AQUARIUM GUIDE
9-12

Welcome to Long Beach Aquarium of the Pacific!

This guide will help your students learn more about marine animals of the Pacific Ocean as they visit the thousands of animals featured in our three Pacific galleries. Most of the answers can be found on the exhibit graphics or from the educators.

The bottom of each page features “Oceans in Peril”—additional facts about threats to marine environments, and marine conservation. They are designed to be a link between the animals in the aquarium and the threats facing the animals in the wild.

We look forward to making your visit to the Aquarium of the Pacific fun, educational, and safe. We appreciate your support of our mission: to instill a sense of wonder, respect, and stewardship for the Pacific Ocean and its inhabitants.

SOUTHERN CALIFORNIA AND BAJA GALLERY

BLUE CAVERN

- A fish's body shape is determined largely by its habitat and prey. For the following shape descriptions:

  1) draw a diagram of that shape

  2) identify at least one fish species—in the Blue Cavern or elsewhere in the Aquarium—that has that shape

  3) describe its habitat (open ocean, sea floor, etc.)

- **fusiform** (tapered at both ends, like a torpedo or cigar)

  diagram:

  species _____

  habitat _____

- **rod** (like a pencil)

  diagram:

  species _____

  habitat _____

- **compressed** (flattened from side to side)

  diagram:

  species _____

  habitat _____

- **depressed** (flattened from top to bottom)

  diagram:

  species _____

  habitat _____

- **ribbon** (long and flexible)

  diagram:

  species _____

  habitat _____

OCEANS IN PERIL

Predators are an essential part of any ocean food chain. They usually prey on animals that are ill, weak, or too old to defend themselves. By eating these weaker animals, predators keep populations healthy and prevent them from becoming too numerous.

SOUTHERN CALIFORNIA AND BAJA GALLERY

AMBER FOREST

- Kelp plants do not have a root system like land plants. Instead of roots, stems, and leaves, what do kelp plants have?

- Kelp is the fastest-growing plant on earth. How fast does kelp grow?

- What is the compound found in kelp that is processed and used in many foods and medicines?

- Name at least five products that contain algin derivatives.

  1.

  2.

  3.

  4.

  5.

- Different animals inhabit the top, middle, and bottom of the kelp. What are the characteristics of animals that you find near the top of the kelp (canopy)?

- What are the characteristics of animals that inhabit the middle of the kelp?

- What are the characteristics of the bottom dwellers?

OCEANS IN PERIL

Kelp forests are very important for the survival of many animals. Although kelp grows quickly, kelp forests are vulnerable to environmental threats. For example, sea urchins—which feed on kelp—are eaten by sea otters. When California sea otters were nearly wiped out, sea urchins destroyed much of the kelp forest. Because our actions can affect the delicate balance of nature, wise resource management is essential.

SOUTHERN CALIFORNIA AND BAJA GALLERY

SEALS AND SEA LIONS

- Seals and sea lions are pinnipeds. Unlike whales and dolphins, pinnipeds are adapted for spending time out of the water. What do pinnipeds do on land?

- Compare the way sea lions swim to the way seals swim.

- Based on their flipper design locomotion styles on land, how does land habitat of seals differ from that of sea lions?

- Sea lion or seal? Write "SL" in the space after the characteristics that refer to sea lions and an "S" after those that refer to seals.

  can walk on all fours _____

  no ear flaps _____

  swims with back-and-forth motion of hind flippers _____

  long, slender neck _____

  short flippers with hair and claws _____

  very vocal _____

  swims with front flippers _____

  sausage-shaped body _____

If possible, observe a seal swimming. Draw a picture of a seal's hind flipper as it swims.

OCEANS IN PERIL

California sea lions and harbor seals are not endangered or threatened. But there are other pinnipeds, including Mediterranean and Hawaiian monk seals, that are so endangered that scientists fear they will soon become extinct. By learning all they can about seals and sea lions, scientists hope to save the endangered monk seals.

SOUTHERN CALIFORNIA AND BAJA GALLERY

SKATES AND RAYS

- What is the closest relative of skates and rays?

- Name three things skates and rays have in common with this relative.

  1.

  2.

  3.

- Name three ways they are different.

  1.

  2.

  3.

- Name the taxonomic group (class) to which rays, skates, and their relatives belong.

- Where are the gills located on rays and skates?

- How do rays breathe when they are half buried in the sand?

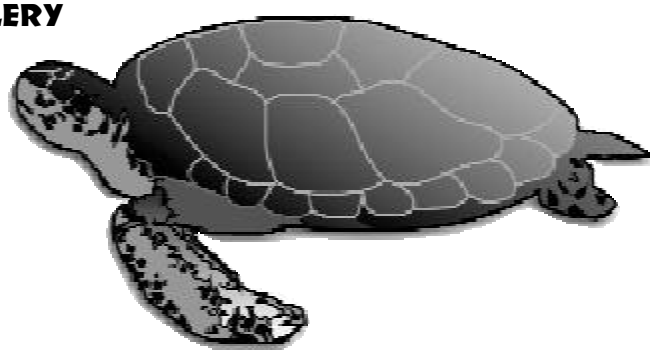
- How do the teeth and diets of bottom-dwelling rays and skates differ from those of open ocean sharks?

OCEANS IN PERIL

Rays defend themselves with a venomous spine on their tails. If you step on a ray, you could receive a serious and painful wound. To avoid being stung when wading through shallow stingray habitat, don't take steps—shuffle your feet through the sand instead. This will alert the ray, and it will swim away.

SOUTHERN CALIFORNIA AND BAJA GALLERY

SEA TURTLES



◆ Diagram the life cycle of sea turtles.

◆ All seven species of sea turtles are endangered or threatened. They are vulnerable to a number of natural and human influence. Name three *natural* dangers to sea turtle adults, eggs, and hatchlings.

1.

2.

3.

◆ How many eggs does a sea turtle typically lay?

How many survive to adulthood?

◆ Name four *human* threats to sea turtle adults, eggs, and hatchlings.

◆ How do the diet habits of green sea turtles change throughout their lives?

1.

2.

3.

4.

OCEANS IN PERIL

All seven species of sea turtles are either endangered or threatened. Once plentiful, sea turtle populations have declined because of overhunting for their meat and shells, habitat loss, and incidental entanglement in shrimp nets. TEDs (turtle excluder devices) are devices with trap doors installed in shrimp nets. Widespread use of TEDs has helped save the lives of many sea turtles.

NORTHERN PACIFIC GALLERY
INVERTEBRATES

- By species, individuals, and mass, invertebrates are the most prevalent animals in the ocean. By its simplest definition, what is an invertebrate?

- Why aren't corals found in the North Pacific?

- Invertebrates belong to several major animal groups, or phyla. They are classified by shared characteristics.

  For each phylum below, name one or two characteristics and three species.

- Explain how an echinoderms tube feet work. Name two things they use their tube feet for.

Phylum	*Characteristics*	*Species*
Cnidaria		
Echinodermata		
Mollusca		
Arthropoda		

- What is the world's largest invertebrate? To which phylum does it belong?

OCEANS IN PERIL

Have you ever been to a tidepool? Many invertebrates make their home in tidepools. There's lots to see, but be very careful where you step or you might crush the animals that live there. Don't take home any souvenirs—tidepool animals need their habitat to survive. If you take any animals, they'll die. Don't take any shells, either—they provide protection for animals.

NORTHERN PACIFIC GALLERY
DIVING BIRDS

- Puffins, auks, and murres belong to the bird family Alcidae. Alcids resemble penguins, but they're not related. Penguins are all found in the southern Hemisphere. Where do alcids live?

- Unlike penguins, alcids can fly. They're also strong swimmers. Which body part do alcids use to swim with?

- Different alcid species prefer two different nesting habitats. What are they?

- What do alcid nests protect the eggs and young from?

- How many eggs do alcids normally lay?

- How many do cormorants lay?

- Describe the shape of a common murre's egg and explain how this shape helps ensure the egg's safety.

- What is an advantage of mating for life?

- List four threats (including historical threats) to alcids and other seabirds.

  1.

  2.

  3.

  4.

OCEANS IN PERIL

Because diving birds are coastal animals, they are vulnerable to a number of human activities including pollution and habitat destruction. You can make a difference by putting litter in a proper trash receptacle. A better idea is to participate in a beach clean-up. Even small efforts can really add up to a large positive impact.

NORTHERN PACIFIC GALLERY
SEA OTTERS

- Sea otters are the only marine mammal that does not have a thick, warm layer of blubber. What does a sea otter rely on primarily to keep it warm?

How does it work?

What must sea otters do to maintain this insulating characteristic?

- Name another of the sea otter's lines of defese against the cold.

- How much do sea otters typically eat?

- Sea otters' diets vary greatly. In general, however, what food items do sea otters typically eat?

- How are sea otters living in the same area able to decrease competition for food?

- Oil spills are devastating to sea otters. Name two effects of oil on sea otters.

OCEANS IN PERIL

Sea otters once ranged continuously along the Pacific Northwest coast. In the late eighteenth and nineteenth centuries, otters were hunted extensively for their fur. By 1903, as few as 1,000 remained. Sea otters now occur in two geographically separated populations. Alaska sea otters have recovered, but the isolated group off the coast of California remains small and vulnerable, numbering about 2,000. A large oil spill off the California coast, like the 1989 Valdez oil spill, could wipe out all California sea otters.

TROPICAL PACIFIC GALLERY
CORAL LAGOON

- To which invertebrate group do corals belong?

- Name two relatives of corals.

  1.

  2.

- In which areas of the earth can you find a large concentration of coral reefs?

- Name two benefits corals receive by living in shallow waters.

  1.

  2.

- Name two dangers of living in the same habitat.

  1.

  2.

- Why are coral reefs called “the rainforests of the sea?” Give two reasons.

- List three ways that human activities threaten corals.

  1.

  2.

  3.

OCEANS IN PERIL

Fragile coral reef habitats cover less than one tenth of one percent of all the oceans’ surface, yet they are home to nearly one million species, including one fourth of all marine fish species. Pollution, boat anchors, careless divers, and coral collectors can cause severe damage to coral reefs.

TROPICAL PACIFIC GALLERY
REEF RESIDENTS—SHARKS

- In any shark species, you can tell males from females. How?

- What is another name for a shark's scales? What are they named for?

- These scales not only make a shark's skin rough, they also make it a more efficient swimmer. How?

- Unlike bony fishes, sharks lack a swim bladder. How do sharks maintain buoyancy?

- Describe the three different modes of shark reproduction.

  1.

  2.

  3.

- Many species of sharks now face the threat of extinction. List at least six ways humans are a threat to sharks.

  1.

  2.

  3.

  4.

  5.

  6.

OCEANS IN PERIL

Sharks may take years to become mature. They also reproduce slowly, giving birth to very few offspring. This makes shark populations extremely vulnerable to human impact. A particularly devastating and wasteful practice is "finning"—sharks are caught, their fins are cut off, and the rest of the shark is thrown back into the sea. The fins are used to make sharkfin soup.

TROPICAL PACIFIC GALLERY
TROPICAL REEF HABITAT

- Fill in the blanks:

  On a coral reef, differences in _____, water movement, and _____ create unique zones with different conditions that attract different residents. Each of these _____ holds an astonishing diversity of reef inhabitants.

- What types of reef residents are found in the sunny shallows?

- Which reef residents prefer the depths?

- The large fish (grouper) patiently waits while the smaller cleaner wrasse cleans it. The two fish have what is called a symbiotic relationship, which means one or both animals benefit from the arrangement. A symbiotic relationship may either be:

  a) mutualistic (both animals benefit),
  b) commensalistic (one benefits, the other is neutral), or
  c) parasitic (one benefits, the other is harmed)

- Which of these do the grouper and cleaner wrasse have?

- How does the sabertooth blenny exploit this relationship?

- What kind of symbiotic relationship do the grouper and sabertooth blenny have?

- Name another reef-dwelling pair with a mutual relationship.

- Name three reef residents that protect themselves with camouflage.

OCEANS IN PERIL

Coral reefs are often called the rain forests of the sea because of the incredible diversity they support, and because of their rapid decline. About 70% of the world's reefs are partially damaged, and 10% have been severely damaged.