeyaay (Diegueño) knew that at the bottom of the stems of streamside rushes (*Juncus textilis*), completely hidden under the leaf thatch shed by the overhanging sycamores and willows, was a deep brick red band of color, prized for basketry designs.

Many plant species of widespread distribution were used by different tribes, sometimes for similar purposes and sometimes for different ones. The California poppy (*Eschscholzia californica*) alleviated Yuki toothaches, fed Sierra Miwok stomachs, healed Wintu newborn babies' navels, and induced sleep among the Ohlone. The corms of blue dicks (*Dichelostemma capitatum*) were eaten wherever the plant occurred: Atsugewi women dug them on the volcanic slopes of Mount Lassen; Paiute women irrigated patches of them in the sandy soils of the Great Basin; Ohlone women uprooted them in the clay soils of the San Francisco Bay area.⁴

Native plants accompanied native people from birth until death. Strings of clamshell disk beads strung with Indian hemp (*Apocynum cannabinum*) hung from the cradleboards of Pomo babies and were laid on the funeral pyre upon death. Native plants were integrated into every kind of object used in daily living, from adornments to musical instruments and weapons. (See Figure 5, top.) A great variety of native plants were also utilized as foods and medicines. The Sierra Miwok, for example, relied on nearly 160 plant species for food and more than 110 plant species for medicines.⁵

Plants were gathered from below sea level to above the timberline. Surf-grass (*Phyllospadix torreyi*), which grows below low-tide level in the waters of the Pacific Ocean, was harvested for Chumash skirts, and the sweet fruit of black elderberry (*Sambucus melanocarpa*) was plucked by hungry Washoe families at meadow edges approaching 11,000 feet. Every plant community in California—from beach dune to evergreen forest and pinyon-juniper

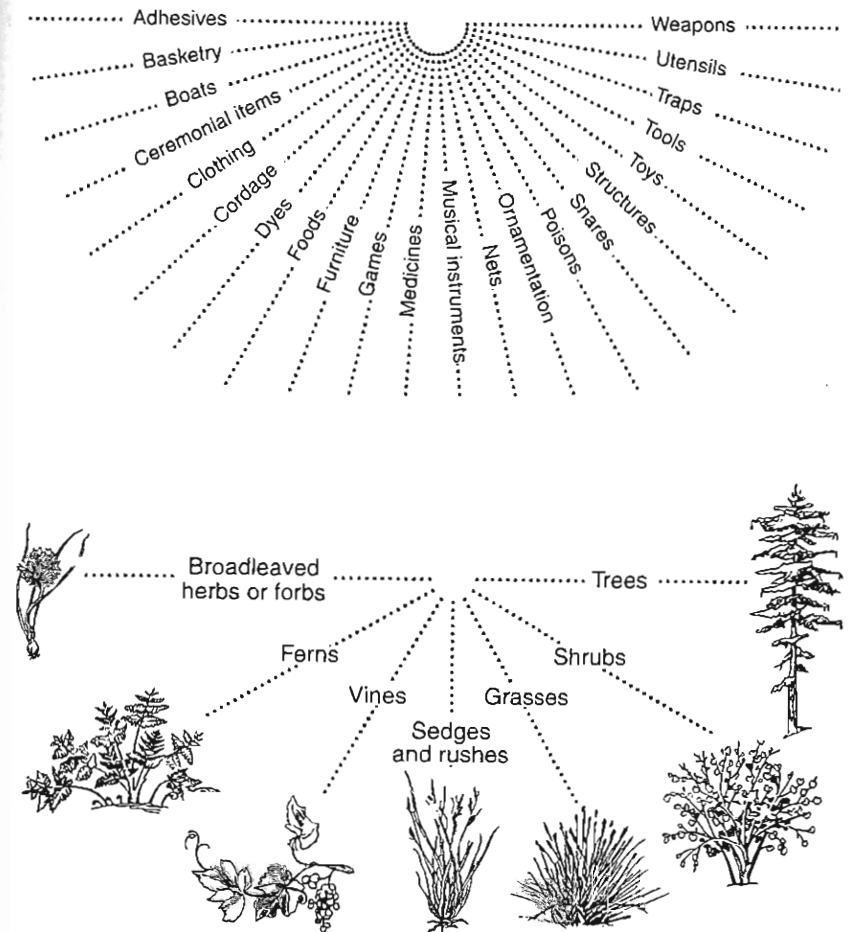


Figure 5. The rich variety of cultural uses for California's native plants that constituted the "material culture" of Indian tribes.

woodland—was visited by gatherers, and within those communities every type of plant life form was gathered. (See Figure 5, bottom.)

Every kind of plant part—underground bulbs, rhizomes, and roots; the oozing resin of trees; the sweet nectar of certain flowers; stems, bark, branches, shoots, leaves, thorns, flowers, seed pods, seeds, seed plumes, and cones—found a use. Baskets alone contained a marvelous diversity of plant parts: the red roots of the Joshua tree (*Yucca brevifolia*) made striking light-



Figure 6. Almost every species of plant had a use—even the hidden roots of six kinds of conifers (coast redwood, sugar pine, gray pine, ponderosa pine, Jeffrey pine, and Sitka spruce). Shown here is Annie Roberts, a Yurok woman, splitting the roots of Sitka spruce (*Picea sitchensis*) to make twined baskets. Courtesy of the Phoebe Apperson Hearst Museum of Anthropology and the Regents of the University of California. Photograph by B. F. White, 1930, #15-9016.

ning bolt designs in Kitanemuk baskets; the tough lemon-colored scapes of *Juncus cooperi* were split for Koso Panamint sewing strands; horsetail (*Equisetum arvense*) rhizomes were split by Ohlone weavers for black lacing; and the seed pod splints of devil's claw (*Proboscidea parviflora* subsp. *parviflora*) decorated Tubatulabal coiled gift baskets. (See Figure 6.)

Californian Indians even found uses for nonvascular plants (mosses, liverworts, and hornworts), fungi, algae, and lichens. For example, a moss (*Dendroalsia abietina*) provided the bedding material for Little Lake Pomo babies. Indian paint fungus (*Echinodontium tinctorium*), which grows on red fir and mountain hemlock, was used as a brilliant orange-red dye by many tribes. Lace lichen (*Ramalina menziesii*), a combination of algae and fungi,

was used for baby diapers by the Kashaya Pomo. Submerged in water, it was said by the Kawaiisu to bring rain. Brown algae such as bull kelp (*Nereocystis luetkeana*), red algae such as laver (*Porphyra* sp.), and green algae such as sea lettuce (*Ulva lactuca*) were eaten by coastal tribes.⁶

Food and Materials from California's Rich Fauna

Many of the 66 species of freshwater fishes, 46 amphibians, 96 reptiles, 563 birds, and 190 mammals that inhabited California were incorporated into the ethnozoologies of the tribes.⁷ Among the animal parts used were bones, fur, organs, skin, tails, tendons, antlers, feathers, hooves, claws, teeth, meat, marrow, sinew, and horns. Weapons used to capture animals included the slingshot for killing small birds, the throwing stick for hunting rabbits, and bows and arrows, clubs, and lances for hunting terrestrial mammals. A skilled Wappo slinger could hit a fence post at a distance of seventy-five yards.⁸ Harpoons, spears, bone gorges, fishnets, and hooks, lines, and sinkers were used for capturing fish.

Indians knew the animals intimately by studying their behaviors, walking the same paths, sharing a drink from the same watering holes, and sleeping in the same habitats. Animal identification came directly from signs—tracks, claw marks on trees, and crushed vegetation where animals had bedded down. Hunters wore clever disguises to stalk animals and whistled to imitate the distress calls of the young. These imitations were often so accurate that they brought forth a host of curious animals and hungry predators. Ingenious traps, snares, and weirs were used to catch birds, fish, and small mammals; for example, the Kumeyaay set up flat stone traps to catch kangaroo rats. For large mammals, hunters dug pits and covered them with boughs. The Pit River derived its name from the deep trapping pits dug by Indians along its banks. Choynumni Indians in the southern San Joaquin Valley would shoot both tule elk and antelope from hunting blinds when the animals came to Tulare Lake to water.⁹

Animal parts were incorporated into an array of cultural objects: adornments, baskets, ceremonial costumes, clothing, cosmetics, currency, dyes, foods, games, household utensils, medicines, musical instruments, poisons, tools, toys, weapons. Porcupine quills decorated basketry hats for the Karuk tribe, and antelope horns were fashioned into spoons by the Tubatulabal. The skins of mudhens were worn as gloves by the Pit River and Atsugewi. By boiling the horns of the bighorn sheep, the Panamint made a glue. In ancient times the Maidu and Pomo made cloaks for sacred dances from the wing and tail feathers of the California condor. Wooden combs of baleen,

the fibrous material forming the sievelike mouth of plankton-eating whales, were combed through Tongva girls' hair. Abalone shell pieces were hung from the ears of the Salinans. The femurs of grizzly bears were fashioned by the Chumash into daggers and decorated with *Olivella* shells.¹⁰

A tremendous diversity of mammals provided food, including deer, elk, pronghorn antelope, bears, gray squirrels, and various kinds of rabbits. Among these, deer were the most important part of the diet for many tribes. The black-tailed jackrabbit (*Lepus californicus*) was so abundant on the San Joaquin plains near Tulare Lake in the 1850s that when the Choynumni conducted a rabbit drive with milkweed nets and throwing sticks, they could kill as many as two hundred in a forenoon. The rabbit meat was eaten, and the fur and skin were made into six-foot-square blankets, capes, and skirts. Many other tribes hunted rabbits as well. Birds killed for food included quail, bandtail pigeons, and various kinds of ducks and geese. Eggs were gathered from quail, geese, ducks, and turtles, then roasted in ashes and eaten. Le Conte noted that gull (*Larus* spp.) eggs were an important food item for the Mono Lake Paiute.¹¹

Tribes living near the coast exploited the rich food resources of the Pacific Ocean. In 1775 Fray Benito de La Sierra wrote an account of the diet of the Indians of Little River and Trinidad Head, noting, "Mussels [probably *Mytilus californianus* and *M. edulis*] are very abundant and form their regular food. . . . What are to be found in great number are seals, to which the Indians are very partial, keeping in their houses a supply of the flesh and bladders of the oil. They preserve the flesh as we do ham and cook it by roasting slices over a fire, the grease being allowed to drip on to certain beaten herbs, the whole being eaten with great satisfaction."¹²

Large schools of fish frequented the coastal waters, feeding bird and human alike. The English naturalist Archibald Menzies wrote of the Chumash fishing off the coast of Santa Barbara in 1793: "[T]hey were always seen out by the dawn of day either examining their fish pots in the Bay or fishing in the middle of the Channel where they never failed to catch a plentiful supply of fish of different kinds particularly Boneto [Pacific bonito, *Sarda chiliensis*] & a kind of Herring [yellowtail, *Seriola lalandi*]." In northern California coastal waters, Indian men and women wielding cornucopia-shaped traps in the waves took surf smelt (*Hypomesus pretiosus*) by the thousands. Alfred Kroeber and Samuel Barrett reported, "The smelt were in former times so numerous that a man often got his net so full that he had to have help to carry it ashore—sometimes even so full that it was necessary to pour some of the fish back into the water for fear of tearing the net because of the weight of the fish." Probably the most important of all fish resources in central and



Figure 7. Chinook salmon (*Oncorhynchus tshawytscha*), the largest and most numerous of California salmon, was an important food for both coastal and inland Indians. Courtesy of Peter E. Palmquist.

northern California, were salmon. At least five million pounds of salmon were consumed by Native Americans yearly.¹³ (See Figure 7.)

A great variety of insects—grasshoppers, cicadas, ants, flies, crickets—were used for food and other items. Yellowjacket nests made of masticated cellulose were raided by members of many tribes for their edible larvae and pupae. The honeydew deposited by aphids on the stalks of cattails, tules, and common cane (probably *Phragmites australis*) was collected by the Owens Valley Paiute, Panamint Shoshone, Chemehuevi, Tubatulabal, and Salinan and made into sugary balls or cakes. Perhaps Honey Lake in northeastern California received its name from the honeydew the Indians collected along its shores. The Cahuilla and Panamint made a glue from the amber-colored gum deposited by a small insect on the bark of the creosote bush (*Larrea tridentata*). When mixed with pulverized rock and heated, this sticky resinous gum fastened stone arrowheads to their shafts and mended pottery. Army worms collected from Oregon ash trees (*Fraxinus latifolia*) were eaten by the Pomo.¹⁴

Edible butterflies and moths, which were harvested in the larval and pupal

stages, included the whitelined sphinx moth (*Hyles lineata*), eaten by the Ca-huilla, and the pandora moth (*Coloradia pandora*), eaten by tribes in the Sierra Nevada. According to Western Mono elders, the pandora moth, the larva of which feeds on ponderosa, sugar, and Jeffrey pine, used to be common on the west side of the Sierra Nevada, but now it is rare. The Mono elder Melba Beecher can specify the exact mountainous areas where it occurred and where she and her family gathered the larvae, called *piagi*. Formerly, trenches were dug around the trees to trap the caterpillars as they descended. The pupae of the California tortoise-shell butterfly (*Nymphalis californica*), called *hooya*, were gathered by the Mono. The flavor was excellent, and one elder said they smelled "just like a pot roast" while cooking. The pupae were dried and stored for future use.¹⁵ Many Indians recalled that the tortoise-shell butterfly was common in chaparral (*Ceanothus cuneatus*) areas at mid-elevations in the Sierra Nevada and would come every year. It is now seen once every decade or so, and in some areas it has not been sighted for forty years.

The Complexity of Gathering Knowledge

Because no one today gathers wild plants or hunts animals for all of his or her personal needs, it is difficult for us—even those of us who are secure in the wilderness—to realize the depth of knowledge required to comfortably stay alive in aboriginal California. Indigenous plant and animal gathering was carried out under an intricate system that took into account life-forms, species, plant properties, environmental site criteria, cultural uses, and strategies of cultivation. When combined, the levels of ethnobiological knowledge became exceedingly complex. Only by following the daily routine of a Hupa fisherman, a Yokuts saltgrass collector, a Yahi hunter, or a Kumeyaay weaver would we begin to fully appreciate the keen memory, knowledge of reproductive biology, attention to environmental cues, and mimicking of animal behavior that was practiced by harvesters to live directly from the land.

For instance, native plants important in Indian economies often grew on several sites within a variety of plant associations, each species and ecotype representing slightly different specific ecological requirements of the association and the site. Thus, ripening times varied according to elevation, weather patterns, and microclimatic differences. Timing of plant harvesting to reap the maximum benefits from plant growth with a minimum of animal or pathogen competition was critical. Memory, therefore, had to be long and accurate, and observation keen. If a village gave insufficient attention

to animal ecology, weather, plant reproductive biology, or microclimatic variations, its winter food supply could be at risk, possibly meaning starvation.

CLASSIFYING ORGANISMS

Complex taxonomic classification systems were a foundation of California Indians' knowledge of the natural world. The ability to repeatedly distinguish a species by shape, color, size, smell, and other factors—and assign various uses to it—was crucial to a village's survival.¹⁶

Humans seem to have an innate ability to categorize organisms into groups based on varying degrees of similarity in their overall morphological structure, says the ethnobiologist Brent Berlin. He argues that human beings have an "inescapable and largely unconscious appreciation of the inherent structure of biological reality."¹⁷ Indigenous groups all over the world classify plants and animals in a hierarchy—layers of groupings based on progressively finer features of distinction. There are broad groupings, such as "tree" or "bird"; intermediate categories that comprise certain plants or animals showing similar distinctive features, such as "pine tree" or "hummingbird"; and fine-textured groupings, equivalent to our species category, such as "Monterey pine" or "Anna's hummingbird."¹⁸

Unfortunately, few detailed studies of folk classification of plants and animals in California have been done.¹⁹ Eugene Hunn's detailed study of the taxonomic knowledge of the Mid-Columbia Indians in Washington has led him to conclude that their "perceptual and analytical capacities" were "on a par with those of a modern-day professional botanist." From what is known of meticulously studied indigenous groups in other places, it is probable that California Indian classifications were every bit as sophisticated as Western schemes.²⁰

With the binomial taxonomic system developed by the Swedish naturalist Carolus Linnaeus in the 1750s as their standard, Euro-Americans typically misjudged California Indians' classification systems. When Stephen Powers, a journalist, first entered Nisenan territory in 1872, he noted that the "savages have no systematic classification of botanical knowledge; there are no genera, no species."²¹ Not being ethnobiologists by training, early observers such as Powers could not comprehend the possibility that Indian naming systems, so different from their own, could be every bit as accurate, finely grained by category, and precise as the Western system.

Merriam, a trained biologist and naturalist, drew the opposite conclusion from Powers. While wandering in the Sierra foothills to map the range of two manzanita species in 1910, he stumbled upon a little hut near a stream

and asked an Indian woman where the lowland and upland manzanita grew. She bluntly told him that “all three [manzanitas] grow right here.” Her daughter fetched specimens of the three species, one of which was unknown to Merriam and to his fellow botanists. As an acknowledgment to her and her tribe—the Miwok—Merriam named the new manzanita species *Arctostaphylos mewukka*.²²

The genus *Arctostaphylos* has a reputation among taxonomists as being difficult to identify at the species level. Not only do manzanita species hybridize readily in areas where distinct species overlap, but there are more than fifty recognized species in the genus in California. Yet this did not prevent the Miwok from encoding the differences in separate names for each type that occurred in their territory. The Karuk in extreme northwestern California identified at least four types of manzanitas in their territory: *pahaav*, or green manzanita (*Arctostaphylos patula*); *fáthip*, or Parry manzanita (*A. manzanita*); *apúnfaath*, or pine-mat manzanita (*A. nevadensis*); and *ohusukamfas* (*A. canescens*).²³

In assigning names to plants, native people paid attention not only to morphological characters but also to the places the plants grew and to what uses they were assigned. For example, the Pomo called the sedge (*Carex barbarae*) *Ka-hum*. The plant’s rhizomes, also referred to as “white root” by weavers, were the chief source of weft (or sewing strands) for light-colored backgrounds in basket weaving. The length, color, and other characteristics of the rhizomes were dependent on moisture, soil, and elevational differences, and based on these differences, at least four types of *Ka-hums* were distinguished in the language: *Ka-pak ka-hum* was *Carex barbarae* from boggy ground; *Ko-di ka-hum* was found in rich, wet lowlands (its short, milky white rhizomes were valued for fine work); *Mi-tcat ka-hum* grew beside streams in sandy banks (and was best suited to large, coarse basket work); and *Bida ka-hum* grew in gravel next to creeks (its long, coarse, and strong yellow rhizomes were used for weft in utensils and storage baskets).²⁴

KNOWING PLANT PROPERTIES

California Indians understood very well the adhesive, unctuous, nutrient, and chemical properties of plants. For instance, the Luiseño harvested the charred seeds of *enwish*, the wild cucumber (*Marah* sp.), for an oily ingredient that gave permanence to the paints used in pictographs. Some contemporary products have their origins in native discoveries, attesting to the efficacy of their assigned uses. Indigenous knowledge has made significant contributions to genetic conservation and modern pharmacology. Cascara

sagrada (*Rhamnus purshiana*) bark, an important cathartic to the Modoc, Hupa, and virtually all indigenous peoples of the Pacific Northwest, is found in health food stores and pharmacies in commercial laxative preparations. Many tribes made fever remedies from the bark of willows; the Ohlone, for example, used *Salix laevigata* in this way. The bark contains the chemical constituent salicin—a white, crystalline glucoside—the original ingredient in aspirin. Chia (*Salvia columbariae*), an important food to the tribes of central and southern California and parts of the Southwest, is recognized as a highly nutritious food and is currently sold in health food stores. The seed floss from milkweed (*Asclepias* spp.), used by California Indians for lining their children’s cradles, is utilized today in jackets, comforters, and pillows.²⁵

PAYING ATTENTION TO CYCLICAL CHANGES

Of necessity, Indians were closely attuned to cyclical changes in plants and animals—the succession of changes through which a plant passes in its development (vegetative growth, flowering, fruiting)—and the reproductive cycles and migration patterns of animals. Timing the harvesting of plants and animals to reap the maximum benefits added another dimension to the complexity of native people’s knowledge. This richness of seasonal patterning was missed by most anthropologists in their ethnographic descriptions of native peoples.

Some greens, roots, and bulbs, such as the large, succulent roots of broom-rape (*Orobancha* sp.), dug by the Cahuillas, had to be harvested before the plants flowered.²⁶ Material from shrubs and trees for basketry was often gathered before vegetative processes began in spring or after they subsided in fall. For example, the wine red bark of redbud (*Cercis orbiculata*), used by many tribes for basketry, had to be gathered in fall or winter, because in spring the bark cells have too much moisture, rendering the material unusable for creating red designs in baskets. If a perennial plant was used for more than one purpose, then harvesting of the same plants occurred at different times during the year, without destroying the plants the first time around. For instance, milkweed (*Asclepias* spp.) plants were gathered in the spring for their greens, in the late summer for their seed pods, and in the fall or early winter for their stems to make cordage. The seeds of many types of plants had to be picked within a week of ripening or they would blow away and be lost to the gatherer. The Karuk gathered ponderosa pine roots after the tree bloomed, because the roots were tougher at this time.²⁷

The physiological and behavioral changes that occurred in animals during seasonal and even daily cycles were also crucial to Indian cultures. An-

TABLE 1
Gathering, Fishing, and Hunting Activities by Season

Spring	<p>Pick basketry materials such as willow. Collect the unfolding new leaves of alum root for greens. Pick mushrooms after rains. Hunt geese as they are returning north. Spear salmon and hook eels as they are making their spring run. Dig edible bulbs before flowering. Build stone surrounds in the desert and hunt antelope and bighorn sheep. Harvest the larvae of the pandora moth around Jeffrey pines.</p>
Summer	<p>Net geese as they are molting. Prune tobacco to promote larger leaves. Gather juniper berries and process them into a sweet cake. Collect immature gray pine cones for roasting. Collect savory berries as they are ripening. Beat edible seeds and grains from the inflorescences of flowers and grasses into wide-mouthed baskets.</p>
Fall	<p>Hunt rabbits for their fur because their pelts are thick. Obtain deer in prime condition as there is a tendency for deer to group, especially when inclement weather forces their migration. Trap quail as they migrate from the mountains to the foothills. Gather ripe acorns from oaks and cones from many kinds of pines for their seeds.</p>
Winter	<p>Pick basketry materials from shrubs and trees because the bark adheres and the sap is down. Gather milkweed and dogbane stalks for their bast fibers for making cordage. Obtain shellfish easily at low tides. Gather wood for arrows before the shoots take up too much moisture and sprout new leaves. Hunt bear, wildcats, and otters.</p>

imals were harvested at certain seasons, or when migration cycles caused natural congregations. Rabbits were taken when fattest, fish when spawning, birds when molting, crickets in the cool mornings when they bunched in the grass. (See Table 1.)

Seasonal changes in the environment such as a shift in wind direction,

budding out of plants, different animal behavior, and swarming of particular insects were cues that certain culturally important plants would ripen soon or that particular animals would be migrating. Linking environmental cues with reproductive cycles required detailed knowledge. For example, Kashaya Pomo women watched for the first warm inland winds of summer as a sign that there would be only a few days to gather the seeds of wild oats (*Avena* spp.) before they fell to the ground. In summer, shellfish can become toxic to humans when they take in tiny, one-celled organisms called dinoflagellates (*Gonyaulax catanella*). Coastal Pomo people stopped gathering clams and other shellfish as soon as elderberry shrubs flowered. When there were ripe elderberries, they knew it was time again to harvest shellfish. When the fruit of the California coffeeberry (*Rhamnus californica*) was ripe, the Tubatulabal people knew that the pinyon pines in the mountains were ready to harvest.²⁸

RELATING ENVIRONMENTAL CONDITIONS TO DESIRABLE PLANT PROPERTIES

Indigenous groups were aware that plants occurring at different elevations and growing in different soil types, in certain plant associations, or subjected to different light intensities produced plant material of varying quality or desirability. For example, the bark of Pacific madrone (*Arbutus menziesii*), used by the Tolowa in northern California for colds, is more potent if gathered in the high country. Hupa weavers preferred the strong black color of five-finger fern (*Adiantum aleuticum*) gathered at higher altitudes to the brownish stems gathered from the lowlands. The Karuk considered that the best yew (*Taxus brevifolia*) wood for making pipes and games was gathered in the wet, shaded areas along creek beds because it grows straight in the shade. The Yurok, who valued Oregon-grape (*Berberis* sp.) root as a medicinal, knew that its potency is heightened when it grows in red soil.²⁹

According to the Nisenan, the best acorn trees were higher up in the mountains on the shady sides of canyons. Among the Pomo, the roots of *Angelica* sp. were most prized for medicine and as a talisman when collected from plants growing in cold places. The Hupa claimed that leaves of *mesteelen* (*Iris macrosiphon*) were better for making the twine and rope used in nets and snares when taken from plants growing under oaks rather than under pines. The Paiute preferred the roots of yucca plants growing above four thousand feet because their roots were a better color than those from plants at lower elevations.³⁰

COMPETING SUCCESSFULLY WITH ANIMALS AND PATHOGENS

The same plants that are desirable for human food and material culture are often also palatable to birds, small and large mammals, and insects, and susceptible to attack by pathogens. In devising ways to cope with this competition from other species, native people had to understand these species' habits and life cycles. Often, harvest was timed to occur before insects could feed on the same resource. A Kashaya Pomo woman, for example, noted that the harvest of mountain dogwood (*Cornus nuttallii*) for making baby baskets was timed with insect life cycles. Sticks were harvested in early fall, right after the shrubs shed their leaves, because "[b]y late Fall, the twigs are infested with worms that weaken the wood." Many harvesting techniques were designed specifically to foil insects or herbivores. Black oak acorns, for example, were frequently harvested by knocking the trees with a long pole before the acorns dropped naturally to the ground. The anthropologist Helen McCarthy suggests that knocking acorns from the trees gave humans a competitive edge over other animals vying for the same resource, and it extended the available harvesting period, maximizing the quantity of acorns gathered during the acorn season.³¹

PROTECTING STORED FOOD

In many parts of California, the indigenous people built granaries to store small and large seeds. The structures were designed to keep out rain, snow, and hail. Waterproofing was often accomplished by shingling the structures with conifer boughs, brush, or grass thatch. If moisture penetrated the contents, certain kinds of bacteria and fungi could spread rapidly through the granary, destroying the entire contents. The cavity inside the granary also had to be insect-proofed by meticulously lining it with an insect repellent plant such as mugwort (*Artemisia* spp.). To thwart the many small mammals and birds—field mice, ground squirrels, gray squirrels, jays, woodpeckers—that would raid the stash if given the chance, the granaries were very tightly constructed and placed in special locations. The Cahuilla, for example, perched their granaries either on platforms made of poles or, in the mountains, on the flat tops of high boulders, out of the reach of field mice and kangaroo rats. The Sierra Miwok built their granaries on stumps or large rocks. All contents had to be carefully dried and thoroughly inspected for insect exit holes or molds *before* placing them in the granary. One rotting seed could contaminate the whole batch.³²

The Cultural Fabric Surrounding Factual Knowledge

In native California societies, gathering and hunting knowledge was not just a set of facts to be memorized and mechanically followed in the daily harvesting rounds but rather was tied to a comprehensive cultural framework of values, beliefs, and behaviors that clearly defined the place of humans in the natural world. To an extent that it is difficult for a non-Indian to appreciate, nature and culture were closely entwined and interlocking. Knowledge of plants and animals informed culture, and culture shaped the way in which this knowledge was employed.

CULTURAL RULES

Nature was considered fully alive and sensate: every rock, hill, valley, wind, plant, and animal was inhabited by spirit forces. Many cultural rules existed to keep humans from offending these spirits, who might otherwise react emotionally and cause lightning, thunder, whirlwinds, or earthquakes. Taboos were rigidly observed concerning diet, menstrual cycles, and sexual activities before gathering or hunting expeditions.³³ While gathering or hunting, people all over California followed two overarching rules: *Leave some of what is gathered for the other animals* and *Do not waste what you have harvested*. Some acorns were left on oak trees, some berries on bushes, and some tubers in the ground for "the birds and squirrels and other animals," said Marie Potts, a Maidu elder. After picking two bucketfuls of blackberries in Trinity County sometime during the 1930s, Sam Young (Nor-Rel-Muk Wintu) told Edith Van Allen Murphey: "There will be someone here after we are gone. We have enough for our needs now. We Indians like to leave something for the one who comes after." This was a rule adhered to by most if not all California Indian cultures.³⁴

The rituals that surrounded the act of harvesting, hunting, or fishing were as important as the act itself. How one approached a plant or animal—with what frame of mind and heart—was very significant. A personal connection was often made by saying a silent prayer, leaving an offering, and thanking the plant or animal for the gift of its life. Straying from this common practice might result in great diminishment of animal and plant numbers. A prominent Pomo basket weaver explained this personal connection to place and to the plants:

When you come to dig these basket roots, you don't rush in there and run all over, you don't do that. My mother always approached

this grass very slowly. She'd come and stand and say a prayer. She also had a cane, and she'd touch this grass with it very slowly. She didn't go in there and just start digging. She'd come to a certain bed and try it; then she'd go on to another one and try there. Before she ever sat down, she'd do this three or four times. Then she'd sit down. She always asked the Spirit to give her plenty of roots. Then she'd say, "Thank you, Father," before she dug. And after she'd finished and had got what she wanted, she said a prayer which is like saying "That's good, you gave me enough. Amen Father."³⁵

CEREMONIES, SONGS, DANCES, AND MYTHS

Legends, ceremonies, songs, dances, and artistic expressions suffused Indian life, forming the foundation of what Gary Snyder calls a "culture of place." They not only fed the human spirit but also instructed people in right and wrong behavior and how they were obligated to nature. Many of these social and religious observances were connected directly with the conservation of natural resources.³⁶

Important cyclical events in the natural world—each the "return" of an important plant or animal food—were marked by songs, ceremonies, stories, and sacred events. The Concow Maidu celebrated the return of the geese in the goose dance; the Kashaya Pomo held festivals when the wild strawberries ripened; the Maidu honored the coming of the clover. Other rituals anticipated the time when a food crop would be ready to harvest. The Sierra Miwok, for example, held a feast to express the hope that the acorn crop might be abundant. Gashowu Yokuts shamans conducted special crop-propheying dances to tell what kind of seed, clover, and acorn crops would come.³⁷ In these community rituals, native peoples humbled themselves to the more powerful forces that controlled the seasonal rhythms of plants and animals.

The plants and animals used by California Indian tribes figured prominently in their folklore, and this in turn influenced hunting and gathering behavior. In a Tubatulabal myth, for example, jimson weed was once a man, who, when he died, told the people to dig his roots if they were in need of help. With this story in mind, Tubatulabal people made a short speech to the plant before they dug its roots. In a Pomo myth, Marumda the Old Man instructed the first people about what was good to eat. "Here you will eat this kind of food," he said, plucking some clover and eating it. The people imitated him and ate. Then he dug up some potatoes. "These also you will eat," he said. He looked for a spot where acorns had drifted in a pocket in the creek: "These you will gather, and with them you will make mush!"³⁸

Most tribes had legends that vividly told of the consequences that would befall humans if they took nature for granted or violated natural laws. According to a Southern Sierra Miwok legend, Half Dome in Yosemite Valley was at one time whole but was shattered in two long ago when the Creator, angry at the Miwok chief for failing to pray for timely rains to replenish the earth, made a powerful earthquake to punish him. In a Pomo legend, after the people had violated the marriage, hunting, and fishing laws, Marumda the Old Man sent a wildfire over the face of the earth. The Yurok believed that the greed for riches gained through trickery and dissention would ultimately cause the Creator to send a great conflagration that would consume all the world in flames. Legends about destructive fires reflect the almost universal belief among California Indian tribes that catastrophic fires were not a regular, natural occurrence but rather a rare punishment for a serious violation of religious and social rules.³⁹

A KINCENTRIC VIEW OF NATURE

Although native ways of using and tending the earth were diverse, the people were nonetheless unified by a fundamental land use ethic: one must interact respectfully with nature and coexist with all life-forms. This ethic transcended cultural and political boundaries and enabled sustained relationships between human societies and California's environments over millennia. The spiritual dimension of this ethic is a cosmology that casts humans as part of the natural system, closely related to all life-forms. In this view, all non-human creatures are "kin" or "relatives," nature is the embodiment of the human community, and all of nature's denizens and elements—the plants, the animals, the rocks, and the water—are people. As "people," plants and animals possessed intelligence, which meant that they could serve in the role of teachers and help humans in countless ways—relaying messages, forecasting the weather, teaching what is good to eat and what will cure an ailment.

This view of other life as related, equal, and highly intelligent is what Enrique Salmón (Rarámuri) calls a "kincentric" view of the world.⁴⁰ In this vision of the world, nature is not to be treated as a separate entity "out there" that you do not touch or interact with, or labeled as a "scene" that is only to be viewed through a lens or shaped by the stroke of a paintbrush. *Homo sapiens* are full participants in nature, and they share mutual obligations and intricate interactions with many other forms of life.

Reflecting this belief, plants and animals throughout California were greeted with familiarity, as if one were visiting with old friends. The Mihi-

lakawna Pomo elder Lucy Smith recalled what her mother used to say about taking care of her relatives, which she only later recognized as including her nonhuman relatives:

[She said] we had many relatives and . . . we all had to live together; so we'd better learn how to get along with each other. She said it wasn't too hard to do. It was just like taking care of your younger brother or sister. You got to know them, find out what they liked and what made them cry, so you'd know what to do. If you took good care of them you didn't have to work as hard. When that baby gets to be a man or woman they're going to help you out. You know, I thought she was talking about us Indians and how we are supposed to get along. I found out later by my older sister that mother wasn't just talking about Indians, but the plants, animals, birds—everything on this earth. They are our relatives and we better know how to act around them or they'll get after us.⁴¹

Kinship with animals and plants was often fostered at birth. The anthropologist Lee Davis says of the Hupa in northwestern California: "The father of a newborn baby took the stump of its umbilical cord[,] . . . found a sapling of a Douglas fir tree and split its most upward pointing branch, placed the umbilicus inside the split and tied the branch back around the baby's navel stump. As the baby tree grew up, so the child's physical and spiritual growth was measured."⁴² California Indians frequently named their children after a plant or animal—again demonstrating that humans were not superior to nature but a part of the natural system. Yuki names include *A'síumnának* ("woodpecker head") and *Musak' ón'li* ("little cedar girl"). The Wappo name *Pipimeta* meant "quail woman," and *Awetulpi* meant "potato valley woman." The Sierra Miwok gave each other special names associated with trees, such as *Sumtciwe*, a female name referring to the fuzz on a young sugar pine cone. The Rumsen Ohlone held naming ceremonies under redwood trees.⁴³

Jaime de Angulo, a physician who recorded the grammar and literature of the Pit River people in the Alturas region of California beginning in the 1920s, asked Bill, a Pit River man, how to say "animal" in his language. Bill replied, "Well . . . I guess I would say something like *teequaade-wade toolol aakaadzi* which means 'world-over, all living.' . . . I guess that means animals, Doc." Jaime then said, "I don't see how, Bill. That means people, also. People are living, aren't they?" Bill said, "Sure they are! that's what I am telling you. Everything is living, even the rocks, even that bench you are sitting on. . . . Everything is alive. That's what we Indians believe. White people think everything is dead."⁴⁴

Trusting that respect and understanding would come through relationship, native people believed that animals—birds, toads, lizards, bears—could become familiar with, even grow accustomed to, the ways of *Homo sapiens*. Thus, we see many examples of indigenous groups living and interacting with potentially dangerous animals. When a man or a woman of the Pass Cahuilla met a California grizzly bear in the mountains, he or she called the latter *piwil* ("great-grandfather") and talked soothingly to him, saying, "I am only looking for my food, you are human and understand me, take my word and go away."⁴⁵

As part of treating other life with respect, California Indian cultures shared an ethic that prohibited needless killing. One old Paiute man said, "I have never shot anything in my life but what is good to eat." Ishi attributed the cause of Saxton Pope's bad luck in deer hunting to his needlessly killing a rattlesnake on the trail. Pope said of Ishi, "He respected these reptiles, and always preferred to walk around a snake, wishing him well and leaving him unharmed."⁴⁶ In *Ecologies of the Heart*, the ethnobiologist Eugene Anderson writes, "[A] properly socialized individual had a powerful sense that the wild world was feeding him, and he ought to be as grateful and as anxious to act decently as he would to any human who fed him out of sheer kindness. Naturally wanton killing was virtually tantamount to murder, and ungrateful murder at that."⁴⁷

Native people reconciled the killing of their plant and animal kin by following certain rules when hunting and gathering (e.g., do not waste or overharvest) and by sharing the bounty with needy relatives and friends. They believed that the necessary sacrifice of some creatures is made for the good of all creatures. "The killing and eating of other beings," writes the human ecologist Paul Shepard, "is understood by most tribal peoples as part of a larger gift of life rather than a victory over nature."⁴⁸

Recognizing the impact of killing other creatures for food, California Indians in various tribes were careful to restore harmony through acts of reciprocity: offerings, prayers of thanks, special ceremonies, and management of habitats to benefit the plants and animals not taken. Thus, California Indians were predators of deer, antelope, and tule elk but also their benefactors. Clara Charlie, a Chukchansi/Choynumni (pers. comm. 1989), explained how animals were helped by regular burning: "My husband's family . . . burned to keep things clear. They also burned for the animals—the deer, bear, rabbits, and squirrels. The new growth the following spring gave them better and higher-quality foods such as buck brush."

Human Rhythms Tied to Natural Cycles

California Indians knew, unequivocally, that their lifelines as humans lay in the cycles of the land. Events were timed with the coming and going of animals and the ripening of culturally important plants. This synchrony was a constant reminder that human destiny and nonhuman life were intimately intertwined. Even the conception of a baby might be planned around specific seasons marked by animal births and the sprouting of plants. The most favorable time for a Miwok woman to have a child was between the months of March and June because, as a Southern Sierra Miwok man explained to a Belgian argonaut, “[i]t is when the Spirit gives existence to everything, that the *’Ohha* (woman) should also give existence.” He further commented that during these months, “he [the sun] is superior in his turn, makes everything grow, the birds in the air, terrestrial animals, and plants.”⁴⁹

Time was not tied to one’s wrist and mechanically broken down into tiny increments of seconds, minutes, and hours. The time of day, for instance, was estimated from the length of one’s own shadow.⁵⁰ The round of the seasons was a circular continuum—solidly connected to complex biological phenomena such as the annual flights of waterfowl, the migration of whales, and the ripening of the acorn crop.

The continual renewal of life from the source—the salmon from their parents’ birthplace, the rivers from their headwaters, the young sprouting redbuds from the ashes of their forebears—was intimately understood by indigenous people. Lunar calendars often reflected the importance of these cyclical events by devoting a lunation to the yearly arrival of a migrating animal or the coming into being of a food crop. The Wappo called one lunar cycle in late spring (our May) *Wa’ ate-hin*, or “pinole moon.” The Northern Maidu designated the same lunation as *Kon-moko*, the time to harvest the seeds, fish, and geese in the valley. A later lunation (September) was named *Se-meni*, or “seed,” in the mountains. The Central Pomo calendar designated a time, *Umchachich-da*, when the seeds ripened. In the Cupeño calendar, one of the lunations is *Tausumbakmaiyl*, or the ripening of grass seeds. April, or *Kapchelum*, was the month for gathering yampah (*Perideridia* spp.) on the northern California Klamath calendar.⁵¹

In addition to dividing the year into a sequence of lunar cycles, the indigenous people of California recognized the cycle of the sun and its more direct connection to seasonal changes. Native people drew spiral pictographs—sets of connected concentric rings radiating out from a center—on cave walls and rock shelters in locations where they are illuminated by the rising sun on the winter solstice.⁵² Solstice ceremonies, such as those practiced among

the Chumash, acknowledged the seasonal changes of the sun, which in turn affected the availability of plants and animals for food and other needs. In *Stories and Legends of the Palm Springs Indians*, the Cahuilla chief Francisco Patencio wrote:

In this tribe were some older people who put up signs to gauge how the sun shone. They found they had to keep moving the stick to the right for a long time, and then to the left, and so by this means they discovered what times the birds had their nests, and what times the animals had their young, also what time the plants grew, and the time the seeds were ripe. This they did year after year as they studied the signs of the sun.⁵³

Native peoples’ movements were also keyed to seasonal cycles. The territories of many tribes were for the most part laid out in an east–west orientation, covering a sequence of elevational zones. At each elevation was a seasonal camp, used when the annual cycles of ripening and population movements yielded abundant resources there. Early anthropologists mistook these movements for a nomadic life, but in actuality indigenous people migrated seasonally within a home territory, returning to the same summer camps and winter villages as had the generations before them. The areas around their villages were familiar, and each useful tree or patch was worked and reworked, thus creating a patterned, semisedentary life.

The cyclical departures and returns of wildlife were so predictable that California Indians, with their weirs, nets, and traps, could have extinguished large numbers of animals. Yet for the most part they did not, having learned that yearly abundance could be ensured by working *with* nature instead of taking advantage of it.⁵⁴ Similarly, they easily could have extirpated populations of annual wildflowers through overharvesting, but instead they were careful to leave seeds so that the plants were maintained in magnificent abundance.

According to various California Indian narratives, humans were given specific instructions through the spirit world to protect the earth’s self-replenishing character. To carry out this directive, the people conducted world renewal ceremonies to drive away sickness, prevent natural disasters such as earthquakes, landslides, or floods, and tap the abundance of salmon, acorns, and other foods that lies dormant, waiting for humans to bring it forth. Some of these traditions are still enacted today.⁵⁵