

Part 4

Plants

and insects

around the lagoons

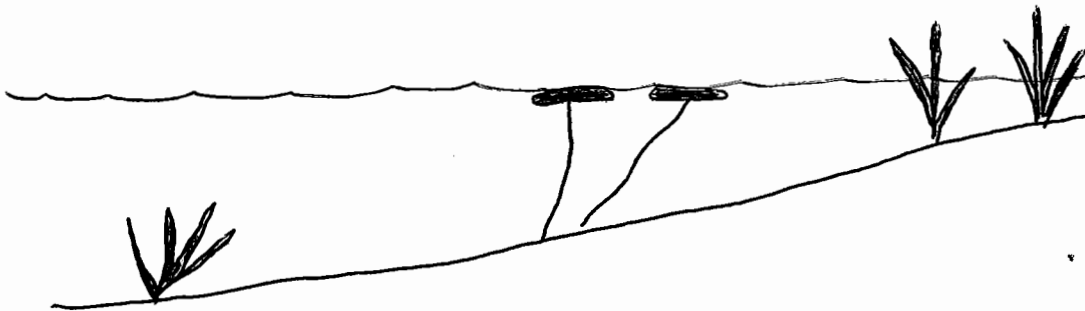
How have plants adapted?

Southern California plants must be drought-tolerant, able to survive long periods of low rainfall and dry soil. Such plants tend to have small, insignificant leaves, since water is lost through leaf surface. Succulents, such as the prickly pear cactus need little water.

However, wetland soils are periodically flooded. These blackish soils are so saturated with water, that they hold little oxygen. Because oxygen is essential for decomposition, these anaerobic soils do not readily decay or break down dead matter.

Plants have special adaptations to allow them to survive in wetlands. Many have hollow stems to allow oxygen to reach the roots.

Some wetland plants float in the water, some live underneath the surface, and some poke up above the surface of the water.



Submergent

Plants live under the surface of the water.

Floaters

Plants are rooted in the bottom. Leaves float at the surface.

Emergent

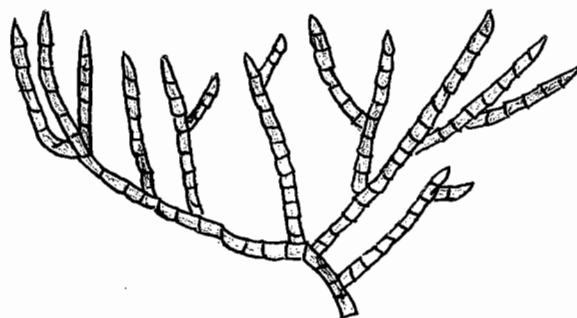
Plants stick up above the surface of the water.

Plants growing in salty water

Salt water is harmful or toxic to most plants. **Halophytes** are plants that have adapted to grow in the salty soil of a marsh. However, even these plants are stressed by the presence of salt; they grow better in fresh water. Such plants often have fleshy tissues full of water to dilute the salt.

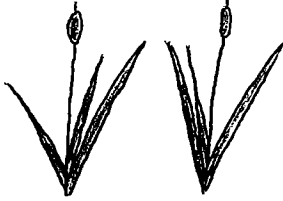


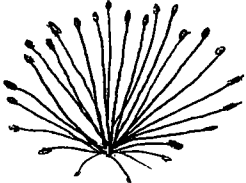

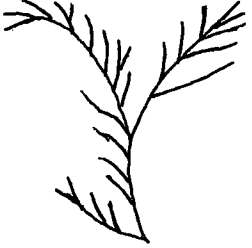
Halophytes have special means of eliminating salt. One way is to excrete salt; this is what humans do when they perspire. Other plants exclude salt from their tissues. In contrast, pickleweed concentrates salt in its tips, which turn reddish, and fall off, thus eliminating salt from the plant.

<i>Plant adaptation</i>	<i>Method</i>	<i>Example</i>
Accumulator	Salt builds up in leaves, which drop off.	Pickleweed
Excreter	Salt is eliminated on the underside of leaves.	Salt grass, Sea lavender
Excluder	Salt is excluded, or kept out of plant tissues.	Jaumea

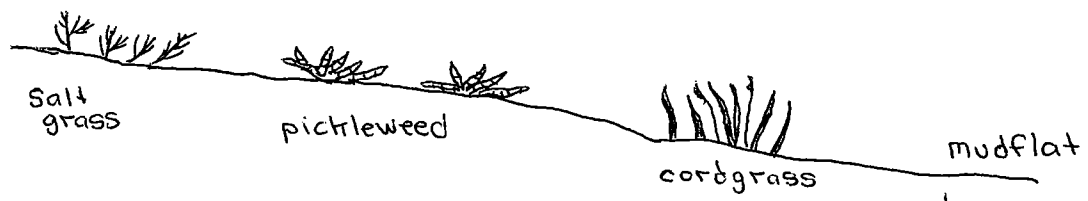


Native Plants of the Salt Marsh

The cards below list some of the ways native plants were used by early Kumeyaay inhabitants.

<p>Cattail Cigar-shaped flowers. Requires fresh water.</p>  <p>Cattails were used for weaving, and ground to form a flour for baking.</p>	<p>Pickleweed (<i>Salicornia</i>)</p>  <p>Growing in salt marsh, its salty taste is like that of a pickle.</p>
<p>Cord Grass (<i>Spartina</i>)</p>  <p>Tall grass growing near water level. Clapper Rails weave floating nests in Cord Grass.</p>	<p>Spiny Rush (<i>Juncus</i>)</p>  <p>Reeds were split and woven into baskets.</p>
<p>Jaumea Succulent plant with tiny yellow flowers.</p>  <p>Grows in the middle zone of the salt marsh.</p>	<p>Salt Grass (<i>Distichlis</i>)</p>  <p>You may see tiny crystals of salt on the underside of the grass. Kumeyaay would thrash the grass to obtain salt.</p>

The plants in the salt marsh vary with height above sea level. The plants growing in the lowest regions are the most salt-tolerant.



Native Plants of the Coastal Sage Scrub

White sage

Fuzzy gray-white leaves.



Sage was boiled, and the steam inhaled to cure coughs and colds. Seeds were toasted and eaten as a type of cereal.

Black sage

Pale lavender flowers.



Seeds and leaves were ground for seasoning food.

Coastal sagebrush

(*Artemesia*)

Soft, feathery leaves.



Used as a flea repellent, and to mask a hunter's odor. Leaves were brewed for a tea to cure stomachaches and colds.

Lemonadeberry

Waxy evergreen leaves.

Pink blossoms & berries.



Berries were used by Kumeyaay to make a lemonade-like drink.

Laurel Sumac

Leaves fold like little tacos.



Leaves were boiled for herbal remedies.

California buckwheat



Leaves were brewed into a tea, used for medicinal purposes.

Coyote brush

Small white flowers, waxy green leaves.



Kumeyaay used branches to cover shade structures called ramadas.

Coastal goldenbush

Yellow flowers bloom in summer and fall.



Birds like to eat goldenbush seeds.

Native Plants of the Coastal Sage Scrub

Our Lord's Candle

(*Yucca whipplei*)



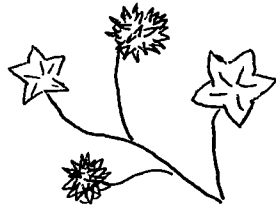
Stalks were roasted and eaten; roots were ground for soap. Leaves were beaten to obtain fibers for nets.

Prickly Pear Cactus



Kumeyaay ate the fruits. Pads were sliced and applied to wounds, and cooked into a stew. Prickly spines were used as tools, and for tattooing skin.

Wild Cucumber



Seeds were ground for paint pigments; balls were used as marbles by children. Roots were mashed, and thrown in water to stun fish.

Bladderpod

Yellow flowers.



Dried pods were ground up for seasoning foods.

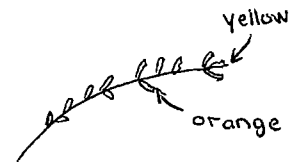
Elderberry

Toothed leaves. Clusters of white flowers and blue berries.



Berries are edible, and can be made into jams or wine. Flowers were made into a tea to cure fever. Hollow stems were made into flutes or clapsticks.

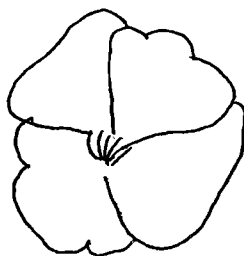
Deerweed



Yellow flowers at branch tips serve as an advertisement to bees for pollination. Older flowers are orange.

Wild Poppy

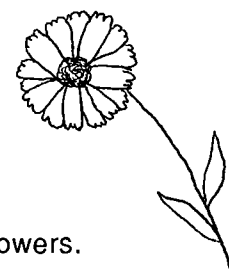
Orange petals.



This is California's state flower, and protected by law. Please do not pick it.

California bush sunflower

(*Encelia*)




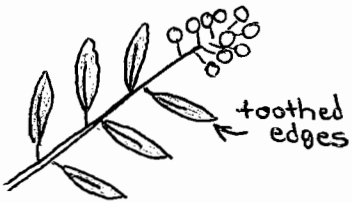


Yellow daisy-like flowers.

Plants of the Chaparral

The word Chaparral comes from the Spanish word for live oak (*chaparro*). Around San Diego, you're more likely to pass through scrub oak, more of a shrub than a tree. Chaparral consists of dense thickets of thorny bushes.

The earliest western cowboys were called vaqueros, from the Spanish word for cows (*vaca*). Vaqueros found chaparral regions nearly impossible to pass through, so they began wearing leather leg coverings, called chaps. Even their horses would wear chaps!

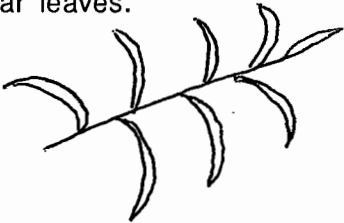



Chaparral has an amazing ability to withstand fire. After a fire, the plants will resprout from their roots.

<p>Chamise Tiny needle-like leaves.</p>  <p>Branches were used for fuel, and used to make bows and arrows. Its oils were extracted for skin infections.</p>	<p>Toyon (Holly) Red berries.</p>  <p>Toyon berries were eaten, raw or cooked. They have a bitter taste.</p>
<p>Warty-stemmed ceanothus White blossoms.</p>  <p>Branches were used for arrows.</p>	<p>Scrub Oak Leathery leaves.</p>  <p>Branches were used for baskets. Acorns were ground to make flour; however Kumeyaay preferred acorns from mountain areas.</p>

Trees of the lagoon

Trees are an important part of the ecosystem, providing:

1. Shelter for birds and animals
2. Food for animals
3. Shade for plants
4. Roots that stabilize the soil, preventing erosion

<p>Arroyo Willow tree Narrow linear leaves.</p>  <p>Kumeyaay used branches for shelter, bark for fibers and a medicinal tea.</p>	<p>Cottonwood tree Heart-shaped leaves.</p>  <p>Kumeyaay used branches as poles to construct their houses.</p>
<p>California Sycamore Five-lobed leaves with hanging ball-like fruits.</p>  <p>Common along stream beds.</p>	<p>Eucalyptus tree Elongated leaves.</p>  <p>This tree is not native to the area; it was imported from Australia, to provide wood for railroad ties. It turned out to be too brittle.</p>

Born on the wind

Many trees, such as willows, are pollinated by wind. Willows have long, narrow, hanging flowers called catkins. Male and female flowers are on separate trees. The yellow male catkins produce pollen, carried by the wind to female flowers.

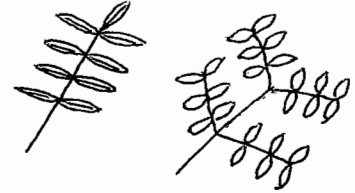
After pollination, fluffy white seeds are released to the wind from female catkins.



Get to Know a Tree

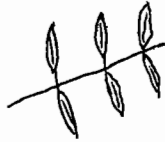
Choose a tree, and make careful observations of it.

Look at its leaves: Are they simple or compound?



How are the leaves arranged?

Opposite



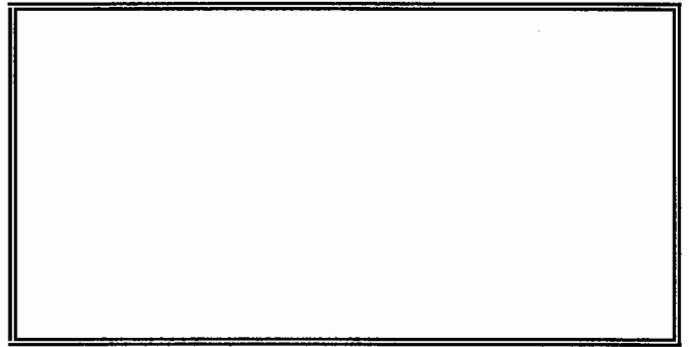
Alternate



Whorled



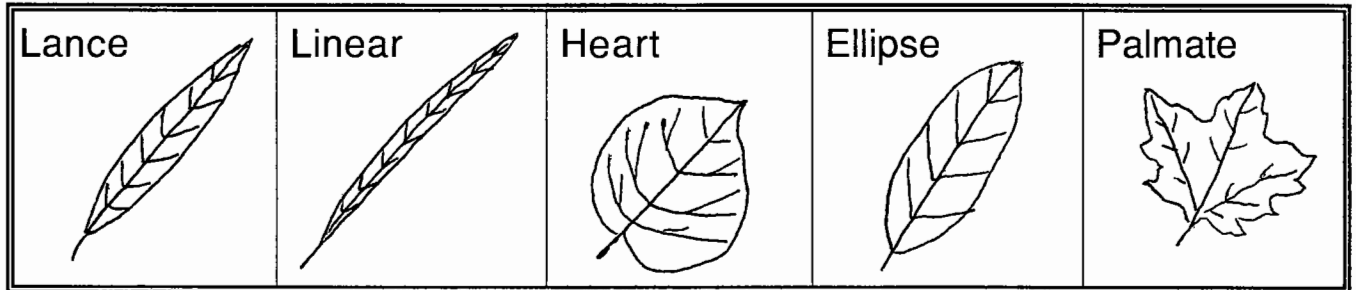
Draw the shape of your leaf:



Are the leaf edges smooth or toothed?



How would you describe the shape of your leaf?



Do you see any flowers or catkins?

On the back of the sheet, do a rubbing of the bark.

Introduced Species

Many plants have been introduced to California from other lands. Sometimes they were brought on purpose, for decoration, medicine, or as food for animals. Often plants arrived accidentally, as seeds in grain, or even in soil loaded into ships for ballast.

The first exotic plants arrived with the Spanish after 1769. The numbers rose dramatically with colonization, and as more settlers arrived.

Wild Mustard

Clusters of yellow flowers.



Spanish padres are said to have scattered mustard seeds to mark El Camino Real, the royal road.

Wild Radish

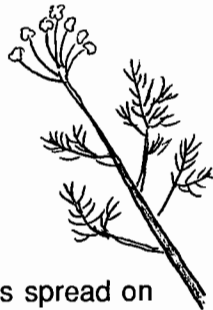
Four purple petals.



Seed pods are edible, as are the roots.

Fennel

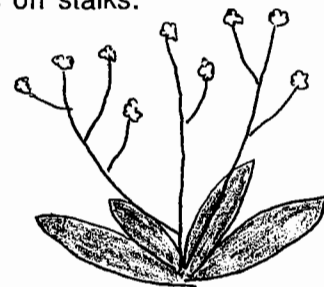
Clusters of yellow flowers.
Feathery leaves.



Smells like licorice. Fennel was spread on mission floors, to provide a pleasing aroma.

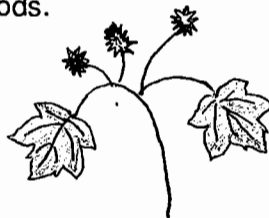
Sea Lavender

Violet flowers on stalks.



Cocklebur

Prickly seed pods.



This plant has seeds adapted to stick to animal's fur to be spread widely.

Tree Tobacco

Tubular yellow flowers.







This plant is too poisonous to eat or smoke.

Invasive Plants

Some non-native plants are particularly harmful to the environment. These invasive plants spread rapidly, aggressively crowding out native plants. They often absorb more water than surrounding plants; some change the soil chemistry, making it unfavorable to native plants.

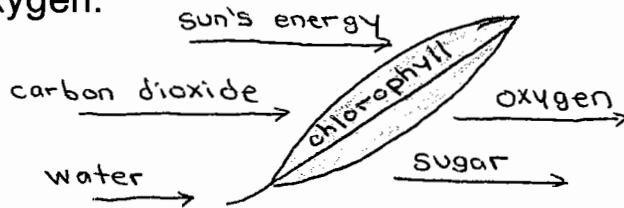
Such invasive plants include: eucalyptus trees, iceplant, sea fig, pampas grass and tamarisk. Wild mustard and radish often take over hillsides around the lagoons.

Local lagoon conservancies work to regularly remove these invasive species. However, they often resprout from roots or seeds. In many places where invasive plants have been removed, wild flowers have returned.

<p>Pampas grass Clumps of long grass with purplish plumes.</p>  <p>Chokes out native plants; dried leaves create a fire hazard.</p>	<p>Hottentot fig Yellow flowers, with fleshy stems.</p>  <p>Planted for erosion control, it often has the opposite effect, pulling down slopes.</p>
<p>Tamarisk Large shrub with tiny leaves, pinkish tips.</p>  <p>It absorbs large quantities of water, lowering the water level in soil available to other plants .</p>	<p>Arundo Donax Giant bamboo-like reed.</p>  <p>These reeds choke waterways, crowding out cattails and bulrush.</p>

Plants make their own food

Plants are **producers**: they make their own food, using a green chemical in their leaves called chlorophyll. Plants take water from their roots, carbon dioxide gas from the air, and energy from sunlight. Mix them together, and the wonder of **photosynthesis** produces sugar and oxygen.



A leaf is a food factory

One plant that grows near wetlands is unusual. It has no leaves and no roots. It has no green chlorophyll, and can't make its own food.

How does it survive? It survives by sucking life from other plants. Its name is Dodder, also called Witches' Hair, because it looks like a long thin orange filament.

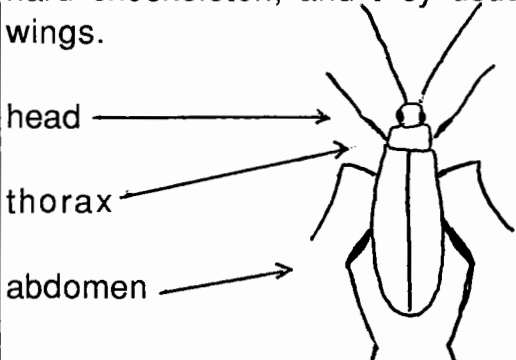
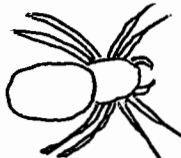
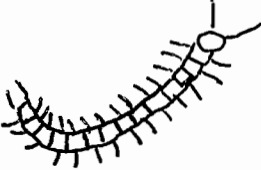


Dodder has minuscule white flowers, which form a tiny fruit with seeds. Seeds drop to the ground, where they may remain dormant for up to four years. When the seeds germinate, they send up a tendril, which seeks a host plant. If it doesn't find a host within a few days, it will die. It often grows on pickleweed, jaumea, or buckwheat.

If the baby plant finds a host, it coils and wraps around the plant, attaching itself with modified roots, called *haustoria*, that cut into the host's stem. It then absorbs water, minerals and sugars from the host.

Dodder is a parasite, and the host plant can be weakened by this infestation. A single dodder vine may extend for 12 feet, though there are reports of a vine extending for half a mile!

Insects around the lagoon








<p>Insects have 6 legs and 3 body parts.</p> <p>They have compound eyes, antennae, a hard exoskeleton, and they usually have wings.</p>  <p>head →</p> <p>thorax →</p> <p>abdomen →</p>	<p>Spiders have 8 legs and 2 body parts.</p>  <p>Other arthropods may have many legs.</p> 
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Life cycle of insects

Many insects undergo metamorphosis, a complete transformation.

Butterflies start life as a caterpillar (larva), then form a chrysalis (pupa), emerging as an adult butterfly.

Other insects, such as grasshoppers, begin life as a nymph, that looks similar to the adult form. The nymph sheds its skin several times as it grows to an adult.

Complete metamorphosis				
egg	larva	pupa	adult	
				
Incomplete metamorphosis				
egg	nymph		adult	
				
<p>Many nymphs live in water, and are a food source for fish.</p>				

Insects around the lagoon

Ladybird beetle

Red with black markings,
commonly known as a ladybug.

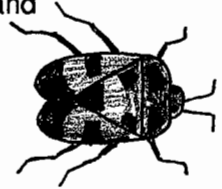


larva



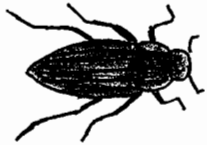
Harlequin bug

Less than half an inch in size.
Dark colored, with orange and
yellow marking.



Darkling ground beetle

Commonly known as a stink bug. It defends itself
by giving off an unpleasant odor.



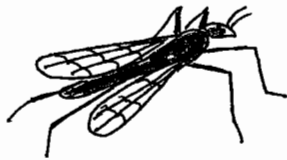
Dragonfly

Immature nymphs develop in water.
Adults prey on mosquitos.



Cranefly

It looks like a giant mosquito.



Swallowtail butterfly

Yellow and black in coloration.



Spittlebug

Small jumping insects.
Nymphs feed amid
a ball of froth.



Mud dauber wasps

Females build nests with mud.



Symbiosis: A Perfect Match

A plant depends upon a moth for survival, while the moth depends upon the plant. Yucca flowers are only pollinated by one species of moth. In return, yucca seeds serve as the sole food source for the moth's larva.

The Mojave Yucca has long sword-like leaves with spiked tips, like daggers. When in bloom, white flowers cluster atop a stalk. Native Americans ate the yucca's fruits, used its fibers for baskets, and made soap from its root.

In spring, the white Yucca moth comes out at night. After mating, the female gathers several pollen grains from a yucca flower, and transfers them to the pistil of another flower. After pollination, the flower's ovaries form seeds, surrounded and protected by a fruit. These seeds will grow the next generation of yucca plants.

After pollinating, the female moth lays her eggs inside the flower's ovary. When these eggs hatch, the pink larva (caterpillar) eats seeds inside the developing fruit. When the larvae have eaten enough, they drop from the plant and bury themselves in the ground. They form a silky underground cocoon, and remain here during winter.

In spring, adult moths emerge, just as the yucca flowers are blooming. The cycle continues, as moths seek nectar from the yucca flowers, transfer pollen, and lay their eggs.

The moth is essential to the survival of the yucca; the yucca is essential to the survival of the moth. This type of symbiosis where both species benefit is called mutualism.

