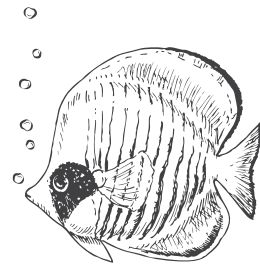


TEACHER GUIDE: GRADES 3-5



THANK YOU FOR CHOOSING BIRCH AQUARIUM FOR YOUR FIELD TRIP!

We hope these resources will help you and your students make the most of your time at the aquarium. Each activity sheet aligns with a different exhibit in the aquarium, and all the answers can be found within that exhibit. You can find the answer key and more exhibit information below.

TIPS & TRICKS

- Print these activity sheets for your students before you arrive. They are not available for printing or pick up at the aquarium.
- Bring your own clipboards and writing instruments for each student. Exhibit windows **cannot** be used as writing surfaces.
- Give a copy of this guide to each chaperone so that they can best support their group of students.

students can touch local animals here! Be sure to put away all materials that could fall into the open water. Follow directions of aquarium staff and volunteers at all times.

QUESTIONS YOU CAN ASK YOUR STUDENTS:

- Have you ever seen this animal before?
- What body parts help it survive in our local environment?
- What do you think the animal will feel like? What does it actually feel like?

There is no activity sheet for Tide Pool Plaza, as your

HAVE YOU BEEN ON YOUR FREE PRE-VISIT YET?

Teachers receive a **FREE** pre-visit prior to your program to help you in the planning process.

Call (858) 534-7336 to make a reservation in advance.

BIRCH
AQUARIUM

UC San Diego
SCRIPPS INSTITUTION OF OCEANOGRAPHY

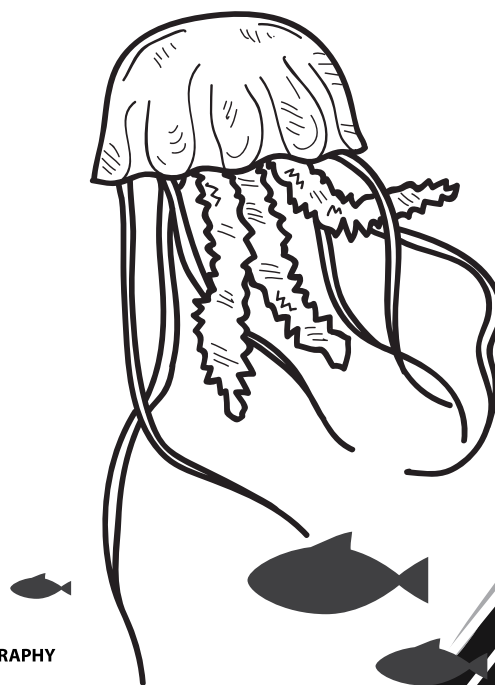
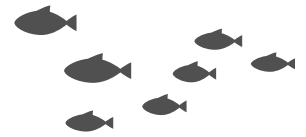


EXHIBIT INFORMATION



SHELIA MARIE DAVIS GALLERIA

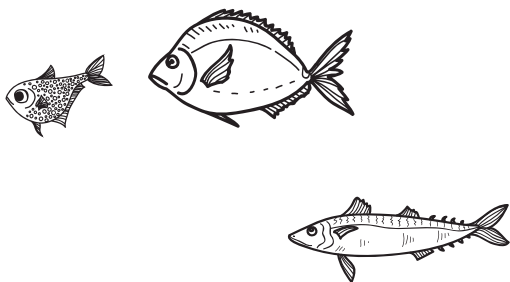
- Don't forget to look up when you walk through the aquarium doors!
- Check out life size models of local shark species.

LIVING SEAS: NORTHWEST & COASTAL CALIFORNIA

- The *Adam R. Scripps Living Seas* Gallery takes you on a journey through the vibrant ecosystems of the Pacific. Begin with the cold waters of the Pacific Northwest to the beauty of Coastal California and on to the colorful reefs of the Tropical Pacific! Ask students what similarities and differences they notice between the animals as they work their way through the different ecosystems.
- Sea anemones can be found in many exhibits throughout the *Living Seas*. Their stinging tentacles stun small prey that swims, crawls, or drifts by.
- The sting of moon jellies is mild to humans.
- Garibaldi can be found in many exhibits, including the Kelp Forest. Juveniles are smaller and covered in bright blue spots, which signals to territorial adults that they are still young.

LIVING SEAS: GIANT KELP FOREST

- Our Kelp Forest holds 70,000 gallons of water!
- Fresh seawater for our exhibits is pumped up the hill from La Jolla Shores thanks to equipment on Scripps Pier.
- The giant kelp that makes up our Kelp Forest Exhibit provides a home for many animals. It can grow up to 150 feet tall at a rate of up to 18 inches per day!



HEALTHY VS. BLEACHED REEF

- Coral reefs are home to more species than any other ocean ecosystem.
- Warming waters caused by climate change cause the algae that live within coral tissues to leave, resulting in coral bleaching. This impacts all the species that depend on the coral as their habitat or food source.
- Scripps scientists are always researching new ways to reduce the impact of climate change on our planet.

SHARK SHORES

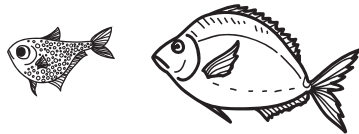
- Sharks and rays are both cartilaginous fishes.
- This means their skeletons are made of cartilage as opposed to bone.

SEADRAGONS & SEAHORSES

- Seahorses have prehensile tails, meaning they can grasp onto objects. Since they are not the best swimmers, this helps them stay in place.
- Some relatives of seahorses and Seadragons are the Seamothers, Cornetfish, Trumpetfish, Pipefish, Shrimpfish and Snipefish. Some of these relatives can also be found in the exhibit!

BEYSTER FAMILY LITTLE BLUE PENGUINS

- Little Blue Penguins are native to Southern Australia, New Zealand, and Tasmania.
- Their climate is actually very similar to our own here in San Diego!
- There is always an education naturalist in the Research Station who can answer any questions you or your students have.



ANSWER KEY



LIVING SEAS: PACIFIC NORTHWEST & COASTAL CALIFORNIA

- Most sea stars have FIVE (5) arms, but sunflower stars can have up to 24!
- When an octopus stretches out its 8 ARMS, they span up to 16 feet, the same length as a parking spot!
- Moon jellies use their short TENTACLES to sting and capture their prey, but this sting is mild to humans.
- Adult garibaldis are orange all over. When they are young, the juveniles have BLUE spots.
- The most important thing that determines where marine organisms live is water TEMPERATURE.
- Fun fact: The average annual water temperatures in Washington state and San Diego are 50°F and 62°F, respectively!

LIVING SEAS: KELP FOREST

The Giant Sea Bass lives in the canopy. Garibaldi, Sheephead, and Opaleye all swim through the understory. You can find Horn Sharks and Swell Sharks resting on the ocean floor.

LIVING SEAS: TROPICAL PACIFIC

- Fish have bright colors to blend in with the colorful coral reefs.
- Patterns, such as spots and stripes, confuse predators as to the fish's actual size and location.
- Many reef fish have a thin body shape to fit between tight spaces in corals, and large fins for turning.

HEALTHY VS. BLEACHED REEF

- Coral reefs are home to more species than any other ocean ecosystem.
- Warming waters caused by climate change cause the algae that live within coral tissues to leave, resulting in coral bleaching. This impacts all the species that depend on the coral as their habitat or food source.
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SHARK SHORES

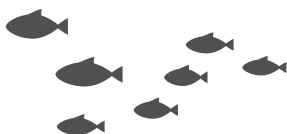
- Sharks: gills, countershading, streamlined body, dorsal fin, mouth on underside of head, tail (caudal) fin
- Rays: gills, flat body, countershading, stinging barb, mouth on underside of head

SEADRAGONS & SEAHORSES

- Yes, seahorses and seadragons are fish!
- They have gills behind their eyes and they have fins as well, even though they look different than most fish. Inside, a backbone helps them stay upright and a two-chambered heart pumps blood around their body!
- Some relatives of seahorses and seadragons are the seamothers, cornetfish, trumpetfish, pipefish, shrimpfish and snipefish. Some of these relatives can also be found in the exhibit!

BEYSTER FAMILY LITTLE BLUE PENGUINS

Help the students stay on time during their ethogram. After the activity, they can go to the Research Station to find out the name of the penguin they observed!



LIVING SEAS

PACIFIC NORTHWEST + COASTAL CALIFORNIA

Traveling through the beginning of *Living Seas* is like swimming down the West Coast. See how the types of animals change from the Pacific Northwest to Coastal California. What is the most important thing that determines where these animals live along the coast? To find out, answer the questions below. Fill in the numbered spots with the correct letter of each answer.

FILL IN THE NUMBERED SPOTS WITH THE CORRECT LETTER OF EACH ANSWER.

1. Most sea stars have _____ arms, but sunflower stars can have up to 24!

- | | |
|--------------|-------------|
| Q. seven (7) | R. one (1) |
| S. nine (9) | T. five (5) |

2. When an octopus stretches out its 8 _____ they span up to 16 feet, the same length as a parking spot!

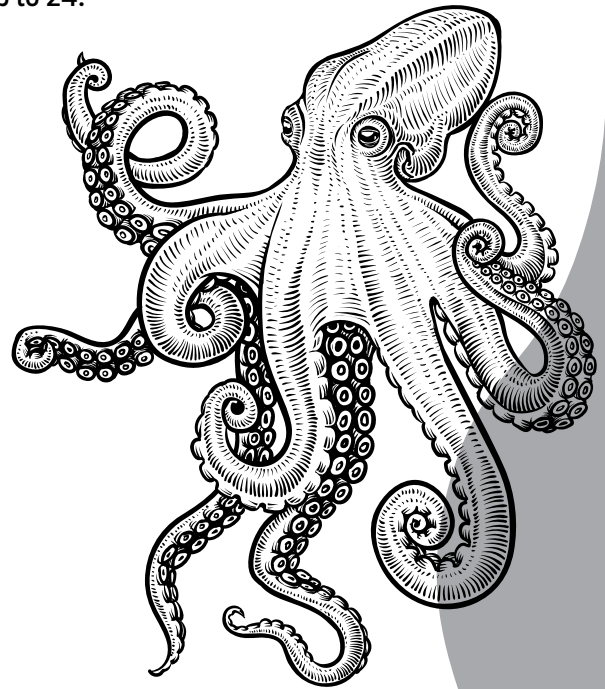
- | | |
|---------|-----------|
| E. arms | F. hearts |
| G. legs | H. eyes |

3. Moon jellies use their short _____ to sting and capture their prey, but this sting is mild to humans.

- | | |
|-------------|--------------|
| J. bells | K. eyespots |
| L. stomachs | M. tentacles |

4. Adult garibaldis are orange all over. When they are young, the juveniles have _____ spots.

- | | |
|----------|----------|
| P. blue | Q. white |
| R. black | S. red |



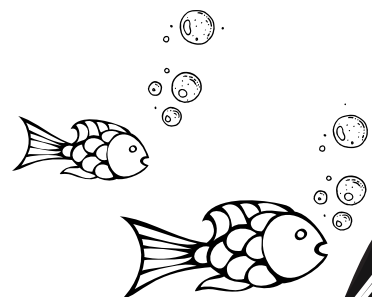
UNSCRAMBLE THE NAMES OF THESE INVERTEBRATES (ANIMALS WITHOUT A BACKBONE) AND FILL IN THE HIGHLIGHTED LETTER IN THE PUZZLE TO SOLVE!

5. esa rats _ _ _ _ _ _ _

6. potcosu _ _ _ _ _ _

7. aes cuirhn _ _ _ _ _ _ _ _ _

8. lelyj _ _ _ _



The most important factor that determines where marine organisms live is water _ _ _ _ _ E R A _ _ _ _ .

1 2 3 4 5 6 7 8

GIANT KELP FOREST

DID YOU KNOW THERE ARE FORESTS GROWING IN THE SEA?

Kelp forests that is! Kelp is a marine algae (seaweed) that can grow up to 150 feet tall. The kelp forest is divided into three zones: the ocean floor (bottom), the understory (middle), and the canopy (top).

Just like in a forest on land, animals live in different zones of the kelp forest. Find the animals in the exhibit and draw a line to match the animal with where you see it living within the kelp forest.

CANOPY

Swell Shark

Garibaldi

Opaleye

Horn Shark

Sheephead

UNDERSTORY

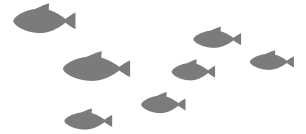
Giant Seabass

OCEAN FLOOR

DID YOU KNOW?

The kelp forest off the coast of La Jolla is a Marine Protected Area (MPA). That means humans cannot collect or harm any of the animals or kelp, which helps keep the ecosystem healthy.

LIVING SEAS: TROPICAL PACIFIC



Your journey down the Pacific continues as you explore the wildlife found in these waters. Think about how these habitats help these animals survive. Pick one animal and draw them in their habitat.

ANIMAL NAME: _____

DID YOU KNOW?

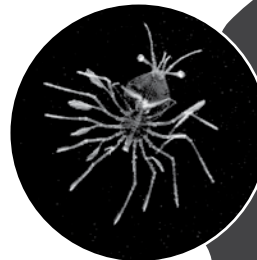
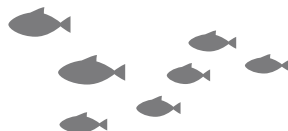
California is home to many species of cold-water corals that inhabit the deep sea.

ANIMAL AND HABITAT

HOW DOES THIS HABITAT
HELP YOUR CHOSEN ANIMAL SURVIVE?

WATCH THE FISHES SWIM THROUGH THE CORAL REEFS.

How do you think their color, shape, and pattern help them hide here? Write your answer below.



FUN FACT:

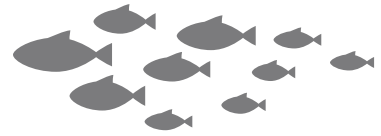
Some animals are born as tiny plankton, and look totally different from when they are grown up! Check out what this spiny lobster looked like as a larva!

SAY WHAT?

Our loggerhead sea turtle was rescued near a power plant in New Jersey. She has paralysis in her back flippers, meaning they cannot move. Scientists 3-D printed a brace to fill a gap in her shell to keep her healthy as she grows!

SEADRAGONS + SEAHORSES

WHAT MAKES A FISH A FISH?



All fish have fins, gills, a backbone, and a two-chambered heart.

Do you think seahorses and seadragons are fish? Draw a seahorse and seadragon
and circle the parts they have in common with a fish. Write your answer below.

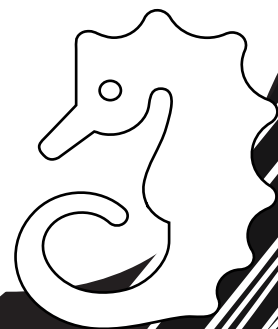
SEAHORSE

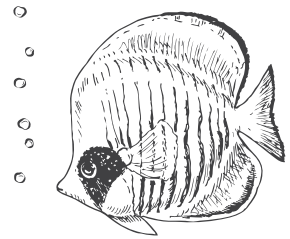
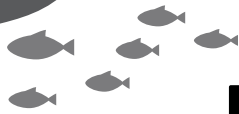
SEADRAGON

Seahorses and seadragons are fish: (Circle one) True / False

MY EVIDENCE FOR THIS IS:

I KNOW THIS BECAUSE...





HEALTHY VS. BLEACHED REEFS

DRAW THE HEALTHY REEF AND BLEACHED REEF BELOW.

HEALTHY REEF

BLEACHED REEF

WHAT HAPPENS TO THE ANIMALS THAT LIVE IN THE CORAL REEF WHEN THE REEF BLEACHES? HOW DOES THE HABITAT CHANGE?

DID YOU KNOW?

Over a quarter of the world's coral reefs have been severely damaged. Overfishing, climate change, and pollution are all threats to these sensitive creatures. Can you think of ways to help protect coral reefs around the world?

BEYSTER FAMILY LITTLE BLUE PENGUINS

Ethograms are a way to study an animal's behavior by collecting data on what they are doing. Use this ethogram to observe what the little blue penguins are doing!

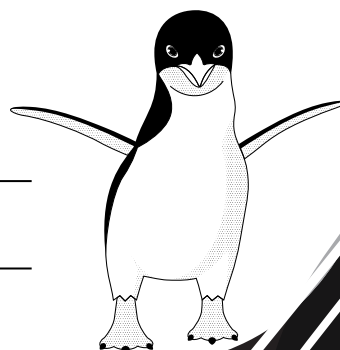
INSTRUCTIONS:

1. Pick a penguin to study. Write its band color(s) on the line below.
2. When you are ready to begin, count to ten. Then, place a checkmark next to the behavior the penguin is doing at that moment. Then, count to ten again and repeat.
3. Do this 12 times (for a total of 2 minutes) to fill out the whole chart. Total each behavior to see what they were doing the most.

BAND COLOR(S): _____

Time	Active		Inactive		Social (calling, interacting with another penguin)	Not Visible	Other
	Swimming	Walking	Standing	Laying			
0:10							
0:20							
0:30							
0:40							
0:50							
1:00							
1:10							
1:20							
1:30							
1:40							
1:50							
2:00							
TOTAL							

WHICH BEHAVIOR DID YOUR PENGUIN DO THE MOST?

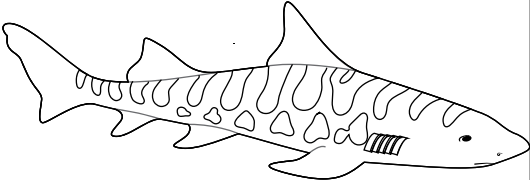
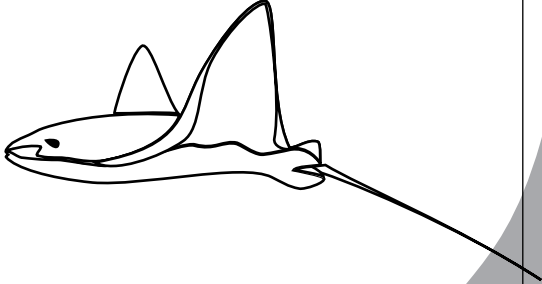


SHARK SHORES

DID YOU KNOW SHARKS AND RAYS ARE RELATED?

They both belong to a group called elasmobranchs.

Can you spot the similarities and differences? Draw a line to match the physical characteristics to the correct animal. Some characteristics might be true of both!

SHARK		RAY
	Gills	
	Flat body	
	Countershading (Darker color on the top vs bottom)	
	Streamlined body (Like a football)	
	Dorsal (top) fin	
	Stinging barb	
	Mouth on underside of head	
	Tail (caudal) fin	

