LESSON 2 Creature Features

Lesson at a Glance

In this lesson the students make open ocean flash cards. The class learns about each ocean animal's unique structure and behaviors that allow them to function and survive in the open ocean habitat. They draw and color ocean animals into the correct zone of the water column they colored in Lesson 1 to create a final ocean zone poster. Students will use observational skills to draw and color their ocean animals from pictures used on their flash cards.

Lesson Duration

Two 45-minute periods

Essential Question(s)

What are the features of animals that live in open ocean habitats? How do the features of open ocean animals help them to survive in their habitat?

Key Concepts

- Animals that live in the open ocean have distinct structures that enable them to survive.

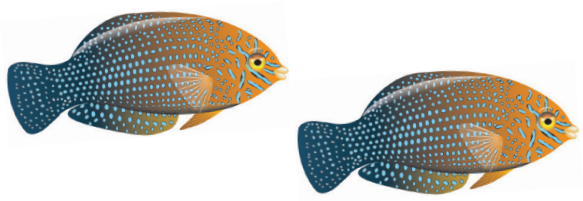
Related HCPS III Benchmark(s)

Science SC.3.4.1
Compare distinct structures of living things that help them to survive.

Fine Arts FA.3.1.3
Use observational skills in creating an original work of art.

Instructional Objective

- I can describe an open ocean plant or animal and identify some features that help it survive in the open ocean.
- I can make observations of open ocean animals to create an original art piece.



Assessment Tools

Benchmark Rubric:

Topic		Cells, Tissues, Organs, and Organ Systems	
Benchmark SC.3.4.1		Compare distinct structures of living things that help them to survive	
Rubric			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Group living things by the distinct structures that help them to survive and provide justification for the grouping	Compare distinct structures of living things that help them to survive	Describe a few ways in which distinct structures of living things help them to survive	Name distinct structures of living things that help them to survive

Topic		How the Arts Communicate	
Benchmark FA.3.1.3		Use observational skills in creating an original work of art	
Rubric			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Consistently use observational skills in creating an original work of art	Usually use observational skills in creating an original work of art	Sometimes use observational skills in creating an original work of art	Rarely use observational skills in creating an original work of art

Assessment/Evidence Pieces

Lesson

- Student discussion of animal features
- Student participation in Open Ocean Animals Card Games
- Written reflection on the structures that enable organisms to survive in Open Ocean habitats
- Open Ocean Zones Poster

Materials Needed

Teacher	Class	Group	Student
• 1 sample set of flash cards • Chart paper • Method to present PowerPoint • Computer with internet access	• None	• Student sets of flash cards • Optional: 32 index cards • Optional: Glue, lamination or double stick tape • Drawing paper • Colored pencils • Crayons • Markers	• None

Instructional Resources

Teacher Reading: *Life in the Ocean Zones*
Teacher Reading: *Video Clips List*
Student Worksheet: *Open Ocean Animal Flash Cards*
Video: *Sunlight Zone Plants Phytoplankton*
Supplemental Resource: *Open Ocean Habitats Interactive Game*

Student Vocabulary Words

bioluminescence: method by which a living organism produces light by using chemicals inside its body.
camouflage: the blending of an animal with its surroundings.
carnivores: animals that eat other animals.
herbivores: animals that eat plants.
mimic: an animal that copies the appearance and/or behavior of another animal.
predators: animals that hunt and kill other animals.
phytoplankton: microscopic plants that drift and float in the ocean and are the basis of life in the ocean.
prey: an animal that is hunted, killed, and eaten by another animal.
schools: an organized group of fish that move and turn together as one.
venomous: an animal which possesses poison that can be delivered into the body of another animal by a bite or sting.
zooplankton: small, usually microscopic, organisms that drift in the ocean.

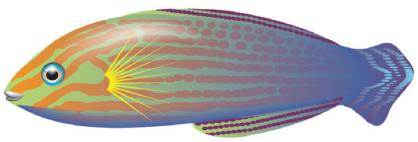
Lesson Plans

Lesson Preparation

- Review the Science Background provided in the Unit Overview and the Teacher Reading *Life in the Ocean Zones.*
- Prepare sets of ocean animal cards, separating the pictures from the descriptions before the lesson. If possible, laminate for future use.

  If using index cards: glue the pictures and descriptions on one side of the index card; the other side remains blank.

  Other option: copy/print cards onto heavier weight paper and have students cut out and use them as flashcards.
- Post chart paper from Lesson 1 *Wonderings About the Open Ocean* nearby.
- Preview the video clips and short video *Sunlight Zone Plants Phytoplankton*. Set up computer and projector, to view.
- Make copies of the *Open Ocean Animal Flash Cards* Student Worksheet; one for every two students.
- Write the directions for the card game on chart paper or whiteboard.
- Preview the interactive piece *Open Ocean Habitats* to be completed at the end of Step II.



I. *Open Ocean Plants and Animals*

A. Refer students back to their "*I Wonder"* questions on the chart paper *Wonderings About the Open Ocean* from Lesson 1. Students may be able to answer some of the questions after the completion of the first lesson. Students may also have additional questions that they may want to add to the list. Teacher may use this as an informal assessment to determine if the class is meeting the instructional objectives for each lesson.

B. Show students the *Sunlight Zone Plants Phytoplankton* video, using the notes and questions provided in the presentation to guide the discussion. Reinforce to students that even microscopic plants have a habitat within an open ocean ecosystem and play an important role as primary producers in marine food chains and webs.

C. View video clips and PowerPoint of different open ocean plants and animals in their natural habitat. Viewing of the following organisms is recommended: Manta Ray, Tiger Shark, Giant Trevally, Greater Amberjack, Big Eye Tuna, Dolphin Fish, Hawaiian Black Grouper, Hawksbill Turtle, Leatherback Turtle, Portuguese Man-O-War, Pelagic Jellyfish, False Killer Whale, Melon head Whale, Sperm Whale, Spinner Dolphin, Humpback Whale, and Hawaiian Monk Seal. The NOAA website for viewing these clips is: http://www8.nos.noaa.gov/onms/park/Parks/SpeciesCard.aspx?pID=18&refID=2&CreatureID=1098

While viewing the short video clips, facilitate a discussion using the following questions:

1) What do you notice about the organisms body shapes?
2) What kind of fins do you see on the larger fish and mammals? How do you think they use these?
3) What kind of eyes do these open ocean animals have? Are they large or small?
4) What did you notice about their behavior and the way they move?

*Note: Responses to these questions and the observations students make may be used as assessment evidence of meeting the Science benchmark 3.4.1 – Compare distinct structures of living things that help them to survive. You may choose to have students record their observations as they view the video clips. Students will be asked to compare/contrast animals' features in the next lesson.

II. *Open Ocean Animal Flash Cards*

A. Introduce the various organisms in the *Open Ocean Animal Flash Cards* set. Pass around individual flash card pictures for students to examine them more closely, or project them on a screen using an Elmo. As pictures are shared, discuss the adaptations each animal has made, how it protects itself, and who its predators are.

B. Pass out student sets of *Open Ocean Animal Flash Cards*; one set for every pair of students or small group.

C. Have students sort the animal flash cards according to their Open Ocean habitat: Photic Zone (Sunlight), Disphotic Zone (Twilight), or Aphotic Zone (Darkness). Students may create a separate stack for organisms that fit into more than one zone. Conduct a check for understanding. Compare how each of the student pairs or groups sorted their organisms. Discuss how the adaptations of various organisms enable them to survive in their Open Ocean Zone.

D. In order to reinforce the student learning have the class work in pairs on the computer using the *Open Ocean Habitats Interactive Game.*

III. *Open Ocean Zones Poster*

A. Create an anticipatory set by reviewing the concepts of tints and shades that were introduced in Lesson 1. Reinforce that tints and shades create value: the lightness or darkness of a color. Introduce that artists, like scientists, are observers of detail.

B. Post or project the following suggested images:

1) M. C. Escher's Ant: http://www.mcescher.com/Gallery/back-bmp/LW328.jpg

2) Robert Wyland's painting in honor of International Year of the Reef 2008:

http://coralreef.noaa.gov/aboutcrcp/howwework/accomplishments/

C. Ask students to look closely at these art prints. Explain that they demonstrate the use of value to give objects a three-dimensional quality. Consider the following questions to guide the discussion:

1) Where do you see the use of value?

2) Where is it lighter or darker?

D. Make connections to their Open Ocean poster by asking the following questions:

1) Where is the source of light in the Photic Zone?

2) Which parts of Photic Zone organisms might be lighter depending on the location of the light source?

3) How might you create organisms such as the shark that have darker upper and lighter lower body shadings?

4) What about organisms in the Disphotic Zone?

5) How might you use tints and shades to show bioluminescence? Or silvery reflective scales?

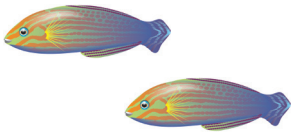
E. Pass out a sheet of drawing paper to each student. Explain that they will use their completed flash cards to *draw* their own animals onto the water column poster they created in Lesson 1 showing the different ocean zones. Consider also having the students access the Internet to access realistic images.

F. Clarify that students will demonstrate their understanding of different structures and functions of the open ocean animals by using observation skills and facts they have gathered from the flash cards, in order to accurately draw the animals in the correct zone with appropriate coloring and size. They will also practice applying tints and shades to create value in their drawings.

G. Have students cut out and paste their organisms onto the Open Ocean poster as they complete their work.

IV. *Open Ocean Animal Card Games*

A. Students may play a Concentration Card Game using the Ocean Animal Flash Cards, 2–4 players can play at a time. This game requires sets of picture and animal description flashcards.



1) Deal all cards face down in a square with six cards across and six cards down.

2) Choose who goes first.

3) Player 1 starts by turning over two cards. The player will read the description card aloud so that the group can decide if it matches the picture card turned over. If they reflect a picture/description

match, then the player takes the pair of cards. If the cards do not match, the player turns them face down, and the next player takes their turn in the same fashion. (Note: There may be times during the game where two picture cards are turned over or two description cards are turned over. If this happens the players turn is over.)

4) The game continues until all of the cards have a match.

5) Whoever has the most matches at the end of the game wins.

B. Written Reflection**:** Have students write a short reflection on the various features of the Open Ocean organisms that enable them to survive.

Extended Activities

1. Visit the following website for downloads and activities that complement this lesson, such as matching games and coloring pages of Hawai‘i’s marine life:
http://Hawaiihumpbackwhale.noaa.gov/education/kidscorner.html

2. Students may play a Predator and Prey Concentration Card Game using the Ocean Animal Flash Cards, 2–4 players can play at a time**.**

1) Have students place all cards face down in a large rectangle resembling the game “concentration.” (Note: You may choose to have students only use the picture cards for this game and have them use the description cards as a reference to match the predator and prey.)

2) The first player turns over two cards. If the cards match as a predator/prey combination, either with the picture or description card, the player takes the predator/prey match and turns over two more cards. If this new pair of cards does not match as predator/prey cards, then they are turned over, and the next player takes his/her turn.

3) The person who has the most predator/prey matches wins.

LESSON 2 Teacher Reading

Life in the Ocean Zones

Pelagic waters are not all the same. Some areas are teeming with life; others are nearly lifeless. Currents flow like rivers under the surface of the ocean. These currents influence everything, from the concentration of marine life to weather systems on land. There is also a huge *vertical* variety of animals and fish, from sunlit surface waters, down through the disphotic ("twilight") zone, to almost complete darkness and crushing pressures below 1,000 meters.

Plants and Animals of the Sunlight Zone

Phytoplankton
In the open waters, photosynthesis is performed by phytoplankton, which is a microscopic floating algae. Phytoplankton needs sunlight and nutrients to grow. Therefore, phytoplankton exists in the photic zone. (View: PowerPoint *Sunlight Zone Plant Phytoplankton*)

Zooplankton
Zooplanktons are microscopic animals which drift in the ocean currents and eat phytoplankton. The most abundant zooplankton species are *copepods* and *krill*: tiny crustaceans that are the most numerous animals on Earth. Other types of zooplankton include jelly fish and the larvae of fish, marine worms, and starfish.

From zooplankton to larger animals
The zooplankton are eaten by a variety of other animals. These animals range from other zooplankton to small fish to giant manta rays, whale sharks, and even the largest animal on Earth, the blue whale. Bigger animals including squid, tuna, marlin, sharks, seabirds, dolphins, and toothed whales in turn eat the small fish.

The open ocean is vast, and large areas are devoid of life. Therefore, animals higher up the food chain need to travel huge distances to find food and places to breed. Some fish predators are large, powerful, and fast, allowing them to cross the oceans in search of food. Sail fish are the fastest fish in the ocean, reaching speeds of 75 miles per hour (120 kilometers per hour). Blue fin tuna are almost as fast as sail fish, and can accelerate faster than a sports car like a Porsche.

Many whale species migrate thousands of kilometers each year between their warm breeding grounds, and their rich Arctic and Antarctic feeding grounds. Marine turtles make long voyages across the oceans between their nesting beaches and feeding grounds.

There is some shelter at the ocean surface. Driftwood, pieces of kelp, and other natural debris floating on the water provide valuable shelter where small fish can hide from predators. Man-made debris is another form of protection used by some small organisms.

There are some land features in the open ocean as, for example, underwater mountains known as seamounts. Formed by volcanoes or sinking islands, seamounts rise steeply from the ocean floor. Deep-water currents are forced up their sides, bringing nutrient-rich water to the surface around shallow seamounts. This allows plankton to thrive, supporting complex food chains, and making these areas "islands" of life in the open ocean. Some fish species periodically gather at seamounts to feed and spawn, while marine turtles and whales stop at shallow seamounts for food and shelter during their long migrations.

Animals of the Disphotic (Twilight) **Zone**

Some sunlight reaches below 200 meters, but not enough to allow photosynthesis. Only animals and bacteria live in these dim and dark waters, with the food chain based on detritus (loose materials) drifting down from surface waters.

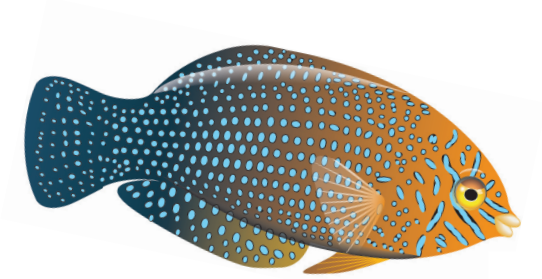
Animals living in the disphotic zone have various adaptations for living in the dimly lit waters. Some species have enormous eyes to find food. To avoid being eaten, many other species are transparent, including squid and crustaceans. Some fish have silvery reflective scales to help make them 'invisible.'

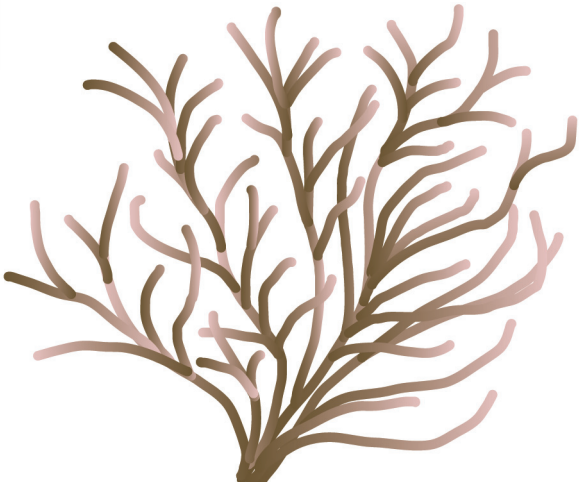
Aphotic (Darkness) **Zone**

The aphotic zone starts at 3,281 feet (1,000 meters). The water is cold, reaching 37.4ºF (3ºC) and the pressure is enormous, up to 1,000 times that on the ocean surface. The deep sea has much less productivity than shallower regions. The fish tend to be much smaller than on the surface, with minimal bone structure, and more jelly-like flesh. The fish in this zone are therefore slower and less agile than fish living near the surface. They also tend to grow much more slowly than surface fish.

Life in the deep-sea is scarce, so predators need large teeth and mouths to cope with whatever crosses their path. The fangtooth fish, for example, has the largest teeth of all marine animals in relation to body size, while gulpers can swallow preys as large as themselves.

An estimated 90% of deep-sea animals produce their own light (**bioluminescence**) to communicate, find food, and even to avoid capture. For example, some shrimp squirt out a bioluminescent liquid to distract predators. There are fish with bioluminescent 'headlamps' for finding food, while others, such as the deep-sea angler fish, use bioluminescent lures to catch prey. Some of these animals produce the light themselves, while others have recruited specialized bacteria to do the job.





LESSON 2 Teacher Reading

Video Clips List

Manta Ray
http://www8.nos.noaa.gov/onms/park/Parks/SpeciesCard.aspx?pID=18&refID=2&CreatureID=1098

Tiger Shark
http://www8.nos.noaa.gov/onms/park/Parks/SpeciesCard.aspx?pID=18&refID=2&CreatureID=1102

Giant Trevally
http://www8.nos.noaa.gov/onms/park/Parks/SpeciesCard.aspx?pID=18&refID=2&CreatureID=1161

Greater Amberjack
http://www8.nos.noaa.gov/onms/park/Parks/SpeciesCard.aspx?pID=18&refID=2&CreatureID=1159

Big Eye Tuna
http://www8.nos.noaa.gov/onms/park/Parks/SpeciesCard.aspx?pID=18&refID=2&CreatureID=1264

Dolphin Fish
http://www8.nos.noaa.gov/onms/park/Parks/SpeciesCard.aspx?pID=18&refID=2&CreatureID=1266

Hawaiian Black Grouper
http://www8.nos.noaa.gov/onms/park/Parks/SpeciesCard.aspx?pID=18&refID=2&CreatureID=1149

Hawksbill Turtle
http://www8.nos.noaa.gov/onms/park/Parks/SpeciesCard.aspx?pID=18&refID=6&CreatureID=1092

Leatherback Turtle
http://www8.nos.noaa.gov/onms/park/Parks/SpeciesCard.aspx?pID=18&refID=6&CreatureID=1094

Portuguese Man-O-War
http://www8.nos.noaa.gov/onms/park/Parks/SpeciesCard.aspx?pID=18&refID=4&CreatureID=1227

Pelagic Jellyfish
http://www8.nos.noaa.gov/onms/park/Parks/SpeciesCard.aspx?pID=18&refID=4&CreatureID=1222

False Killer Whale
http://www8.nos.noaa.gov/onms/park/Parks/SpeciesCard.aspx?pID=18&refID=1&CreatureID=1080

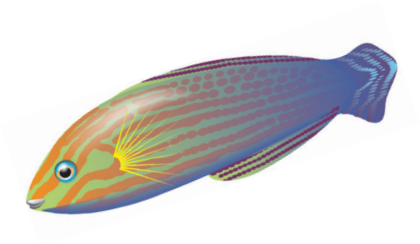
Melon head Whale
http://www8.nos.noaa.gov/onms/park/Parks/SpeciesCard.aspx?pID=18&refID=1&CreatureID=1082

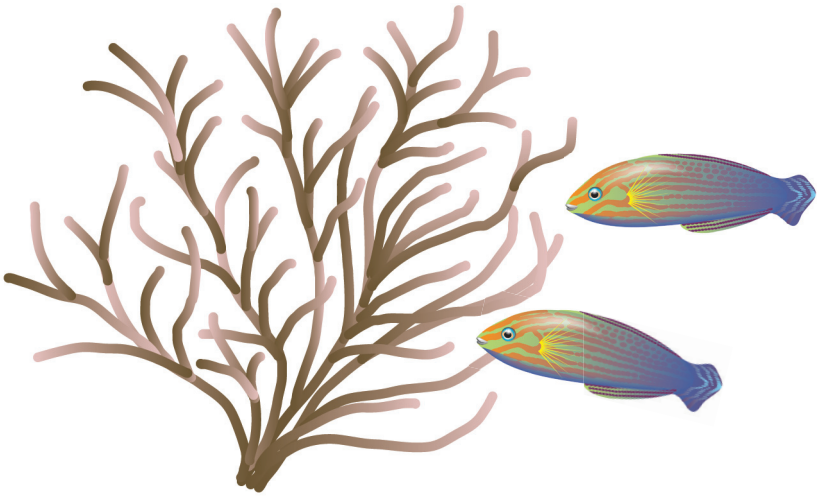
Sperm Whale
http://www8.nos.noaa.gov/onms/park/Parks/SpeciesCard.aspx?pID=18&refID=1&CreatureID=1081

Spinner Dolphin
http://www8.nos.noaa.gov/onms/park/Parks/SpeciesCard.aspx?pID=18&refID=1&CreatureID=1395

Humpback Whale
http://www8.nos.noaa.gov/onms/park/Parks/SpeciesCard.aspx?pID=18&refID=1&CreatureID=1076

Hawaiian Monk Seal
http://www8.nos.noaa.gov/onms/park/Parks/SpeciesCard.aspx?pID=18&refID=1&CreatureID=1077





Open Ocean Animal Flashcards

PHYTOPLANKTON

1. Lives in the “Sunlight” Zone.
2. Microscopic one-celled algae that live on the surface.
3. A producer (plant) that uses energy from the sun.
4. The first link of the marine food chain.

ZOOPLANKTON

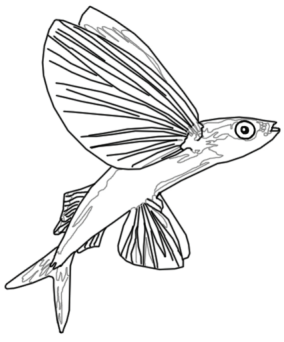
1. Lives in both the “Sunlight” and “Twilight” Zones.
2. They are tiny microscopic floating animals.
3. They eat phytoplankton and other zooplankton.
4. During daylight hours, some move down to the “twilight” zone to avoid being seen or eaten. At night, they travel back to the surface to eat phytoplankton.

KRILL

1. Krill are a form of zooplankton.
2. They are small, shrimp-like and swim in the seas.
3. They are pink, “see-through” animals that swim together in groups called swarms.
4. Many animals eat krill.
5. Krill eat phytoplankton and some krill also eat zooplankton.
6. Krill spend their days in the lower, darker parts of the “sunlight” zone.

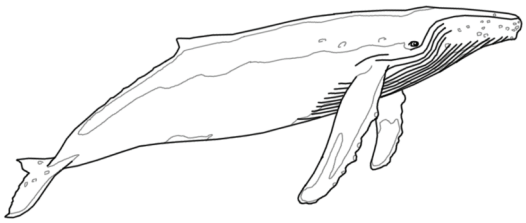
FLYING FISH

1. Flying fish can jump out of the water and glide through the air over long distances.
2. Flying fish swim quickly toward the water’s surface, and leap out of the water.
3. Flying fish use their unusual flying talent to escape predators, such as swordfish, tunas, and other larger fishes.
4. Flying fishes eat small crustaceans and other tiny animals.



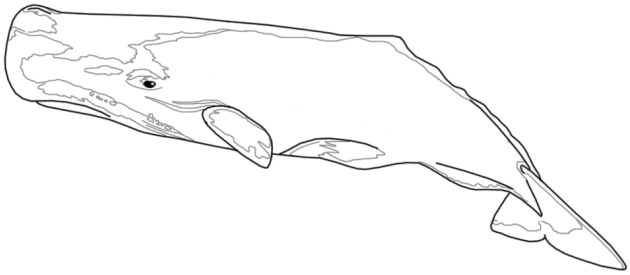
HUMPBACK WHALE

1. A BALEEN whale, has “bristles” instead of teeth, to capture krill (tiny shrimp), and other zooplankton.
2. Lives in the Sunlight Zone.
3. Moves from one place to another, every year.
4. Eats in cold waters in the summer, and travels to warm waters in the winter to give birth.
5. Humpbacks are mammals. They are warm-blooded, and must come to the surface to breathe air.



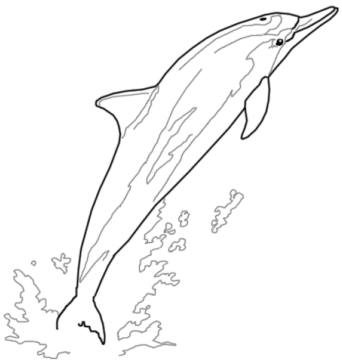
SPERM WHALES

1. Sperm whales are the largest toothed whale and live in the “sunlight” zone.
2. Can dive down to “darkness” zone. Sperm whales can dive down as far as 2500 meters.
3. Males can reach 59 feet (18 meters) in length; more than half of this length is taken up by their head.
4. Sperm whales are found in all the world’s oceans.



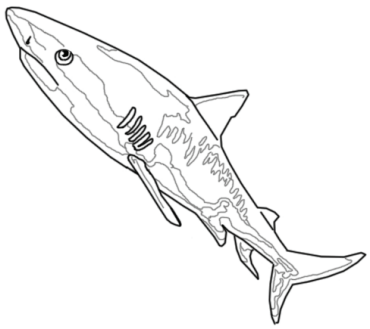
DOLPHIN

1. There are 60 or more types of dolphins. Spinner Dolphins are commonly seen in Hawai‘i.
2. Dolphins have nearly hairless, torpedo-shaped bodies with short, strong necks to help them swim quickly.
3. Tail flukes, flippers, and rubbery skin help dolphins glide through the water and turn quickly to avoid predators.
4. Dolphins travel together in schools or pod for safety.
5. Dolphins are mammals and breathe air. They can dive down to the “darkness” zone.



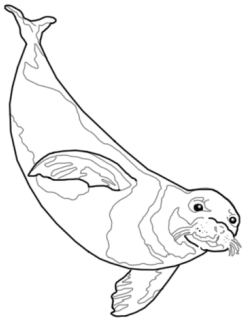
TIGER SHARKS

1. Tiger sharks live in warm seas, and tend to swim near the surface and live in the “sunlight” zone.
2. Tiger sharks rely on a keen sense of smell to find their prey.
3. Tiger sharks are fast swimmers to catch their prey.
4. Tiger sharks have smooth skin with torpedo-shaped bodies that let them move quickly in the water.
5. Tiger sharks will eat almost anything, including seals, turtles, seabirds, and a variety of fish.



Hawaiian MONK SEAL

1. The Hawaiian Monk Seal has four flippers, and a torpedo-shaped body for fast swimming.
2. It lives in the “sunlight” zone, but can dive to the “twilight” zone to eat squid, fish, octopus, and eel.
3. Monk Seals can keep swimming for as long as a month.
4. They can hold their breath for 20 minutes.
5. Monk Seals live alone on both land and water.

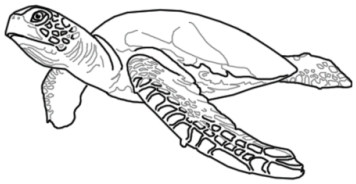


MANTA RAY

1. Large diamond-shaped bodies with wings up to 25 feet (7.62 meters) across help Manta Rays glide through the water. It lives in the “sunlight” zone.
2. Their bodies are black on top, and white on their bottom, to help them blend into ocean water and hide from predators.
3. Its main predator is the shark.
4. The Manta Ray eats plankton, tiny fish, and shrimp known as krill.

GREEN SEA TURTLE

1. Streamlined bodies and large flippers for quick moving and swimming.
2. Eats algae and sea grasses in the “sunlight zone” It is an herbivore.
3. Brownish to black on top and yellowish underneath, to blend into open ocean waters.
4. Hard shell protects them from predators.
5. Green sea turtles can swim up to 35 mph.

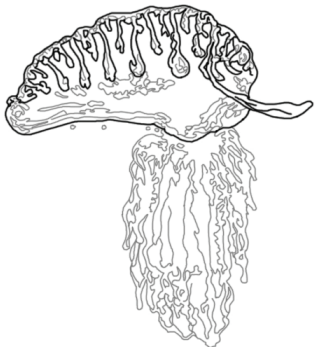


YELLOW FIN TUNA

1. Metallic blue/black on top and silvery white down to the belly for blending into ocean waters.
2. Long pectoral (side fins) for fast swimming and turning.
3. Eats on the surface and can go down to the “twilight” zone to find food.
4. Swims in schools with other fish of similar size for safety.
5. Eats smaller fish and squid.

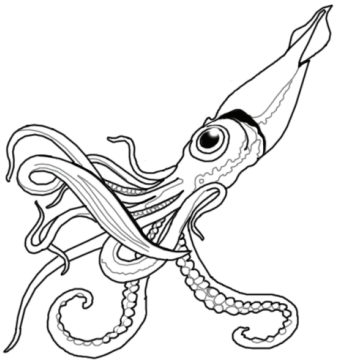
PORTUGESE MAN-O-WAR

1. Has an air bladder that allows it to float on the ocean surface.
2. Moves with wind and currents.
3. Can deflate its air bladder to sink in order to avoid predators.
4. Has poisonous tentacles that can reach 30 feet down. Uses the tentacles to sting and stun small fish and shrimp to eat.
5. Main predator is the sea turtle.



SQUID

1. Squid can change the color of their skin to blend into their environment and hide from predators.
2. They move by using jet-propulsion, by squirting water through the siphon.
3. When in danger, squid squirt a cloud of dark ink to confuse their attacker and allow them to escape.
4. Squid eat fish, shrimp and other squid.
5. Many animals eat squid, including many sharks and other fish, some whales, other squid, and people.



LANTERN FISH

1. This fish lives in the “twilight” zone, and its bio-luminescent organs light up as it swims.
2. It uses its lights to attract prey, and other fish.
3. Lanternfish have huge eyes.
4. Lanternfish are rarely over one foot long and have silver scales.
5. Lanternfish eat zooplankton.

DEEP SEA ANGLER FISH

1. Angler fish live in the “twilight” zone.
2. Angler fish have a fishing rod that grows from the female anglerfish’s snout, and ends in a glowing blob of light.
3. Millions of light-producing bacteria cause the lure to light up.
4. The inky black or gray skin of the angler fish makes it invisible in the darkness.
5. The deep sea angler’s eyes are small.
6. Most angler fish are shaped like a tennis ball.