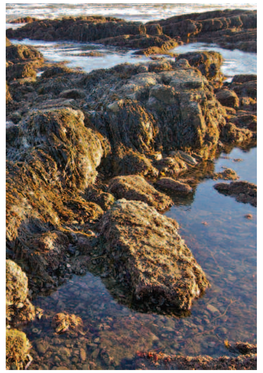
9 Kelp Beds *(continued)*

Do It! Look for *algin*, *alginate* or *carageenen* in your foods to see if you are eating seaweed!

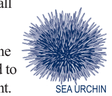
Make sure your trash gets into a covered trash can, recycle when you can and most importantly reduce packaging, Most of the debris found floating, caught in the kelp and washed ashore are plastics used for packaging. Check to see when you buy products if you can buy in bulk or select those that have less packaging and are reusable. By reducing our consumption of disposable products we save energy and water, too.

10 Point Fermin State Marine Park



The Point Fermin State Marine Park was established in 1969 to reduce the destruction of plants and animals in the tidepool area and preserve its diverse marine life. It extends one-half mile from Cabrillo Beach to the base of the Point Fermin Lighthouse in San Pedro.

The regular rise and fall of the ocean, caused by the gravitational pull of the earth, moon and sun is referred to as tides. Tidepools are formed by depressions in the rocks that trap water as the tide goes out. The best time to visit the refuge is at low tide, when most of the rocks and pools are exposed. Tidepool animals live in different zones depending on their ability to adapt to harsh conditions that include battering waves, drying out and access to food. Remember to watch the waves even at low tide. The rocks will be wet and slippery, which can make even small waves dangerous.



SEA URCHIN

The diversity of plants and animals attests to the many different ways that species have evolved to protect themselves in this rigorous environment. To cling tightly to rocks in surf, **barnacles** glue themselves down, **mussels** attach with tough fibers they secrete and **shore crabs** use their hooked legs to hold on to rocks. Empty snail shells provide **hermit crabs** refuge from battering waves and predators. To avoid drying out at low tide, **limpets** pull their shells tightly against the rock to seal in moisture, barnacles close up their shell plates and **sea urchins** live in damp holes. **Sea anemones** shield themselves with shell fragments, pebbles and seaweed.

HERMIT CRAB

The collecting of seashore animals and plants is prohibited throughout California without a Fish and Game license. Collecting in this refuge is NOT allowed, with the exception of hook-and-line fishing of finned fish. Bait collecting is also prohibited. The cliffs above PFSMP are also Monterey shale from the late Miocene period. **Fossils** of whales and fish from 16 million years ago are in this formation. Along the cliffs, three **storm drains** descend from the housing community above bringing anything that enters the gutters down to the ocean, including trash and animal waste. The **"Spanish breakwater"** that extends into the water at the beginning of the refuge was a cover for the lower part of the drain that descends from 40th Street. Avoid contact with any water flowing out of these pipes and swim at least 100 yards from any storm drains.

Along the base of the cliffs is a military **bunker** which was to be used by the Coast Artillery during World War II as part of a defense system. It is one of five mining casements originally constructed in 1916. The plan called for placing floating mines in Los Angeles Harbor, with electrically controlled detonation from the bunkers; however, the harbor was never mined and the bunkers were never used. Care should be used in moving around the remaining walls of the bunker, because the constant battering of the surf has made them unstable.

Do It! At low tide, select a tidepool to observe for a few minutes and count how many different organisms you see. The longer you look, the more you may find. Touch gently and leave all animals where you find them.

There are three storm drains leading into Point Fermin State Marine Park carrying rainwater, soap from washing cars, pet waste, dead leaves, oil and more. You can reduce the impact of gutter water by "adopting your gutter" and being responsible for keeping it clean. As you keep the gutter in your neighborhood clean you're also protecting the beach by preventing damage from stormwater runoff. Help recharge groundwater by creating planters in your yard and, when you can, join beach cleanups. Together we can make a difference.

11/12 Stephen M. White and Juan Rodriguez Cabrillo Statues

Stephen M. White was a U.S. Senator who defeated efforts to move all major port business from San Pedro to Santa Monica in 1896. He opened the way for the federally constructed breakwater that transformed the extensive mudflats of San Pedro into the Port of Los Angeles.

In 1542 **Juan Rodriguez Cabrillo** was the first European explorer to see the coast of California. He landed on the beach that bears his name. At the base of his statue is a bronze benchmark, put there by the U. S. Coast & Geodetic Survey as a reference point from which to measure how far the mountains rise above sea level and how far the tides rise and fall.

13 Cabrillo Marine Aquarium

Cabrillo Marine Aquarium (CMA), designed by world-famous architect Frank O. Gehry, features exhibits of Southern California's unique coastal environment. The Virginia Reid Moore Research Library, the hands-on Exploration Center and Aquatic Nursery designed by Barton Phelps are recent additions to the Aquarium. CMA is a facility of the City of Los Angeles Department of Recreation and Parks and is also supported by the non-profit FRIENDS of CMA. It provides a variety of activities for all ages. Become a member and enjoy advance notice of Aquarium activities, new exhibits, invitations to special events, discounts on programs and in the CMA gift shop and much more.

Visit the watershed interactive exhibit in the Exploration Center to find out more about how you can make choices to protect our shore. Storm drain pipes carry water from the streets of Point Fermin neighborhoods into the ocean. What message should we place by these catch basins in our neighborhoods? Have you seen a message near your gutters that tells the same thing?

Please record your observations on the chart below.

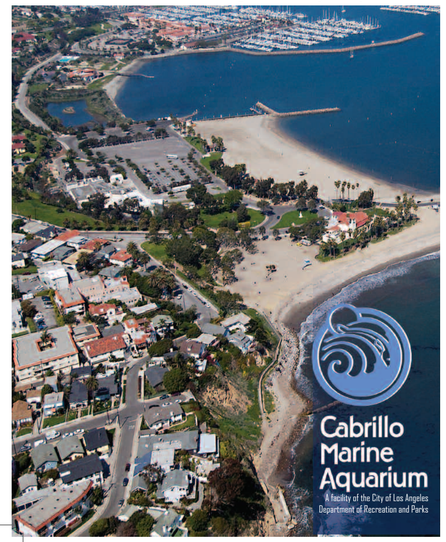
	salt marsh	native garden	inner beach	pier	outer beach	tidepools
great blue heron						
snowy egret						
brown pelican						
gull						
round stingray						
schooling fish						
grunion						
butterfly						
mussels						
barnacles						
sea anemone						
kelp flies						
hermit crab						
limpet						
purple sage						
buckwheat						
pickleweed						
eelgrass						
giant kelp						
beach wrack						
diatomaceous earth						

Cabrillo Marine Aquarium
A facility of the City of Los Angeles Department of Recreation and Parks

WALK CABRILLO

Cabrillo Beach Coastal Park A Diversity of Habitats

No other oceanfront in metropolitan Los Angeles offers such a range of seashore habitats within a short walking distance. Do as much or as little of the tour as time and energy allow, knowing that no two trips around the Coastal Park will ever be the same – there are new things to see every time you visit!



While the Coastal Park can be thoroughly enjoyed with a minimum of preparation, the following tips can help enrich future visits:

- Wear comfortable walking shoes
- Wear sunscreen
- Bring a windbreaker or jacket (winds can pick up suddenly anywhere in the park)
- Consult local tide tables (the Marine Park is best explored during low tides)
- Bring binoculars
- Bring a camera
- Bring a friend!

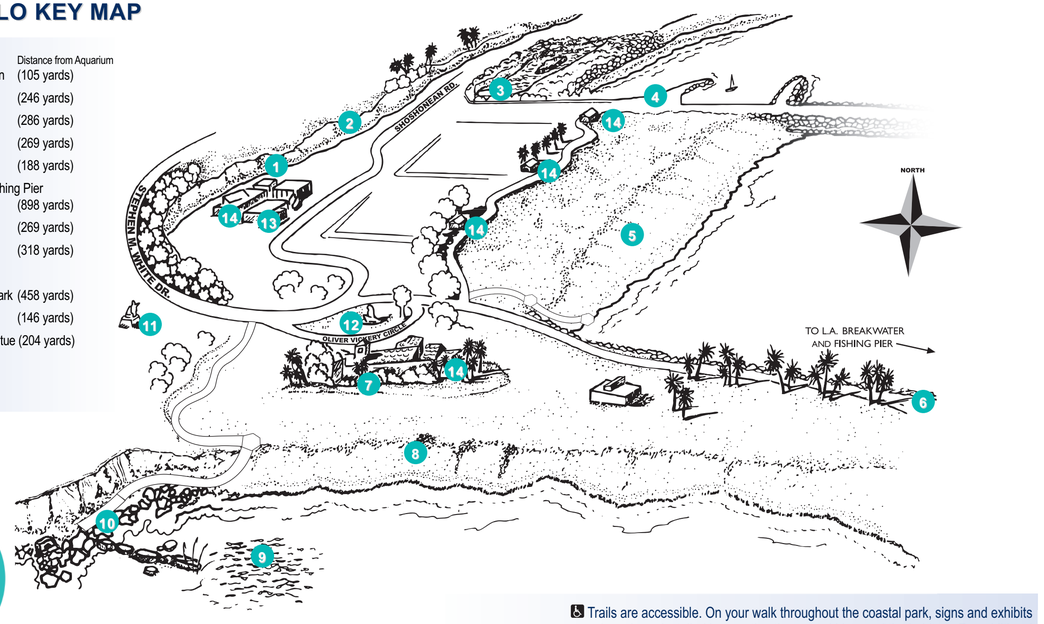
If you are visiting during Cabrillo Marine Aquarium operating hours, be sure to borrow a key for the salt marsh gate BEFORE going to the marsh!

We all connect to the ocean through the watershed. The watershed is the area of land from which water flows to a larger body of water like a lake or ocean. In Los Angeles there are four main watersheds (Los Angeles River, San Gabriel River, Dominguez Channel and Lower Santa Monica Watersheds). All of these watersheds carry water from the mountains and cities of the Los Angeles Basin into the ocean. Any trash or toxins found in the gutter also get carried to the ocean. In areas where water can perculate back into the soil, the freshwater aquafers underground are restored and that water can be pumped out when fresh water is needed.

As you move through the Cabrillo Beach Coastal Park, notice the connections to the watershed. In this guide watershed connections are marked by a water drop.

WALK CABRILLO KEY MAP

	Distance from Aquarium
1. Coastal Native Plant Garden	(105 yards)
2. Cliffs/Fossils	(246 yards)
3. Salinas de San Pedro	(286 yards)
4. Boat Launch Ramp	(269 yards)
5. Inner Cabrillo Beach	(188 yards)
6. L.A. Harbor Breakwater/Fishing Pier	(898 yards)
7. Cabrillo Bathhouse	(269 yards)
8. Outer Cabrillo Beach	(318 yards)
9. Kelp Beds	
10. Point Fermin State Marine Park	(458 yards)
11. Stephen M. White Statue	(146 yards)
12. Juan Rodriguez Cabrillo Statue	(204 yards)
13. Cabrillo Marine Aquarium	
14. Restrooms	



WALK THE WALK BE EARTH FRIENDLY

Trails are accessible. On your walk throughout the coastal park, signs and exhibits have been installed interpreting the natural history of the habitats. For additional assistance out to the sand, beach wheelchairs are available for checkout at the Aquarium.

Cabrillo Marine Aquarium
3720 Stephen M. White Drive
San Pedro, CA 90731
TEL. : 310-548-7562
TTY: 310-548-2052
www.cabrilloaq.org

Walk Cabrillo is printed through generous grants from the Water Replenishment District.

Aerial photo courtesy Los Angeles Harbor Department
Habitat photos: Gary Florin

SEASONAL EVENTS:

Grunion Program: Cabrillo Marine Aquarium presents special evening programs March through July to watch the grunion fish come up onto the beach to lay their eggs. Schedules are available in January.

Sea Rangers: Aquarium volunteers take their enthusiasm and knowledge out to the coastal park's habitats to interpret to the public. Contact the Aquarium to find out when and where you can meet them.

Adopt-a-Beach/Earth Day: Join Cabrillo Marine Aquarium staff and volunteers to help make a difference by cleaning up Cabrillo Beach and tidepool areas. Adopt-a-Beach occurs in September and on Earth Day in April. Keeping our beaches clean is a year-round program available the first Saturday of each month.

Tidepool Walks: Weekend tours of Point Fermin State Marine Park occur periodically throughout the year. Call the Aquarium for scheduled dates.

A facility of the City of Los Angeles Department of Recreation and Parks

Accredited by the ASSOCIATION OF ZOOS & AQUARIUMS

1 CABRILLO BEACH COASTAL NATIVE PLANT GARDEN

The Native Plant Garden established by Cabrillo Marine Aquarium in 1997 represents a coastal sage scrub community that is native to Southern California. Adapted to a "Mediterranean climate" (hot summers and mild winters), these plants are drought tolerant and can survive in nutrient-poor soil. Coastal sage scrub is recognized as a threatened plant community in Southern California with 60-90% already gone. There are two main native plant gardens: one is located behind the upper parking lot by the main aquarium, and the other is located by Salinas de San Pedro. These gardens provide shelter and nutrients for many insects and birds, including the **blue butterfly**, **harlequin bug** and **hummingbirds**, all of which are dependent on this type of plant community.

Native plants have been used traditionally by Native Americans for food, medicines, dyes, ropes, shelter and clothing. **Purple sage** and **sagebrush** are highly fragrant shrubs that were made into teas to treat stomachaches, fevers and colds. **California buckwheat** has clusters of white flowers that turn brown as they dry. These flowers were used as an eyewash by local peoples while the red tubular flowers of the **California fuchsia** were used in dyes. Some local groups are still using native plants for various purposes.

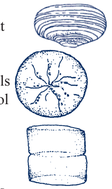
The native plant gardens survive primarily on rainwater. Their extensive root systems help keep sediment from washing into the ocean. When they are dormant (summer and fall) they often have smaller leaves or drop leaves to keep from drying out. Try to visit the garden during different seasons or compare the plants in the garden with the native plants in the Aquarium courtyard that are watered year round. Establishing your own native plant garden can create much-needed habitat for some of these organisms. Native plants can be very successful in your garden, requiring little water or care once established.

Do It! Use your senses of touch, smell and sight to gently compare leaves of different plants along the path and try to determine how they are adapted to this habitat.

2 Cliffs/Fossils

The cliffs that run behind the Aquarium and along the back of the Coastal Park are predominantly Monterey shale. Monterey shale is a sediment composed of very fine-grained sedimentary rocks that once formed the ocean bottom.

Within the cliffs are billions of compressed shells of microscopic algae called **diatoms** that can be identified as white layers amongst the shale. The shells are made of silicon dioxide, the main constituent of glass. These sharp shells make diatomaceous earth, which is used in pool filters as well as insecticides, toothpastes and other items requiring an abrasive material. Diatomaceous earth was also used to make chalk. Fossils of deep-sea life such as hatchetfish may also be found within the layers. A late Pleistocene (Ice Age) outcropping of the Palos Verdes formation dating back 100,000 years is present as well. The fossils in this outcrop are primarily purple olive snails and clams of the genus Macoma.



Care should be taken around the cliffs. Many of the rocks and patches of diatomaceous earth crumble easily and do not support climbing. Care should also be exercised when handling fallen pieces of diatomaceous earth, because the microscopic glass shells can irritate eyes and the linings of the mouth and nose.

Do It! See if you can notice different layers of sediment in the cliffs. Find layers of white diatomaceous earth.

3 Salinas de San Pedro

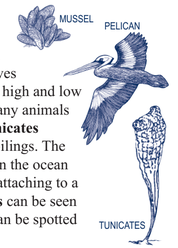
Salinas de San Pedro is a 3.75-acre salt marsh created by the Port of Los Angeles in 1985 to replace lost shallow-bottom fish habitat. Approximately 3,400 acres of wetlands were historically found in the Los Angeles/Long Beach Harbor area. Over 91% of California wetlands, which include salt marshes, have been lost due to development, dredging or filling. With loss of habitat, plants and animals that depend on these communities disappear. The salt marsh is host to salt-tolerant plants, many invertebrates, fish and migratory and resident birds. **Salt grass** and **pickleweed** grow along the banks of this wildlife refuge. The numerous holes on the mud surface are evidence of the thriving underground community of invertebrates that dominate the marsh mud. During high tides, **corbina**, **sharks** and **stingrays** visit the baylike waters that also provide a habitat for rapidly growing schools of **juvenile fish**.

The salt marsh is an essential filter that cleans the water as it comes off land. It collects fine bits of sediment so that seaweed and filter-feeders don't get clogged by those sediments. While marshes have bacteria that can break down some toxins, it is essential to not allow chemicals to flow down the drain and to protect this fragile nursery for baby fish. The plants surrounding the marsh are halophytes, plants that live in a salty environment and can expel the salts they get in the water either through their roots or leaves.

A diverse bird population can be seen in the salt marsh throughout the day. At low tide some birds are seen foraging in the mud and shallow water. At high tide, diving and wading birds are seen feeding and resting. Juvenile **black-crowned night-herons**, **willets**, **great blue herons** and **snowy egrets** are a few of the birds that forage year round, while migratory visitors include **least sandpipers**, **killdeer** and **grebes**. Varied bill types enable different bird species to feed in different areas of the marsh. Some types of bills are best for use in the mud to reach worms, clams and crabs. Others are best for catching fish or eating floating algae. Prints in the mud are evidence of **raccoons** that feed in the marsh at low tide. You may also notice bubbles coming up through the water in parts of the marsh, as well as a "smell of rotten eggs." This is a natural occurrence along the Palos Verdes Peninsula where hydrogen sulfide gas release has been impacted by earthquakes. Additional hydrogen sulfide gas is generated by the decomposition of organic material in the marsh. This gas provides a nutrient source for bacteria in the marsh, beginning a chemosynthetic food chain. Be aware of **feral cats** that roam around the area; the cats prey on native birds and upset the balance of the habitat. It is illegal to abandon or feed them.

Do It! Look for birds in the marsh and surrounding trees. Compare bill lengths and shapes to guess what they might eat. The length of their legs and the shape of their feet may also give you a clue.

4 Boat Launch Ramp



Boaters frequent this area to launch their vessels. The floating dock moves vertically along the pilings with the high and low tides. Acting as an artificial reef, many animals such as **mussels**, **barnacles** and **tunicates** attach to the sides of the dock and pilings. The larval stages of these animals drift in the ocean as plankton before settling out and attaching to a surface. **California brown pelicans** can be seen diving for fish while **cormorants** can be spotted feeding and drying their wings.

In the distance, the Youth Aquatic Sports Center and Cabrillo Marina are visible to the north, both of which can be accessed by continuing on the sidewalk along Shoshonean Road toward 22nd Street.

Do It! Lay flat on your stomach and look on either side of the dock for animals that are attached to it. Also look for animals crawling below the dock, attached to the rocks or living among the eelgrass beds.

Showers allow visitors to rinse off after swimming. Try to limit how much freshwater you use to reduce the amount of runoff into the ocean and to reduce the demand upon freshwater.

Trees in the parking lot provide some permeable space for water to seep back into the sediment. The freshwater that seeps back into the ground near the shore helps to provide a barrier to keep saltwater from seeping into groundwater that we use for drinking.

5 Inner Cabrillo Beach

As a wave-protected sandflat, the inner beach is a relatively calm environment that supports a wide variety of burrowing animals, many of which are not found on the wave-swept outer beach. Small, thin tubes covered in shell pieces are a home for the **decorator worm** that is found buried under the sand. A plowed track in the sand or a small mound in the shallow water reveals the **purple olive snail's** position. Adapted for rapid, shallow burrowing the purple olive has a streamlined, polished shell and a large muscular foot lined with cilia and mucus.

This habitat is critical for shorebirds. The broad upper beach accommodates large groups of **ring-billed**, **western** and **Heermann's gulls** and the protected waters contain **flatfish**, **pipefish** and schools of **smelt**. **Eelgrass** beds grow close to shore providing shelter, food and protection for invertebrates and fish. Because of restricted tidal flushing, inner Cabrillo Beach can be more strongly affected by pollution than the outer beach. The sand on this beach has been replaced with sand from Simi Valley, quarried from an ancient ocean.

The storm drain pipe at the southwest corner of the beach is diverted during low flow. When water does flow out, the gravel lining the path allows it to seep into the sand providing some filtration before it flows into the sea. Remember to never swim or fish near a storm drain and to keep debris from entering the catch basins near your home. Check with a lifeguard to determine if conditions are safe for swimming.

Do It! Find evidence that animals are on the beach as well as things that do not belong there. Tell a story of how each item arrived on the beach.

6 Los Angeles Harbor Breakwater and Fishing Pier

Completed in 1912, the San Pedro side of the Los Angeles Harbor Breakwater curves 1.8 miles out to Angel's Gate Lighthouse and the Los Angeles Harbor entrance. A mid-breakwater stretches to the Long Beach Harbor entrance, with a third section running almost to Seal Beach. The entire length of the breakwater is over nine miles, making the Los Angeles-Long Beach Harbor the largest man-made harbor in the Western Hemisphere. The rocks of the breakwater provide habitats for a wide variety of marine life both above and below the waterline.

Walk out onto the fishing pier to get a better view of the harbor. The pier pilings are rich with organisms such as **barnacles**, **mussels** and **sea anemones** that attach themselves to hard surfaces. You may also notice animals like crabs and sea stars on the pilings as well! These animals live in zones along the pilings (and rocks of the breakwater) that are determined by how long they can survive being exposed to air. If you are inclined to fish, there is no license required to fish from the pier. However, all other fishing regulations, including size and number limits, are enforced. Posted health advisories to not consume white croaker and to limit consumption of other fishes due to DDT and PCB contamination should be heeded.

Do It! Look at fish that have been caught and try to identify them using the posted field guides.

Where does the water flow from the fishing pier sinks? What should we be sure of as we use these sinks? Look back at the land from the pier. Do you see paths for the water to flow into the ocean? Do you see areas where there is a chance for the water to seep back into the land?

7 Cabrillo Bathhouse

Cabrillo Beach's historic bathhouse was completed in 1929 to provide services for beach visitors. It was the home of Cabrillo Marine Museum for almost fifty years, displaying local marine life and nautical artifacts. The collections were then split with the opening of the Los Angeles Maritime Museum at Berth 34, San Pedro in 1980 and the opening of the new Aquarium at its present location in 1981. Renovation of the bathhouse was completed in 2003 and once again this historic building is being used by Recreation and Parks to serve the community. A variety of watersports and family programs are offered throughout the year. Restrooms including showering facilities are available during business hours.

8 Outer Cabrillo Beach

Entirely man-made, Cabrillo Beach was created between 1925-1927 when the harbor was being dredged to allow the entrance of larger ships. The wave-swept outer beach faces continuous erosion and has had the sand replenished in 1946, 1964 and 1991. Only a few types of animals are specialized to thrive in this turbulent, shifting environment.

Most are powerful burrowers, such as **mole crabs**, **pismo clams** and **bristle worms** that are found beneath the sand. Their streamlined shapes aid in burrowing and resisting dislodgement. Many have breathing tubes called siphons that extend to the surface of the sand. Visitors to this habitat include shorebirds such as **willets**, which probe the sand for buried prey, and small fish called **grunion**, that lay their eggs on the beach on certain spring and summer nights. On the sand you may find some **beach wrack**, seaweed that has been washed ashore, being eaten by **kelp flies** and **sand hoppers**. These animals break down the seaweed for use by other organisms in the sand. On a clear day Catalina Island can be seen in the distance, approximately 22 miles to the south.

Do It! Examine beach wrack that has washed ashore. Look for animals that may be attached or hidden among the kelp. This decaying kelp is critical to a healthy beach.

Do you notice any human-made debris found in the beach wrack? Some washes down rivers or off boats but most washes ashore from storm drains. Cigarette butts, plastic pellets and styrofoam pieces mistaken as food have a tremendous impact upon migratory birds and other animals. Help by throwing away any trash that you find, and leaving natural items like shells and seaweed behind.

9 Kelp Beds

Just offshore are the trailing tops of **giant kelp** that break the ocean surface. Kelp beds provide shelter and food for a complex community of plants and animals. The kelp attaches to rocks below with a root-like holdfast. During heavy wave action, the kelp may be dislodged and washed up on to the beach or tidepools. Small invertebrates, such as snails and **bryozoans** may still be in the holdfast or attached to the kelp blades when washed ashore. Giant kelp, named for its size, is one of the fastest growing organisms on earth – up to two feet a day. Kelp is harvested commercially for use in toothpastes, hair products, salad dressings, ice cream and many other products.