

## Carousel of the Living Sea

### Objective:

1. Students will understand how fish swim and breathe in water.
2. Students will demonstrate the ability to measure, compare and sort ocean objects.
3. Students will group animals and describe their habitats.
4. Students will be able to organize information and ocean objects to create a project.

### Performance Objectives:

**Strand 1:** Concept 1 – PO 2; Concept 2 – PO 1-3;  
Concept 3 – PO 1-2; Concept 4 – PO 1-2

**Strand 4:** Concept 3 – PO 3

NGSS: K – LS1 – 1

**Grade: Pre K – K**

### **Key Vocabulary:**

- Aquarium
- Gills
- Scales
- Habitat

### **Related Literature:**

*The Earth is Mostly Ocean*  
Allan Fowler

*Splash! A Book About  
Whales and Dolphins*  
Gilda & Melvin Berger

*In the Sea*  
David Elliott

### **Background Information: Carousel of the Living Sea**

Oceans cover about 70% of the surface of the Earth. Oceans are very deep and have animals and plants in them. You can find oceans on a map of the world. Oceans are filled with salt water. Fish, sharks, and polar bears are some of the special animals that live in the ocean.

What is it like to be a fish? Fish have features that help them live in the water and breathe with the use of their gills. The **gills** allow oxygen to be taken out of the water as the fish swims. People breathe with lungs, which makes people very different from fish. Fish have eyes, but they do not have eyelids, so they sleep with their eyes open. Fish can taste their food and even hear what is around them.

A fish has a body that is well suited for life in the water. They have a body shape that allows them to swim very fast and with the use of their fins. Fish can move

their body in different directions. When the fish swims, the fins and tail move back and forth to move the fish. In the aquarium, people can watch all types of fish moving around in the water and even swimming in “schools.” A “school” of fish is a group of fish that are the same type swimming together. Many different types of fish swim in schools.

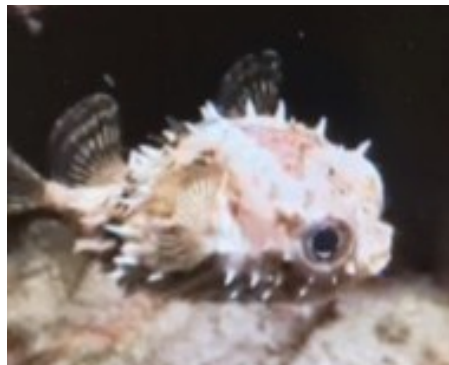


While fish come in many different sizes, shapes and colors, all fish have a bony skeleton inside their body and scales on the outside of their body. Fish **scales** are hard and clear and help to protect the skin of the fish. The scales may be covered with a layer of slime to help the fish move through the water. Fish adapt to the water, but it is important that the water is free of pollution so the fish can live a long life. Fish that live in **aquariums** rely on people to keep their habitat clean and fresh with a large supply of food. For shelter, fish hide among the rocks and plants to keep away from predators.



The **puffer fish** is a type of ocean creature with very unique characteristics. There are several different **species** that can be found from the Pacific Ocean to the Red Sea. While the puffer fish is a slow swimmer, it can use a burst of energy to try to escape danger. Puffers can even swim backward!

Puffer fish have tapered bodies with large stomachs. They also have pointed spines that help them look fierce. These fish can change their shape in an instant. If the puffer senses danger, it can gulp water into its large stomach and blow up like a floating balloon. Puffer fish have a toxin in their body that can be deadly to any predator that eats them.



Green Sea Turtles are found around the world in warm subtropical and tropical ocean waters. There are 7 species of sea turtles and the green sea turtle can grow 3-4 feet in length and up to 350 pounds. They are marine reptiles, which means they have scales, lay eggs, are cold-blooded (ectothermic) and breathe air. Even though sea turtles spend almost all of their lives at sea (except when females lay their eggs on land) they still need to come to the surface to breathe.

Females lay eggs on sandy beaches in nests on the same beach they were born. Eggs and sea turtle hatchlings face the biggest threats because they are so small and become prey for many animals. Every species of sea turtle is threatened due to beach habitat loss, human development, getting caught as **bycatch** (on accident) and pollution.

The shell of a sea turtle is fused with their skeleton and backbone. The top of their shell is called a **carapace** and the bottom of their shell is called a plastron. The sections on their carapace are called scutes. Unlike other turtles or tortoises, sea turtles do not have the ability to pull their head into their shell for protection. Instead, they have smooth streamlined heads and flippers to help them move through the water gracefully, or for **hydrodynamics**. Their front flippers are their main source of power and movement through the water and their hind flippers assist with steering. Adult males have much longer larger tails than adult females. Their shell color varies from dark brown to a lighter yellowish brown so, they are not named after the color of their shell. They are named after the food they eat as an adult and the color of their insides! As juveniles, green sea turtles are omnivorous eating both seagrasses and small fish, but as adults, they are strictly herbivores and eat seagrasses. They have a mouth called a beak with a serrated jaw to assist with eating seagrasses. The internal organs and fat of green sea turtles are green due to their adult diet. (<https://www.nwf.org/Wildlife/Wildlife-Library/Amphibians-Reptiles-and-Fish/Sea-Turtles/Green-Sea-Turtle.aspx>)



[Library/Amphibians-Reptiles-and-Fish/Sea-Turtles/Green-Sea-Turtle.aspx](https://www.nwf.org/Wildlife/Wildlife-Library/Amphibians-Reptiles-and-Fish/Sea-Turtles/Green-Sea-Turtle.aspx))

California sea lions can be found all up and down the Pacific coast, as far North as British Columbia and as far south as Mexico. The average lifespan of a California sea lion is approximately 15-25 years. Lifespan can exceed 30 years under human care because of the opportunity for consistent food

supply and veterinary care, as well as the absence of predators, pollution, and habitat destruction. Adult California sea lion females weigh between 110-220lb on average; males weigh between 440-880lb when full grown. Sea lions typically cruise at speeds of around 12 miles per hour, but can reach bursting speeds around 20mph.

Females typically have the appearance of a flat head, whereas adult male sea lions have a raised forehead on the center of their skull, caused by a ridge of bone, called a sagittal crest. This can be about 1-2 inches high when fully developed. Sagittal crests tend to be present on the skulls of adult animals that rely on powerful biting and clenching of the teeth, such as carnivores. Male California sea lions can also 'flex' the muscles on top of this crest, causing the crest to rise, when posturing aggressively or defensively toward other male sea lions.



Male sealion displaying his Sagittal crest.

Sea lions can hold their breath for up to 20 minutes and can dive to depths of around 900ft, although they typically don't because their food source is in much more shallow waters. Sea lions are voluntary breathers, which means they consciously have to think about every breath they take. Their nostrils are naturally closed, but sea lions have specific muscles in their cheeks called myastacial muscles that flex to open their nostrils when they want to take a breath.

On the front of their face, or muzzle, they have whisker like appendages called vibrissae. They have 20-30 per side, or 40-60 total. They are made up of keratin, like our fingernails, but are highly sensitive to motion because they have nerve endings and muscle tissue in them. In dark, murky waters they use their vibrissae to detect schools of fish and changes in currents. Vibrissae feel much like uncooked spaghetti!



Close up of vibrissae.

Sea lions use thermoregulation to help cool or warm their bodies. Their flippers are highly vascular, with lots of capillaries close to the surface of the skin, and can easily distribute warmth or cold to other parts of the body. When a sea lion is cold,

it will float on the surface of the water and hold its flipper(s) up to absorb the sun's rays. This flipper will absorb the heat, which is circulated to the rest of the body. When a sea lion is too warm, the process is reversed as they lay on land and hold up their flipper(s) to absorb a cool breeze or dip their flippers in the cool waters, which helps to cool the blood and distribute it to the rest of the body.

Pacific harbor seals are found north of the equator in both the Atlantic and Pacific Oceans. In the northeast Pacific, they range from Alaska to Baja California, Mexico. They favor near-shore coastal waters and are often seen on rocky islands, sandy beaches, mudflats, bays, and estuaries. They are the most widely distributed species of pinniped (walruses, eared seals, and true seals). They are true or crawling seals, having no external ear flaps. True seals have small flippers and must move on land by flopping along on their bellies. An adult can attain a length of 6 ft. and a weigh 290 lb. Blubber under the seal's skin helps to maintain body temperature. Females outlive males (30–35 years versus 20–25 years).



Pacific harbor seals spend about half their time on land and half in water. They can dive to 1,500 feet for up to 40 minutes, although their average dive lasts three to seven minutes and is typically shallow, and they sometimes sleep in the water. They are opportunistic feeders, eating sole, flounder, sculpin, hake, cod, herring, octopus, and squid. While harbor seals swim safely in the surf, they will often curiously watch humans walking on beaches. However, they are wary of people while on land and will rush into the water if approached too closely or disturbed. In fact, if disturbed too often, they have been known to abandon favorite haul-out sites or their pups.

Both courtship and mating occur underwater. The mating system is not known, but thought to be polygamous. Females give birth once per year, with a gestation period of approximately nine months. Birthing of pups occurs annually on shore. The timing of the pupping season varies with location, occurring in February for populations in lower latitudes, and as late as July in the subarctic zone. The mothers are the sole providers of care, with lactation lasting four to six weeks.

## SEA LIONS vs. SEALS

- California sea lions have external ear flaps, while seals have only small holes that are the opening of an internal ear. Sea lion ears are similar to our external earlobes, but folded tightly to protect from water entering the ear canal.
- Sea lions have long foreflippers to hold their weight, and can rotate their hind flippers to walk on land. Seals have short, stubby foreflippers and cannot walk on land, but instead undulate, much like an inchworm. Sea lions use their foreflippers to propel them through water, whereas seals use their hind flippers as their main power source.
- Sea lions have nails on the middle three digits of their hind flippers. Their foreflippers have no nails or hair. Seals have nails on both hind and foreflippers.
- Sea lion vocalizations sound like a bark or roar, which is how they got their name. Seals demonstrate sounds such as wheezes, wretches, and blows.

Interesting fact there are 5 million living organisms in 1 tea spoon of ocean water. Imagine what is in a bucket of ocean water!

Additional Resources:

**Pufferfish Inflating:** <https://www.youtube.com/watch?v=rAGWO5i2C5M>

**Green Sea Turtle Feeding on Jellyfish:**

<https://www.youtube.com/watch?v=DmNOsOm0JiE>

**Baby Turtles Entering the Ocean:**

<https://www.youtube.com/watch?v=t1kFiehGh9s>

**Sea Lions Barking:** [https://www.youtube.com/watch?v=ds6Qcrf\\_Gks](https://www.youtube.com/watch?v=ds6Qcrf_Gks)

**Seals vs Sealion Video:** [https://www.youtube.com/watch?v=wJ-F4n\\_XjTM](https://www.youtube.com/watch?v=wJ-F4n_XjTM)

Sources: NOAA; National Geographic; World Wildlife Federation; National Aquarium; Encyclopedia of Earth; Florida Museum of Natural History; U.S. Department of Natural Resources. Photos: OdySea Aquarium and public domain.

## Procedures and Activities:

1. State the learning objectives.
2. Read related literature and discuss the ocean animals and habitats.
3. Review the vocabulary.
4. Teach students the fish rhyme.
5. Present background information to students. Show several pictures of ocean animals so students can see the variety, size and varied habitats.
6. Discuss the characteristics of fish (gills, scales, eyes, etc.)

7. Explain that fish live in the ocean. Using a map, locate the Pacific and Atlantic oceans and their relationship to Arizona.
8. Explain what an aquarium is and how it functions as a habitat for ocean animals.
9. Explain the term habitat and relate it to where students live. Compare the differences between habitats for people and ocean fish.
10. Discuss the food that ocean animals eat as compared to what people eat.



**Indicates ‘take along’ activity.**

**Activity:** Goldfish Crackers. Give students 5 to 10 goldfish crackers. Ask them to assemble their crackers into a “school” of fish. Ask open-ended questions related to the background information and call on students to respond. As each correct answer is given, all students eat one of the crackers until all questions are answered.

Note: A counting activity can be incorporated into this activity. Students can add, subtract, identify more or less and can practice grouping with the goldfish crackers.

**Activity:** ‘Turtle Cookie’ make a tasty treat.

**Activity:** color the shark, sea turtle, harbor seal and sea lion.

**Activity:** Paper plate fish are creative fun for students. Give each student a clean, white paper plate. Using acrylic paint in a tray, each student places their (one) palm into the surface of the paint, then places the palm on the center of the white paper plate. The hand print becomes the fish and its fins. Turn the plate to the side to give the illusion of a fish and fins. While paint is damp, students can sprinkle glitter on the paint. Once the paint is dry, students can either draw an eye on the fish or a googly eye can be glued on the fish. A masterpiece!

Materials: white paper plates, acrylic paint, glue, glitter, googly eyes (optional).

**Activity:** ‘On the Beach’ is an activity that involves organizing, sorting, counting, measuring and discussing sea shells.

**Activity:** ‘Where Do They Live’ is an activity that involves matching the correct habitat with the animals. Students demonstrate their understanding of two specific habitats.





**Activity:** ‘I Spy’ is an activity students can do during or after the field trip. Pictures may be cut out and laminated for easy carrying on the field trip. Students look for the ocean animals in the pictures.

### **Reflections and Assessments:**

After visiting **OdySea Aquarium**, allow students the opportunity to share their thoughts with the class. Discuss the ocean life experience and what the students have learned. Ask students to respond to the following questions to check for understanding:

1. How are fish different from people?
2. How do fish breathe?
3. Do fish have a tail? What is it used for?
4. Where do fish live?
5. What do fish eat?
6. What fish did they like the best?

**Activity:** Students will need a large sheet of drawing paper and crayons. Ask students to divide the paper in half by folding it and opening it up again. On one half they are to draw a picture of a fish in a habitat. The habitat may be an aquarium, fishbowl, or body of water. On the other half of the paper students will draw a picture of themselves and their habitat. This activity allows students to demonstrate the differences between characteristics and habitats of fish and people. Participation in the activity is the final assessment.

Most activities meet the **STEM** education guidelines involve problem solving, investigation, gathering data, analysis, using technology, application of math skills, integration of interdisciplinary instruction and inquiry.

## Turtle Cookie



Snack Items: Pretzel sticks, Vanilla wafers, White frosting, Blue food coloring, Mini candy for eyes, Oatmeal (any flavor) cookies

Directions: Each turtle cookie has 4 ½ pretzel sticks, 2 oatmeal cookies, 2 candy eyes, one vanilla wafer, white frosting to hold the cookies together, and blue frosting to attach the eyes.

Spread white frosting on the bottom of both cookies. Place 4 pretzel legs and the half piece for the tail; place the vanilla wafer (head) in place and put the second cookie on top. Secure the cookies by pressing lightly. With a small amount of blue frosting, frost the candy eyes and put on the head. A tasty treat for sure!

## **Fish Rhyme:**

1, 2, 3, 4, 5  
I caught a fish alive  
6, 7, 8, 9, 10  
I let it go again  
Why did I let it go?  
Because it bit my finger so  
Which finger did it bite?  
The little one on the right.

(Note: The rhyme incorporates counting and hand-eye coordination using left and right hands.)

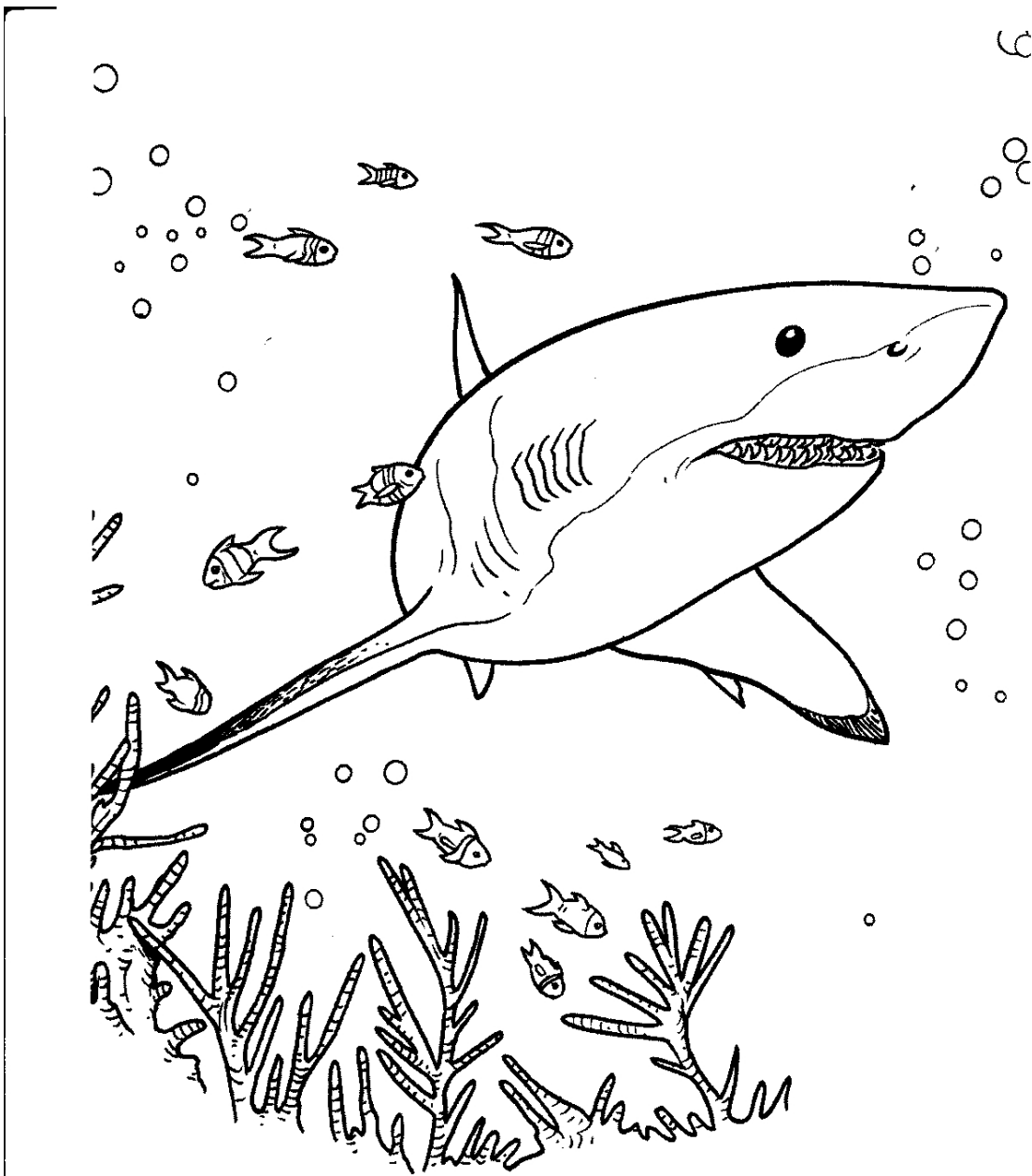
### **Sea Star Song** (Twinkle, Twinkle Little Star tune)

Sticky, sticky little sea star  
How I wonder what you are.  
Beneath the sea so cool and blue  
Can you see me as I see you?  
Sticky, sticky little sea star  
How I wonder what you are.

### **Catch a Fish Song** (Row, Row, Row Your Boat tune)

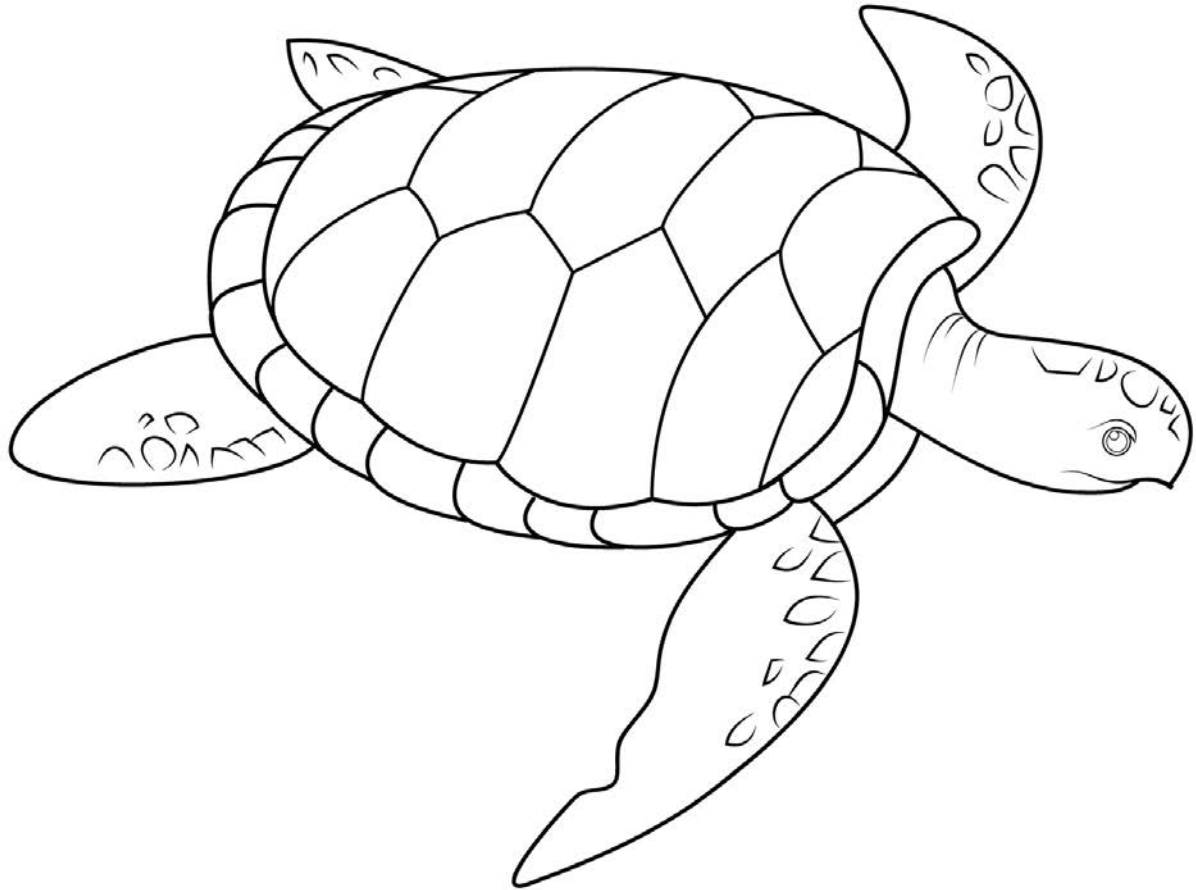
Catch, catch, catch a fish,  
Hook it on your line.  
Reel it, reel it, reel it in,  
This one will be mine.

# Color the Shark



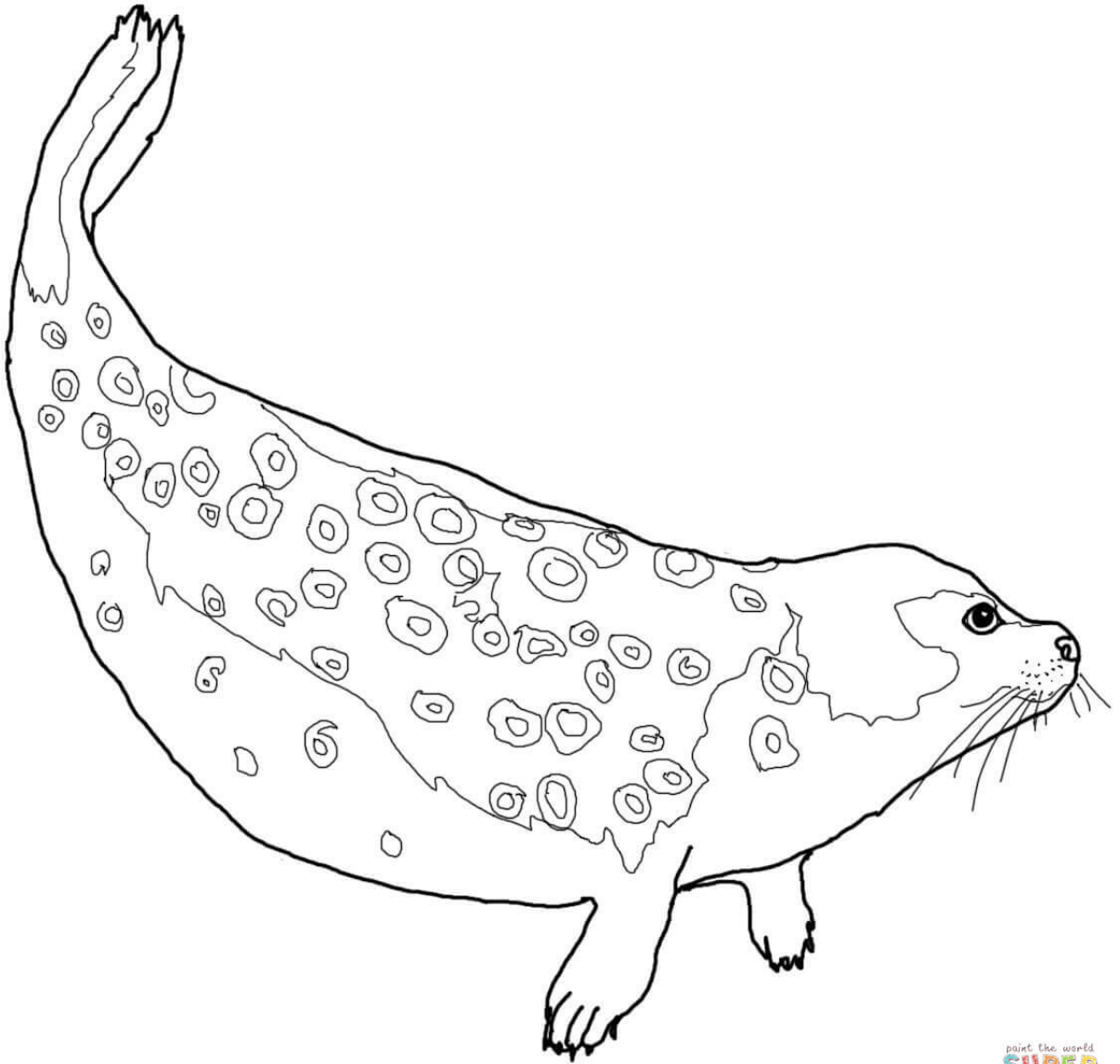
**Shark**

# Color the Sea Turtle



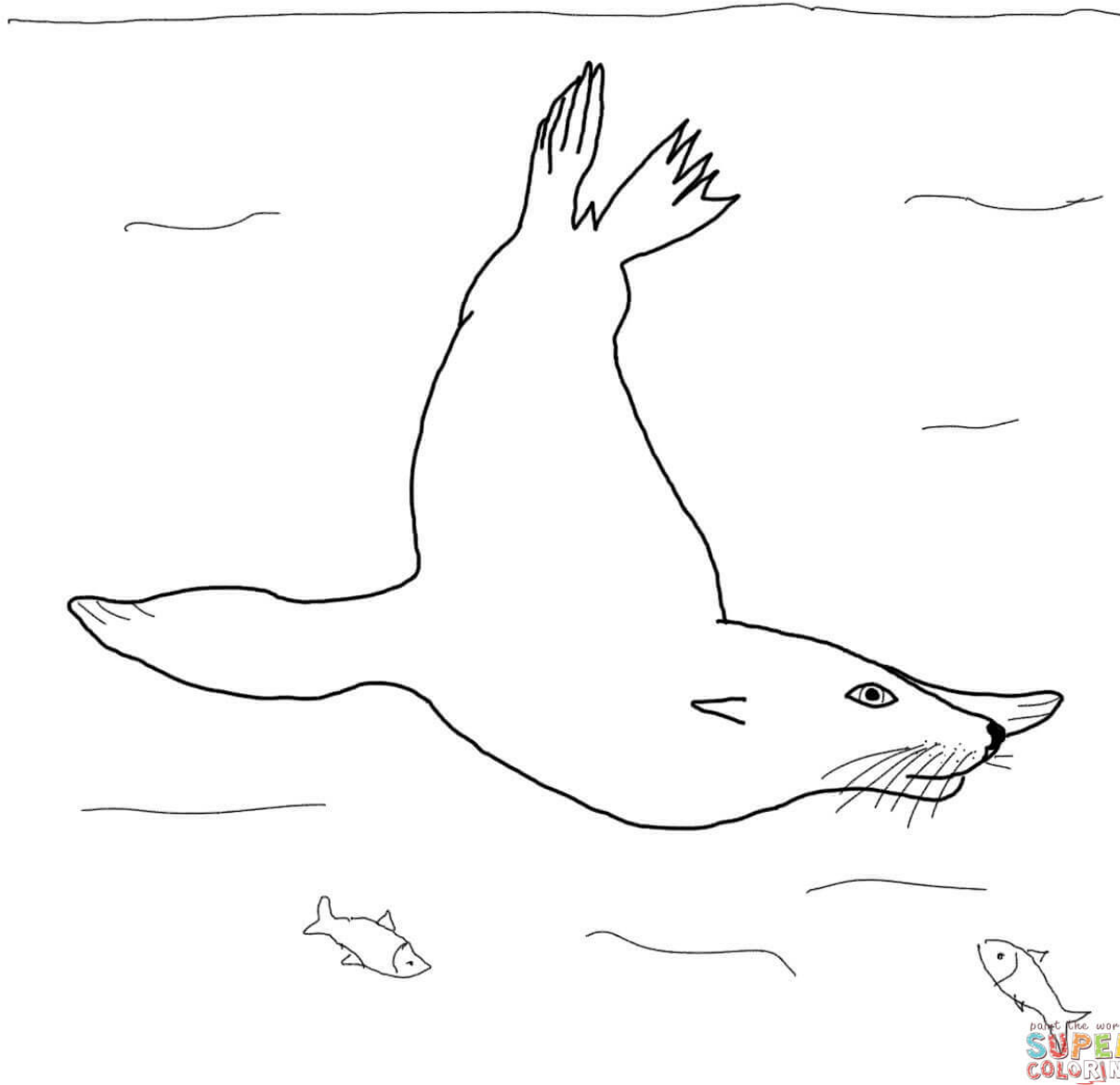
Join the world  
**SUPER**  
COLORING

# Color the Harbor Seal



paint the world  
**SUPER**  
COLORING

# Color the Sea Lion



# On the Beach

Grade level: Pre K – 2

Objective: Students will learn about the size, shape, texture, and makeup of sea shells.

This activity meets the **STEM** education standards, and can be modified for various grade levels.

Students begin the activity in small groups. Each group receives a bag of assorted sea shells. Students look over the shells and assemble them by size, shape, texture, color and/or weight (if scales are available).

Ask students what generalizations can be made about the shells and why?

Explain the term ‘sample’ and that this is only a sample of the kinds of shells found in the ocean and on ocean shores. Students (Pre-K – K) select one shell, show it to the class and describe it (big, small, rough, smooth, etc.). Draw and color a picture of the shell.

## **Additional Activity: Pre K-K**

This activity is designed to expose students to simple statistics. Students will identify size differences, measurement, and counting.

1. On a piece of construction paper, have students assemble the shells (about 7-9 depending on size, be sure it's an odd number) in a line from smallest to largest.
2. Using a ruler, measure the line of shells and mark the paper with a dot at the beginning and end of the line of shells.
3. Count the shells and write that number on a number card or on the construction paper.
4. Draw a line under the middle shell.
5. Circle the shell you like the best.
6. Draw and color a picture of your favorite shell.

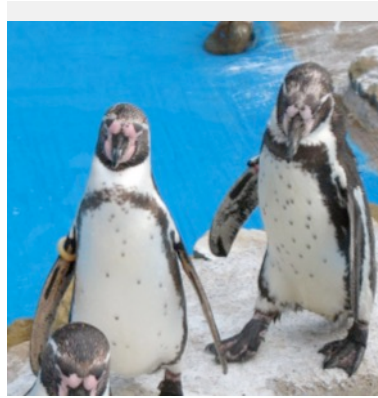


## Sea Shell Game

(Make 5 sea shells to use on a flannel board or use real sea shells, and place the on the board. Sing with the students.)

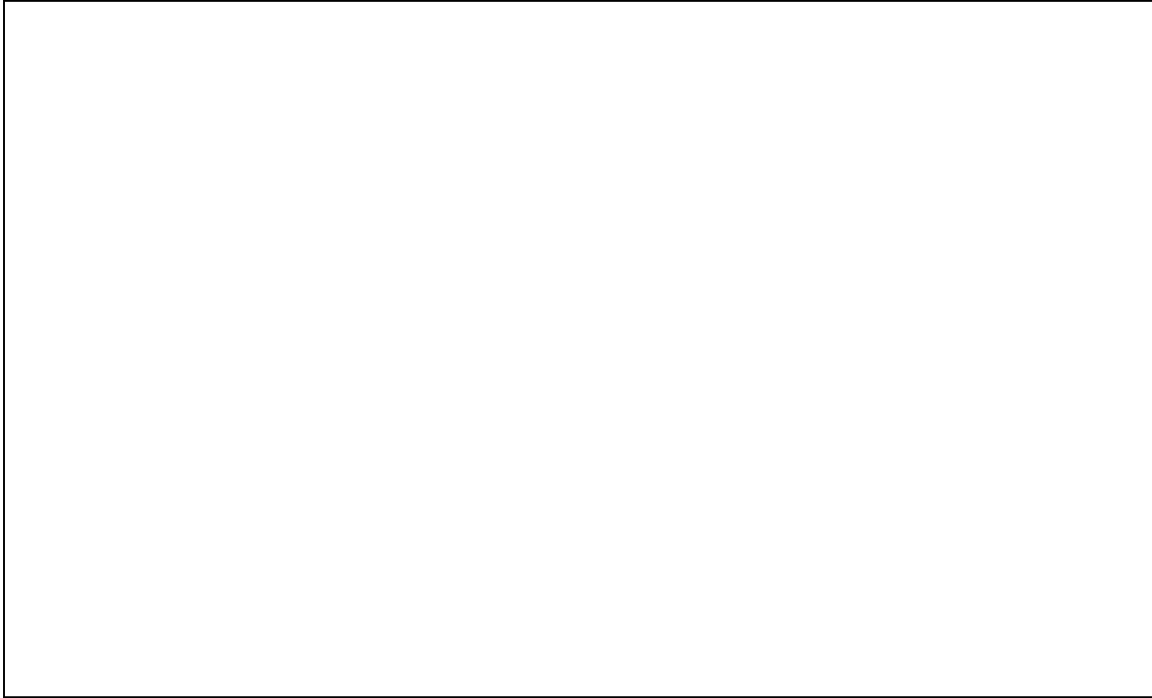
Five little sea shells lying on the shore,  
Swish went the waves and then there were four.  
Four little sea shells cozy as could be,  
Swish went the waves and then there were three.  
Three little sea shells all pearly new,  
Swish went the waves and then there were two.  
Two little sea shells sleeping in the sun,  
Swish went the waves and then there was one!  
One little sea shell left all alone,  
Whispered, “SHHHHHHHH” as I took it home.

## Where do they Live?

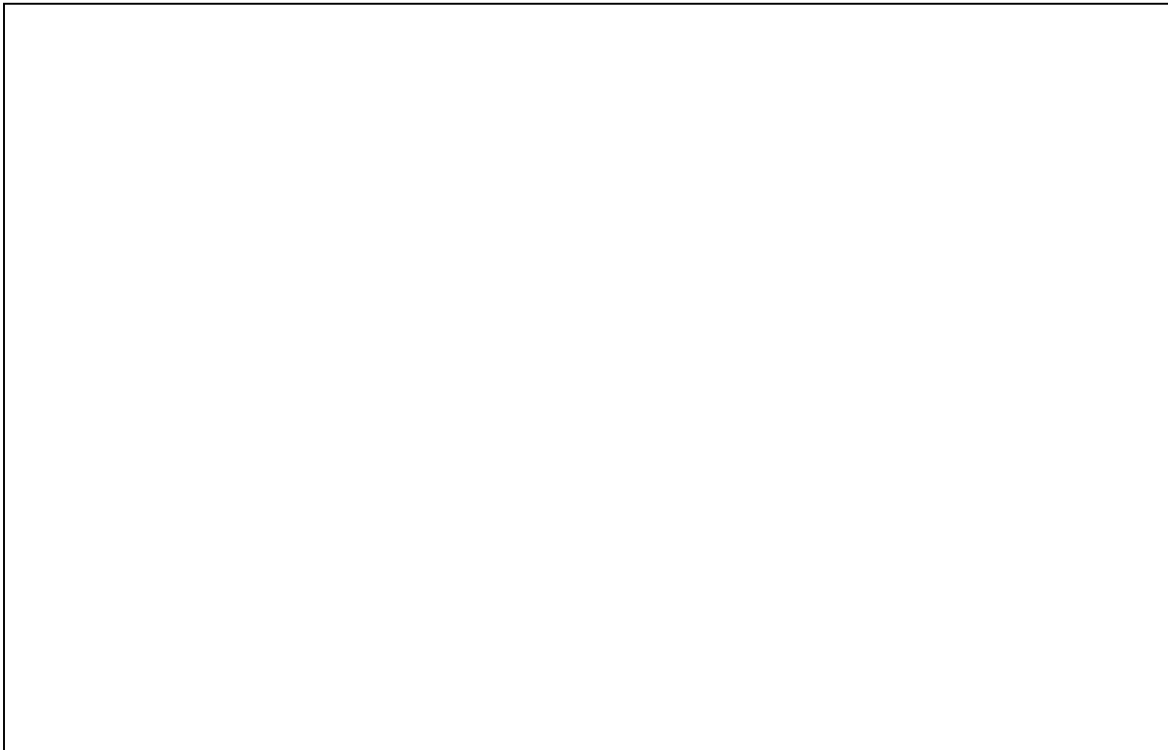


All animals live in a habitat. Many habitats are different.  
Cut out the animals and put them in the correct habitat.

I live in the desert



I live in the ocean





# I Spy

When you walk through the aquarium, look for these animals. Circle the ones you find.

