Open Ocean Survival Activity Sheet

Name: Teacher Guide **Date:** _____

Instructions:

You can prepare the creature cards ahead of time (laminate them to use in future activities). If you do this, you can ignore #1-4 in the procedure.

1. Gather your materials to survive in the open ocean!
   a. Creature ID cards, hole punch, string or yarn for wearing creature cards, Colorful paper (yellow, blue, and red), long pieces of tape, rope, or string to mark off ocean zones in the classroom, glue or tape to stick the two sides of the creature cards together, *Optional*: coloring materials (markers, pencils or crayons).
2. Each person will pretend to be a specific open ocean creature. Create your creature card to learn more about your new identity! You can assign creatures or let students choose.
   a. Cut out your creature card on the **cut line**.
   b. Fold on the **fold line**. You should have a creature image on one side and the description on the other.
   c. Glue (or tape) the two halves together.
   d. Hole punch the top corners.
   e. Cut out a piece of string or yarn about a foot long. Tie each end to the hole punched corners on the ID cards.
   f. *Optional:* Color in your creature picture to bring it to life!
   g. Drape it around your neck as your new ID.

Note: The creature cards are grouped in sets of three (with one creature from each zone). Cards connected by the same number (e.g., 1A & 1B, 2A & 2B, 3A & 3B, 4A & 4B) have similar ecological roles in each zone. To clarify, creatures in sets 1A and 1B are similar, so we recommend selecting creature cards based on their numbers first (see example A), and then add additional sets based on the letter (see example B).

- Example A: For a small class, choose sets with different numbers. For example, a class of 12 students would have 4 groups of three, so you could use card sets 1A, 2A, 3A, and 4A.
- Example B: A larger class, of 24 students, would have 8 groups of 3, so you could use all of the cards.

3. Read the back of your card to learn about your creature.
   a. Record the words in **bold** on your worksheet. These clues will help you know what action to take during the game!

4. Create your own animal dance that represents your creature! For example, if you are a shark, you could put your hand on top of head to represent a dorsal fin.
   a. Practice your dance!
   b. Describe your dance below:

Examples:

- **Squid**: Cup hands in circles around each eye to represent large eyes for life in the twilight zone.
- **Green Sea Turtle**: Hands on hips with elbows back to represent shell.
- **Humpback Whale:** Arms out to side to represent giant pectoral fins.
- **Yellowfin Tuna**: Hands to side close to form a torpedo-shaped body.
- **Tiger Shark**: Hand on top of head to represent dorsal fin.

Establish the ocean zones!

You may want to prepare the ocean zones ahead of time.

5. Now that you have created your creature card, you will establish your ocean zones in the classroom. Make sure you have plenty of space!
6. Create the ocean zone labels. Use a black marker and write in big letters (decorate if you want!):
    a. "Sunlight Zone" on yellow paper.
    b. "Twilight Zone" on blue paper.
    c. "Midnight Zone" on red paper.
7. Use tape, rope, or string to create zones by marking lines across the classroom.
    a. Label the zones with your paper labels.
    b. There should be enough room so that all students can stand in each zone.
    c. Tape the sunlight zone on one side, the twilight zone in the middle, and the midnight zone on the other side.
    d. *Optional:* You can use the tape, rope, or string to create a border around each zone.

Descend through the ocean zones!

This activity highlights expeditions from the Hawaii Underwater Research Laboratory (HURL). Check out their page for their photo gallery and illustrations as well as more information on their submersibles, research projects, and technologies.

8. Your teacher is the narrator. Listen as they read the introduction:

"Close your eyes and imagine that you are standing at the edge of the beach looking out to sea—beyond the horizon. You can see past the shoreline, past the coastal waters to the open ocean. The open ocean covers more than half our planet Earth and is home to a variety of plants and animals that have adapted to survive from the surface to the very deep sea.

You have been given a new identity on your creature ID card and I have a new identity also! I am Dr. Open Ocean. I study life in the open sea and I am about to head out on my underwater submersible, the Pisces IV. I am going to journey through the open ocean zones in my submersible to explore some of the adaptations that help different organisms survive in their part of the ocean. Are you ready to come with me on this journey? Let's go investigate how well your organism might do if you were forced to live somewhere else!

Additional teacher narration (not on student worksheet): As I begin my descent into the first zone, I will share my observations with you. Listen for clues about how life exists in this region and use the information on your card to figure out how well you survive. If the description sounds like your ideal environment, do your creature dance and stand up! If the description sounds like you might do okay (but not great), do your creature dance and sit down! If the description sounds like you will not do well at all (and might even die), do your creature dance and lay down!

Now, take a few minutes to read the back of your card to learn about your creature. Write a few things down on your worksheet about how your creature survives. Pay close attention to the words in bold, they will help you know what action to take later on!"

9. As Dr. Open Ocean begins their descent into the first zone, they will share their observations with you. You will listen for clues about how life exists in this region and use the information on your card to figure out how well you survive:
    a. If the description sounds like your ideal environment, do your creature dance and stand up!
    b. If the description sounds like you might do okay (but not great), do your creature dance kneel down!
    c. If the description sounds like you will not do well at all (and might even die), do your creature dance and sit down!
10. Gather in the area labeled the "Sunlight Zone" and listen to the next part of the adventure in the open ocean - **The Sunlight Zone:**

"Prepping for a trip like this takes a lot of effort! My team and I have been hard at work organizing the journey, gathering supplies, and planning for our research goals. After a long journey on a transport boat, The Pisces IV is ready to be lowered into the sea. I get into the 20 foot long submersible, settle on the cushions, and peer out the small bubble-like windows in anticipation [show photo 1].

As the sub begins to sink below the surface, the water line divides my window and I glance at the sky above. The sun warms the water and can even shine through to about 600ft in tropical waters! With so much sunlight, organisms like phytoplankton and algae that use the sun's energy to photosynthesize thrive in this zone. In fact, I see an algae drifting by, kept afloat with it's own packets of air!

With so many photosynthesizers around, there is also an abundance of herbivores, like zooplankton, who thrive by feeding on plant matter. Animals that feed on zooplankton and other surface swimmers also do well in this sunlight zone. With my sub still just at the surface, I look across the sea and I see a jelly [show photo 2]! Like the algae, it has a bubble of air to help it float at the surface while the rest of it, the long dangling tentacles, drift below and catch food.

Because there is so much light in this region, it is much easier to see what is around. Creatures who have adapted to have colors or patterns that help them blend in survive well here. They can hide from predators more easily or go unnoticed when catching prey!"

Additional teacher narration (not on student worksheet): Look at your card and determine if you will do well in the sunlight zone. Remember, If you will do well here, stand up. If you will do okay, but you might do better deeper in the water, kneel down. If the sunlight zone is just not for you, lay down."

The Sunlight Zone Photos

The Pisces IV will take you on your journey in the deep sea.

Photo 1. The pisces IV submersible
Image courtesy of the Hawaii Undersea Research Laboratory (HURL)

This jelly floats on the surface!

Photo 2. Portuguese Man-O-War
Image courtesy of Wikimedia

11. Look at your card and determine if you will do well in the sunlight zone.
Remember, if you will do well here, stand up. If you will do okay, but you might do better deeper in the water, kneel down. If the sunlight zone is just not for you, sit down. Don't forget to do your creature dance!

12. Move to the area labeled "Twilight Zone" and continue listening to the next part of the adventure in the open ocean - **The Twilight Zone**:

"Now that we've explored a little bit of the surface waters, it's time to dive deeper into the twilight zone! Brace yourselves as we descend from about 600 feet up to 2,000 feet deep. Here, there is very little light and the water is cold without the sun to warm it. There is also less oxygen. In order to see the creatures around me, I have to turn on all of my lights! [show photo 3].

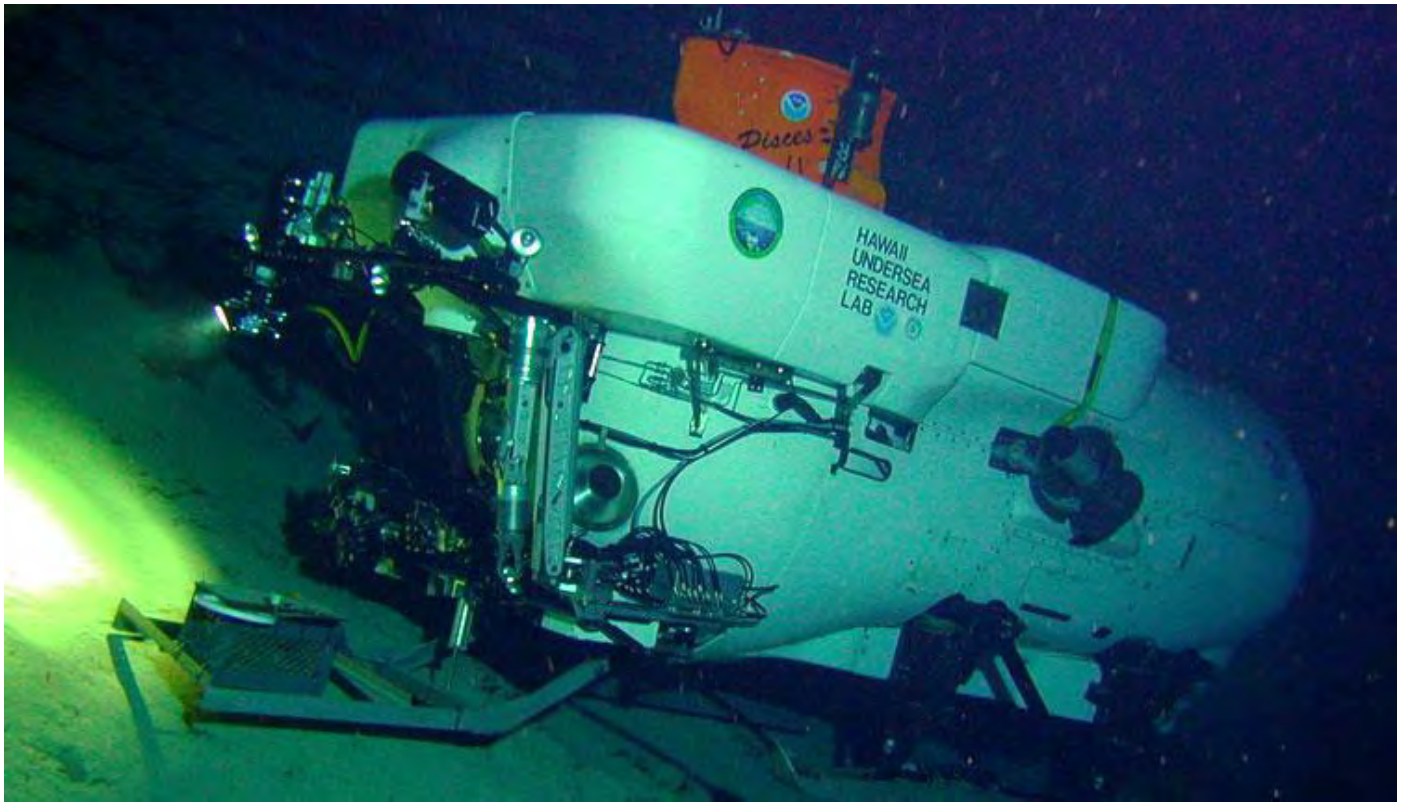
Many animals here are adapted to living in low light conditions. There are a lot of animals who make their own light, a feature called bioluminescence. They can use this either as camouflage from predators below or as lures to attract prey. Some have even adapted to have specialized eyes. One such squid has two different sized eyes [show photo 4]. The larger one is thought to be used to look upward, taking in the limited light that may penetrate through the surface waters. The other smaller eye then, peers downward, catching glimpses of any bioluminescent animals.

The ocean twilight zone is also an important source of food for many marine animals. Some zooplankton and fishes use the twilight zone to hide during the day and then they swim shallower at night to feed. Some animals, like the sperm whale, have to come to the surface to breathe but feed on giant squid that live in the twilight region.

Additional teacher narration (not on student worksheet): Look at your card and determine if you will do well in the twilight zone. Remember, if you will do well here, stand up. If you will do okay, but you might do better deeper or shallower in the water, sit down. If the sunlight zone is just not for you, lay down. Don't forget to do your creature dance!"

13. Look at your card and determine if you will do well in the twilight zone.
Remember, if you will do well here, stand up. If you will do okay, but you might do better deeper in the water, kneel down. If the twilight zone is just not for you, sit down. Don't forget to do your creature dance!

Twilight zone photos:



It's too dark to see without lights in the twilight zone!

Photo 3. The Pisces IV underwater.
Image courtesy of NOAA, via the Smithsonian

The cockeye squid!

Photo 4. The eyes of this squid help it to survive in the darkness of the twilight zone.
Image courtesy of Wikimedia Commons

14. Move to the area labeled "Midnight Zone" and continue listening to the next part of the adventure in the open ocean - **The Midnight Zone**:

"Our next and last stop is the midnight zone, where we are engulfed in complete darkness! The depth in this zone can range from about 2,000 feet to over 10,000 feet in some parts of the ocean! The Pisces IV can carry us to 6,500 feet - just what we need for this trip to reach the bottom at our given location. As we near the final stage of our study, we have to pay close attention to our timing since the submersible can only support us for about 7-9 hours. So let's get to it!

The water here is near freezing (usually about 39 degrees F) and dark. There is no light for photosynthesis so no phytoplankton or algae can grow here. Without the ability to see in the darkness, some organisms have even evolved without eyes! Water pressure is also very great here because of all the thousands of feet of water pushing down from above. A lot of the animals tend to be blobby and watery in order to survive the high pressure.

There is very little food in the deep ocean, so many predators also have large heads, mouths, and teeth to be able to eat whatever comes their way (otherwise, they might not get a chance to eat for a long time!). Others rely on matter that falls from the zones above, known as marine snow. This debris seemingly sprinkles down (like snow!), eventually reaching the seafloor. Some animals can filter the food scraps from the water with specialised feeding appendages. Others live in the mud on the seafloor and constantly sift through the sand for food.

Look at your card and determine if you will do well in the twilight zone. Remember, if you will do well here, stand up. If you will do okay, but you might do better shallower in the water, kneel down. If the sunlight zone is just not for you, sit down. Don't forget to do your creature dance!"

15. Look at your card and determine if you will do well in the midnight zone.
    Remember, if you will do well here, stand up. If you will do okay, but you might do better shallower in the water, kneel down. If the midnight zone is just not for you, sit down. Don't forget to do your creature dance!

16. Now that you've made it to the deepest part of the ocean, it's time to go back up! Listen as your teacher tells the final story of your journey back up to the surface. Your teacher will indicate what zone you are in. When you get to the zone that you do best in, stay in that habitat.

"We are approaching the limit of our dive time and need to head back up to the surface. Before our submarine leaves the midnight zone, let's say goodbye to the creatures who are adapted to living in the deepest part of the ocean. Creatures that are standing, do your creature dance and then tell us about the adaptations that help you thrive in the midnight zone. [Allow students in the midnight zone to share about their creature.]

[Move to the twilight area]
All other creatures — come with me as our Pices IV rises up to twilight zone. If this is your ideal habitat, do your creature dance and then tell us about the adaptations that help you thrive in the twilight zone. [Allow students in the twilight zone to share about their creature.]

[Move to the sunlight area]
All remaining creatures — come with me as our Pices IV continues rising to the surface zone. If this is your ideal habitat, do your creature dance and then tell us about the adaptations that help you thrive in the surface zone." [Allow students in the sunlight zone to share about their creature.]

17. *Optional concluding activity*:

    a. Group Habitat Discussions: Talk with the other organisms adapted to your zone and discuss what sorts of adaptations help the creatures survive well in your zone. (Each group can also write their key ideas on the board for the whole class to discuss and compare.)

    b. Record Your Creature Zone: Create a model of the ocean zones on the board. Write the name of your creature in the zone where it was best adapted.

Activity Questions:

1. My creature was _____. I survived best in the _____ zone. The things that helped me to survive well were _____ and _____. I didn't survive well in the _____ zone because _____.
2. Look at your card and find the number and letter combination in the corner. Find the two other students with the same number/letter combination and learn about the other creatures in your group.
    a. Share your creature description with the other students in your group. Listen as they share about their creature.
    b. Which creature survived best in each of the habitats?
        i. Sunlight Zone:
        ii. Twilight Zone:
        iii. Midnight Zone:
3. Pick one of the three ocean zones that you have explored. Design, draw, and label a creature that would survive well there.
4. Pick an organism that you are very familiar with, such as a pet, and describe its habitat:

    a. If you put this creature in a different habitat, how would it do? Describe the habitat.

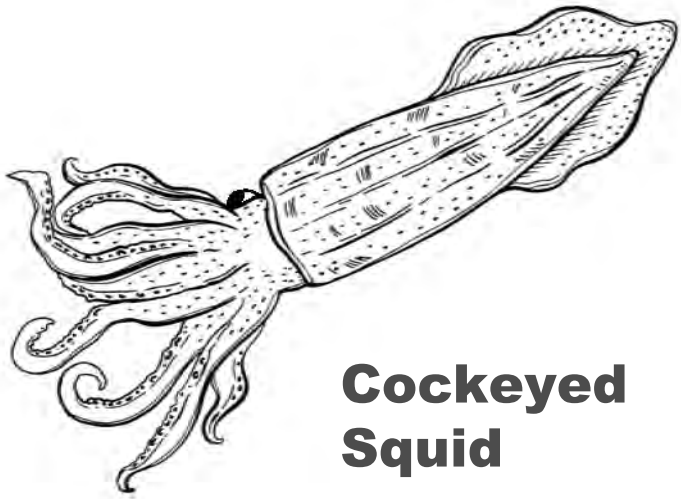
5. Man o war question to tie back to the phenomenon.

Sargassum

Fold along this line

1. **DESCRIPTION**: This algae lives in **shallow areas** where it can get plenty of **sunlight**. It also has floats that keep it near the surface
2. **DIET**: A **primary producer** that uses energy from the sun to grow through a process called **photosynthesis**.
3. **PREDATORS**: Eaten by turtles, urchins, and even parrotfish.

1A



Cockeyed Squid

Fold along this line

1. **DESCRIPTION**: Also called the strawberry squid, this animal can **produce it's own light**. This is called **bioluminescence**. It moves by squirting water through a siphon. **One eye is adapted to look up and see in the dimly lit waters above. The other eye is smaller, allowing it to see other glowing animals in the darkness below**.
2. **DIET**: Eat glowing, or bioluminescent, animals.
3. **PREDATORS**: Many animals eat them, including many sharks and tuna, some whales, and people.

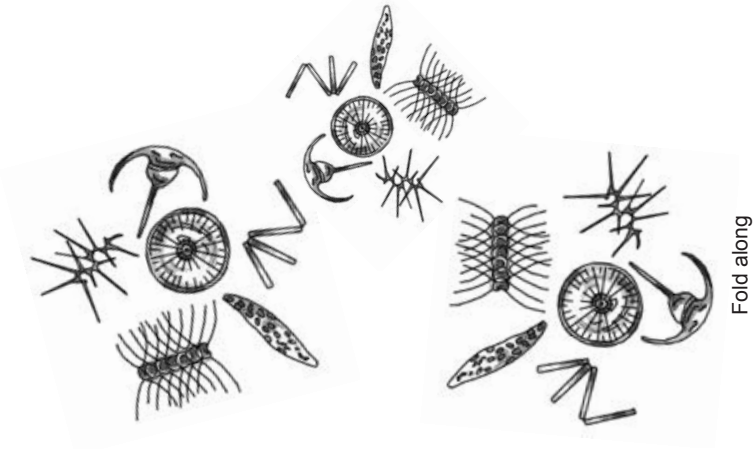
1A

Glass sponge

Fold along this line

1. **DESCRIPTION**: This sponge is adapted to live in **cold** and **deep** water. It is **attached to bottom**. Shrimp use them as homes.
2. **DIET**: Little zooplankton filter through holes in the glass sponge.
3. **PREDATORS**: Some sea stars or sea slugs.

1A

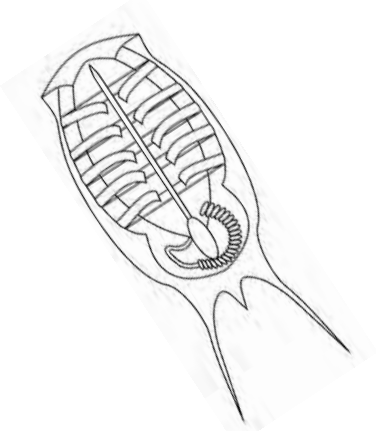


Phytoplankton (ʻŌulaula kaʻamaʻai)

Fold along this line

1. **DESCRIPTION**: Tiny, microscopic, one-celled algae. They are found all over the globe. Phytoplankton use **photosynthesis** so they **rely on light to make food**. They **can travel deeper in the water column at night**.
2. **DIET**: A **primary producer** that uses energy from the sun to grow through a process called **photosynthesis**.
3. **PREDATORS**: Eaten by small organisms like shrimp and krill.

1B



Salp

Fold along this line

1. **DESCRIPTION**: A salp has a **jelly-like body**. This allows the salp to pump water through it's body to move by jet propulsion. They sometimes live in groups called colonies. Salps are generally **found in deeper** waters but will **migrate to the surface layer** to feed.
2. **DIET**: While pumping water to move, the salp filters and **feeds on phytoplankton**.
3. **PREDATORS**: Salps are eaten by many fishes including the Ocean Sunfish and the Blue-ringed Angelfish.

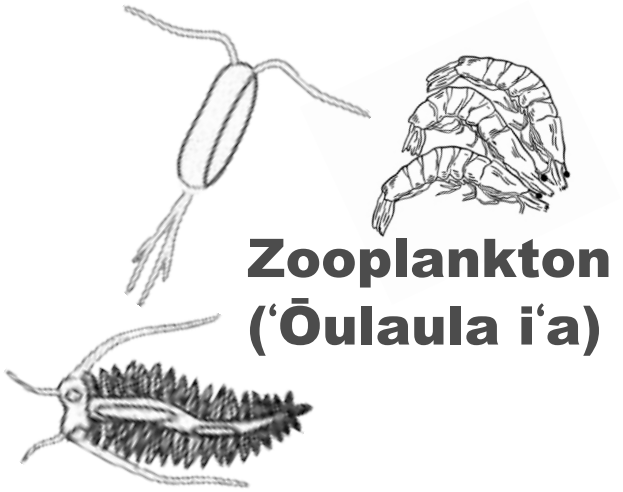
1B

Sea pen

Fold along this line

1. **DESCRIPTION**: Sea pens are a type of coral that **live in the deep** sea. They **anchor** themselves to the muddy and soft sea floor. They live as a colony.
2. **DIET**: Sea pens filter zooplankton from the water.
3. **PREDATORS**: Sea stars feed on sea pens.

1B

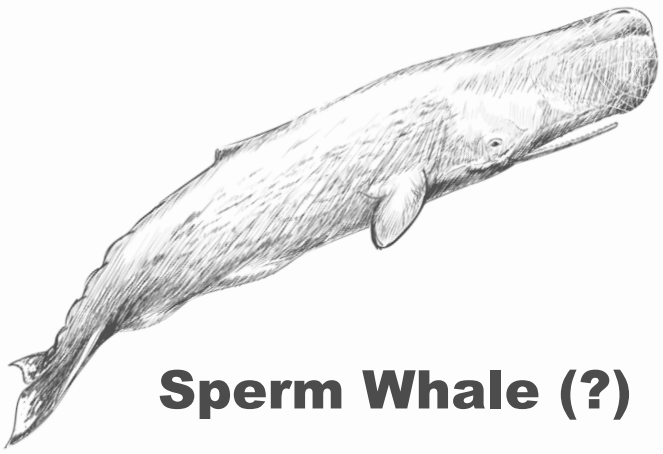


Zooplankton (ʻŌulaula iʻa)

Fold along this line

1. **DESCRIPTION**: Very small animals that drift and/or swim **throughout the ocean**. They are found in almost all parts of the ocean. Many undergo a **vertical migration**. This means that they move up and down in the water column at different times of the day.
2. **DIET**: Phytoplankton.
3. **PREDATORS**: Many animals eat them by filtering them through their teeth like structures or grabbing them in their stinging tentacles.

2A

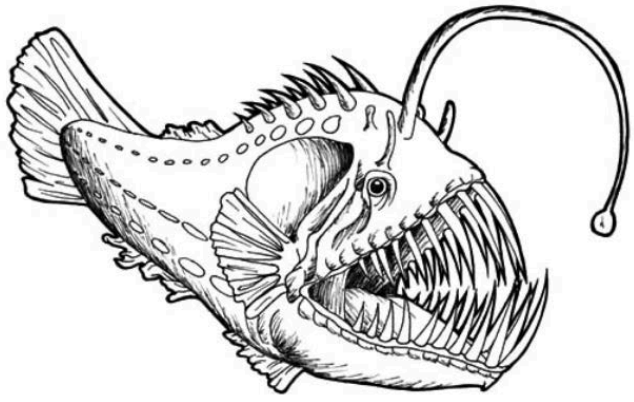


Sperm Whale (?)

Fold along this line

1. **DESCRIPTION**: Sperm whales are large animals that live out in the open ocean. They **breathe air at the surface** and **dive to great depths to feed**.
2. **DIET**: Sperm whales dive to deeper waters to feed on giant squid.
3. **PREDATORS**: Orcas

2A



Anglerfish (?)

Fold along this line

1. **DESCRIPTION**: The anglerfish **lives in complete darkness**. It uses a **glowing** "lure" attached to it's head to draw in it's prey. It has **large teeth** help to capture anything that may cross it's path. It is slow and lethargic behavior suited to the energy-poor environment of the deep sea.
2. **DIET**: Anglerfish eat whatever they can catch including shrimp, snails and other fish.
3. **PREDATORS**:

2A

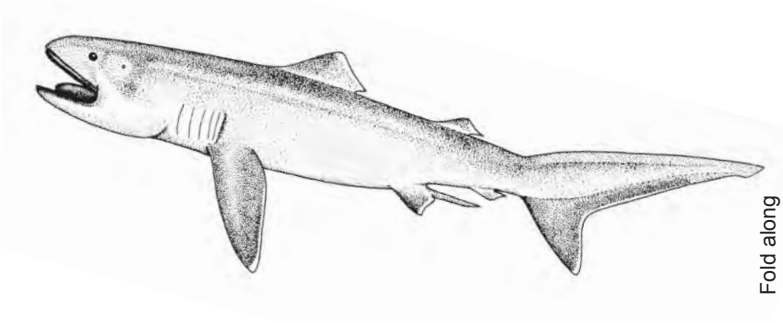
Man o' War

Fold along this line

1. **DESCRIPTION**: This jellyfish **floats and drifts on the surface of the water**. It has stinging cells in its tentacles that dangle and catch food.
2. **DIET**: The man o' war preys on some fish, zooplankton and shrimp.
3. **PREDATORS**: Loggerhead sea turtles, the blue sea slug, and violet snail.

2B

Megamouth Shark

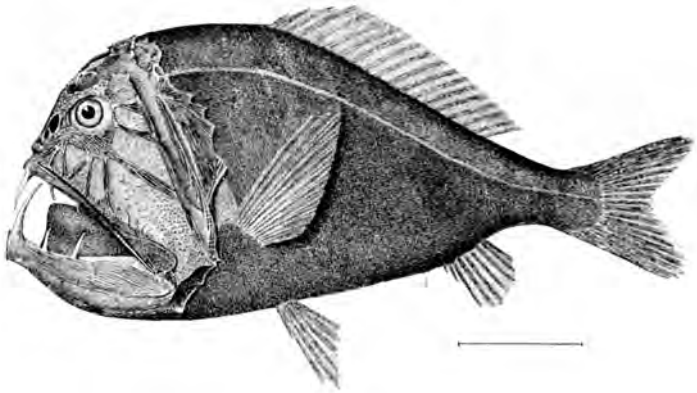


Fold along this line

1. **DESCRIPTION**: This shark swims with it's mouth open so that it can filter food particles from the water. Not many individuals have been spotted because they **live deep**. They are not very good swimmers and have **soft, flabby bodies**. One megamouth shark was observed to **swim closer to the surface at night to feed and then return back to the deeper waters during the day**. This behavior is called **vertical migration**.
2. **DIET**: Filters plankton and jellyfish from the surrounding waters
3. **PREDATORS**:

2B

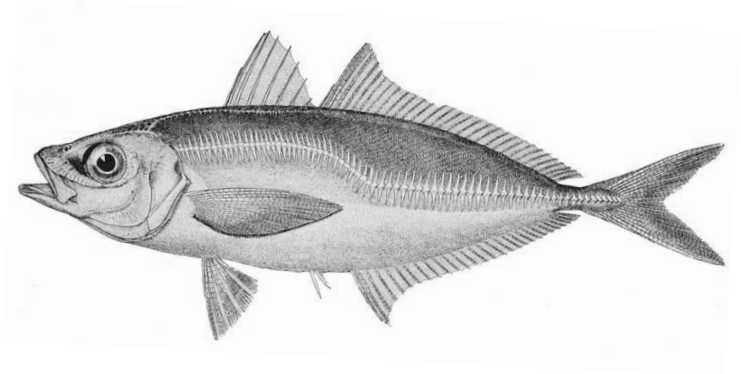
Fangtooth fish



Fold along this line

1. **DESCRIPTION**: This fish has **very large teeth** so it can capture any food that swims by. It has **small eyes since it lives in complete darkness** most of the time. It may do a **vertical migration** pattern, moving up to the twilight zone to feed.
2. **DIET**: They eat other small fish or squid.
3. **PREDATORS**: Other large fish and some species of shark may eat them.

2B

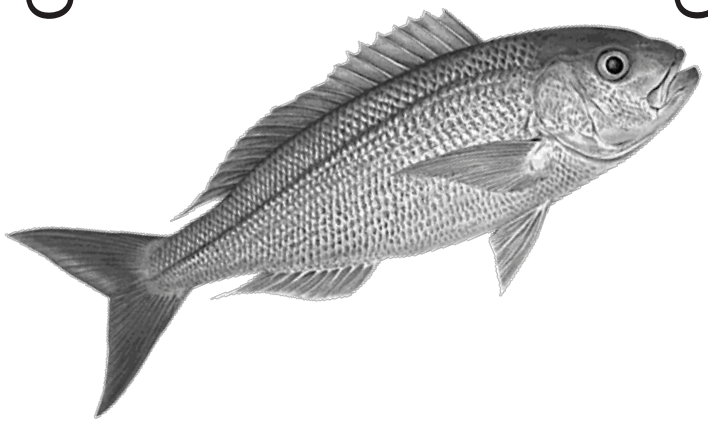


Big Eye Scad (Akule)

Fold along this line

1. **DESCRIPTION**: Found in large schools, this fish is mostly active at night. It has a **coloring that helps it blend in to the surface waters** with blue-green on it's back and sides and white on its belly.
2. **DIET**: Feeds on small fishes and crustaceans that live in **shallow waters**
3. **PREDATORS**: Akule are a very popular food source for humans. They are also eaten by larger fish such as tuna.

3A

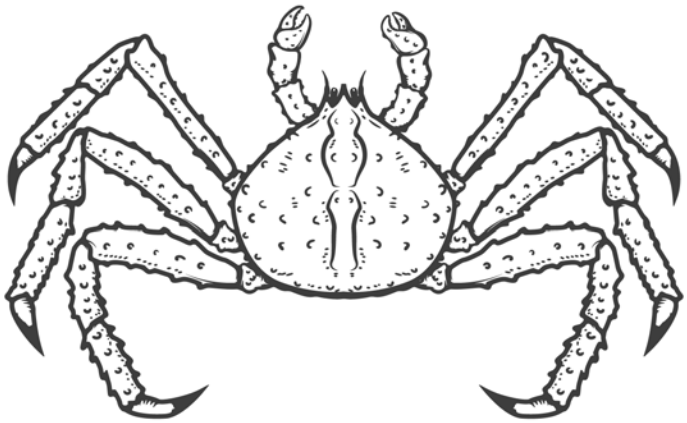


Hawaiian Pink Snapper (Opakapaka)

Fold along this line

1. **DESCRIPTION**: This fish is a type of **deep water** snapper that live in the **twilight** region. The like to live in rocky areas.
2. **DIET**: Feed primarily on small fishes and crustaceans.
3. **PREDATORS**: Opakapaka is a popular seafood choice for humans.

3A

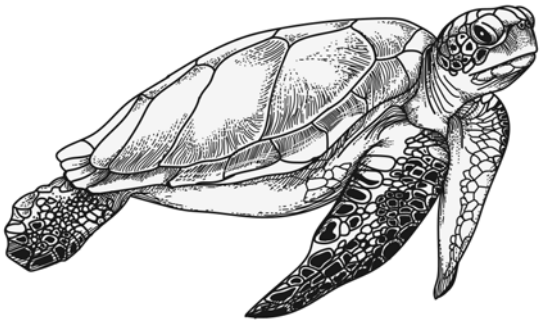


King Crab

Fold along this line

1. **DESCRIPTION**: King crabs are **adapted to cold water**. They **crawls on the bottom** to find food. They can grow to be very large.
2. **DIET**: They eat almost anything they can find and crush with their claws including worms, clams, mussels, barnacles, other crabs, fish, sea stars, sand dollars, and brittle stars.
3. **PREDATORS**: They are eaten by large fish, octopuses and even other king crabs.

3A

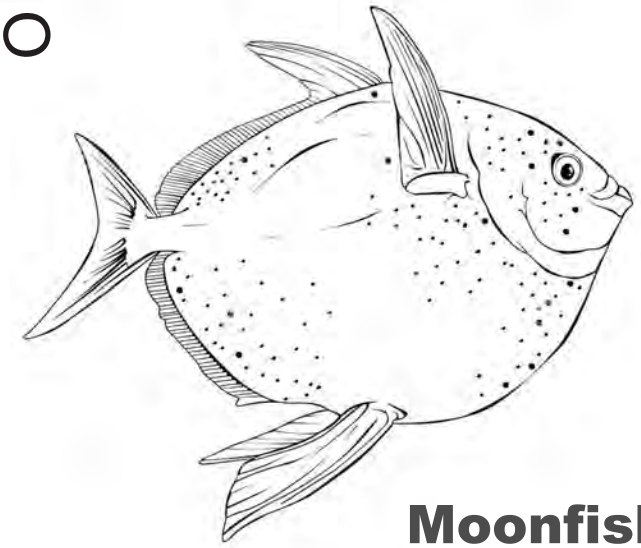


Green Sea Turtle (Honu)

Fold along this line

1. **DESCRIPTION**: Green sea turtles **breathe air** and females **lay their eggs on sandy beaches**. Brownish to black on top and yellowish underneath, to **blend into shallow open ocean waters**. They can also dive a bit deeper to search for food. Hard shell protects them from predators.
2. **DIET**: Eats algae and jellyfish.
3. **PREDATORS**: Sharks

3B

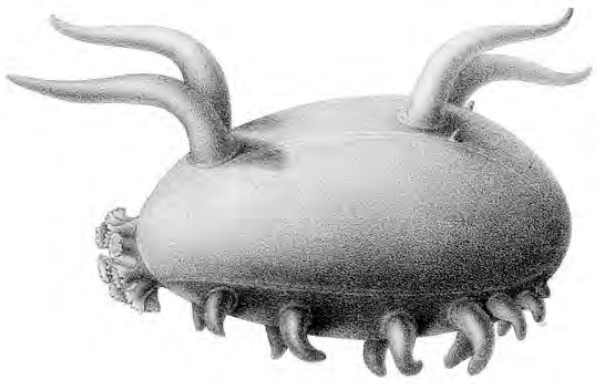


Moonfish (Opah)

Fold along this line

1. **DESCRIPTION**: This fish is shaped like a large disc. It can generate it's own heat by continuously moving it's fins. This **allows it to live in the cold waters of the deep**. It may participate in **vertical migration** to find food.
2. **DIET**: Feed mainly at **mid-water depths** on squid, krill and other smaller fish.
3. **PREDATORS**: Humans and large sharks.

3B

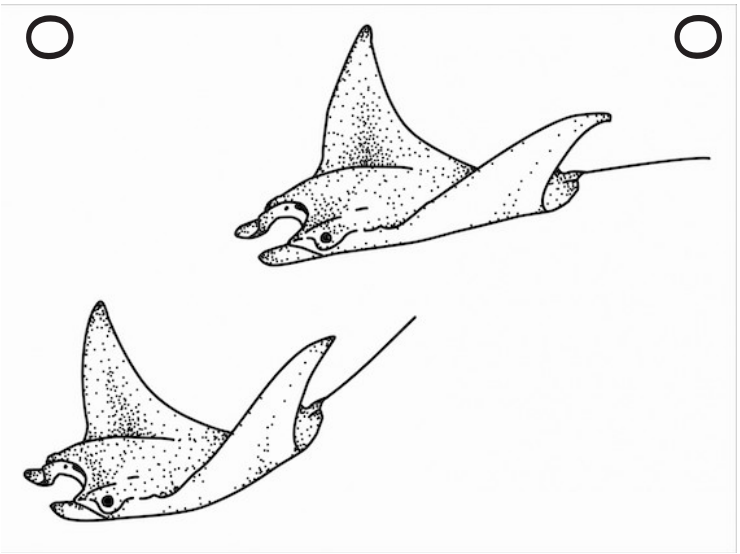


Sea Pig: Deep Sea Cucumber

Fold along this line

1. **DESCRIPTION**: This deeps sea cucumber **crawls along the seafloor** and filters through the mud for food. They have **blobby bodies** to withstand the high pressure of the deep sea.
2. **DIET**: Sea pigs eat any material that they can find in the mud.
3. **PREDATORS**: Parasites

3B



Manta Ray

Fold along this line

1. **DESCRIPTION**: Manta rays can have a wingspan over 20 feet! They glide through the water filtering food. Manta ray bodies have **counter shading,** so they are dark on top and white on the bottom. This color pattern helps them stay camouflaged in shallower waters.
2. **DIET**: Feed on zooplankton in **shallow and mid-deep waters** by opening their mouths filtering
3. **PREDATORS**: Large sharks and orcas

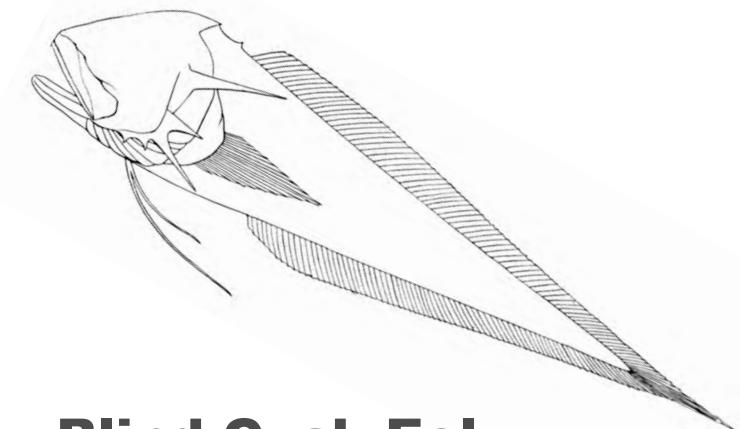
4A

Giant Squid

Fold along this line

1. **DESCRIPTION**: The giant squid can grow to incredible lengths up to 45 feet! They also have **very large eyes to help them see in the dimly lit waters**.
2. **DIET**: **Feed on deep-sea fish** and other squid species.
3. **PREDATORS**: Eaten by **sperm whales** in the mid-water depths.

4A

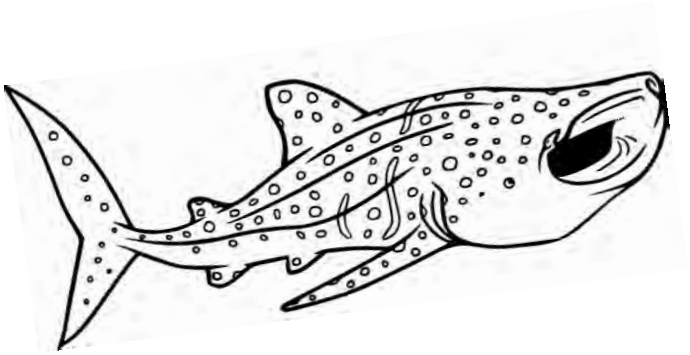


Blind Cusk Eel

Fold along this line

1. **DESCRIPTION**: The blind cusk eel has adapted to life in **complete darkness** by not having any eyes. They also have pale, **jelly like skin**. They live in the cold waters of the deep-sea.
2. **DIET**: ?
3. **PREDATORS**: ?

4A

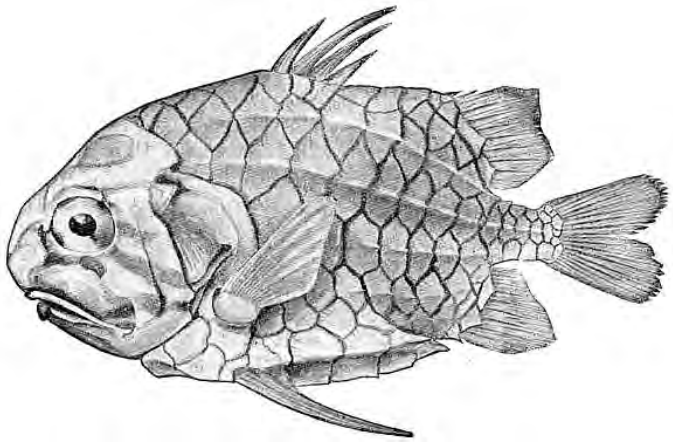


Whale Shark (?)

Fold along this line

1. **DESCRIPTION**: The whale shark swims with it's mouth wide open to filter food from the water. Their bodies have counter shading, so they are dark on top and white on the bottom. This color pattern helps them **stay camouflaged in shallower waters**.
2. **DIET**: Eat zooplankton
3. **PREDATORS**: Orcas and humans

4B



Pinecone Fish

Fold along this line

1. **DESCRIPTION**: This fish is also called a pineapplefish and can **make it's own ligh**t. It primarily hides in deep caves and ledges during the day and will hunt at night.
2. **DIET**: This fish uses it's own light to attract and detect prey like zooplankton or shrimp.
3. **PREDATORS**: Humans collect these fish for the aquarium trade. They have also been found to be eaten by some sharks and octopuses.

4B

Dumbo Octopus (?)

Fold along this line

1. **DESCRIPTION**: The dumbo octopus **hovers just above the sea floor to feed.** It's arms are adapted to help it crawl along the bottom. It survives in **very cold and deep** areas.
2. **DIET**: Worms and crustaceans
3. **PREDATORS**: Sharks and other species of octupus

4B