MARINE FOOD WEBS

SUMMARY/OVERVIEW

Grades: 3-5

Prep Time: 1 hour

Learning Environment: Outdoor & Indoor

Total Lesson Length: 4.5 hours

DESCRIPTION:

This booklet introduces students to several aspects of the marine food web, the roles that different organisms play in it, how they interact, and why they are important. It highlights the crucial interdependence of the animals in their ecosystem.

CURRICULUM EXPECTATIONS:

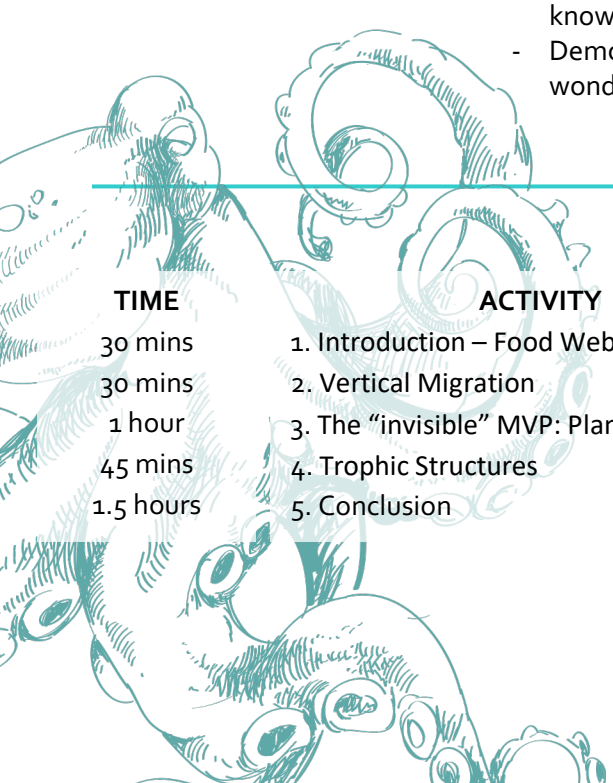
Processing and Analysing:
- Experience and interpret the local environment

Planning and Conducting:
- Make observations and measurements, using formal measurements and digital technology as appropriate
- Make observations about living and non-living things in the local environment

Questioning and Predicting:
- Make predictions based on prior knowledge
- Demonstrate curiosity and a sense of wonder about the world

BACKGROUND:

Food Webs refer to the predator-prey interactions that different animals and organisms have in their ecosystem throughout their lives. It defines the role they play in the inter-connected and delicate balance of life on earth. The marine food web describes specifically the "who-eats-whom" interactions with the creatures that live in the oceans.



LESSON PLAN

TIME	ACTIVITY	LOCATION	MATERIALS
30 mins	1. Introduction – Food Webs	Indoor	Printed worksheet
30 mins	2. Vertical Migration	Indoor	Internet, printed worksheet
1 hour	3. The "invisible" MVP: Plankton!	Indoor OR Outdoor	Craft items (see page 6)
45 mins	4. Trophic Structures	Indoors	Printed worksheet, scissors, glue
1.5 hours	5. Conclusion	Outdoors	Printed worksheet, clipboard, pen

TIME	ACTIVITY	LOCATION	MATERIALS
30 mins	1. Introduction	Indoor	Printed worksheet

Introduction: Food Webs

GOAL: Introduce the concept of Food Webs and the interdependence among organisms.

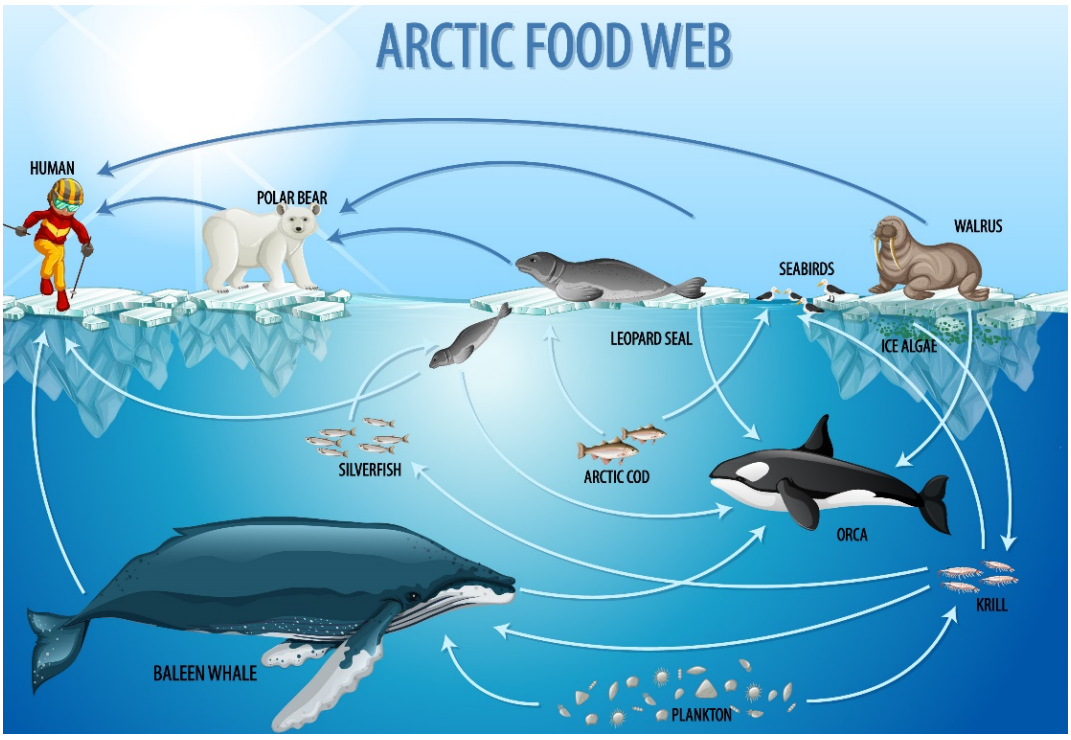
PREPARATION: Print worksheet on page 3.

LESSON PLAN: Students are given an image of an incomplete food web that they can fill in with arrows corresponding to the predator-prey interactions of the animals.
*Hint! The arrows move in the direction of energy flow.

CONTENT: Organisms in a community are linked through what they eat and what eats them. Fill in the food web chart below (page 3) with arrows corresponding to the animal's role in the food web as predator or prey. In a Food Web, the main direct consequence is the transfer of energy in nature, from the prey to whichever predator is eating it.

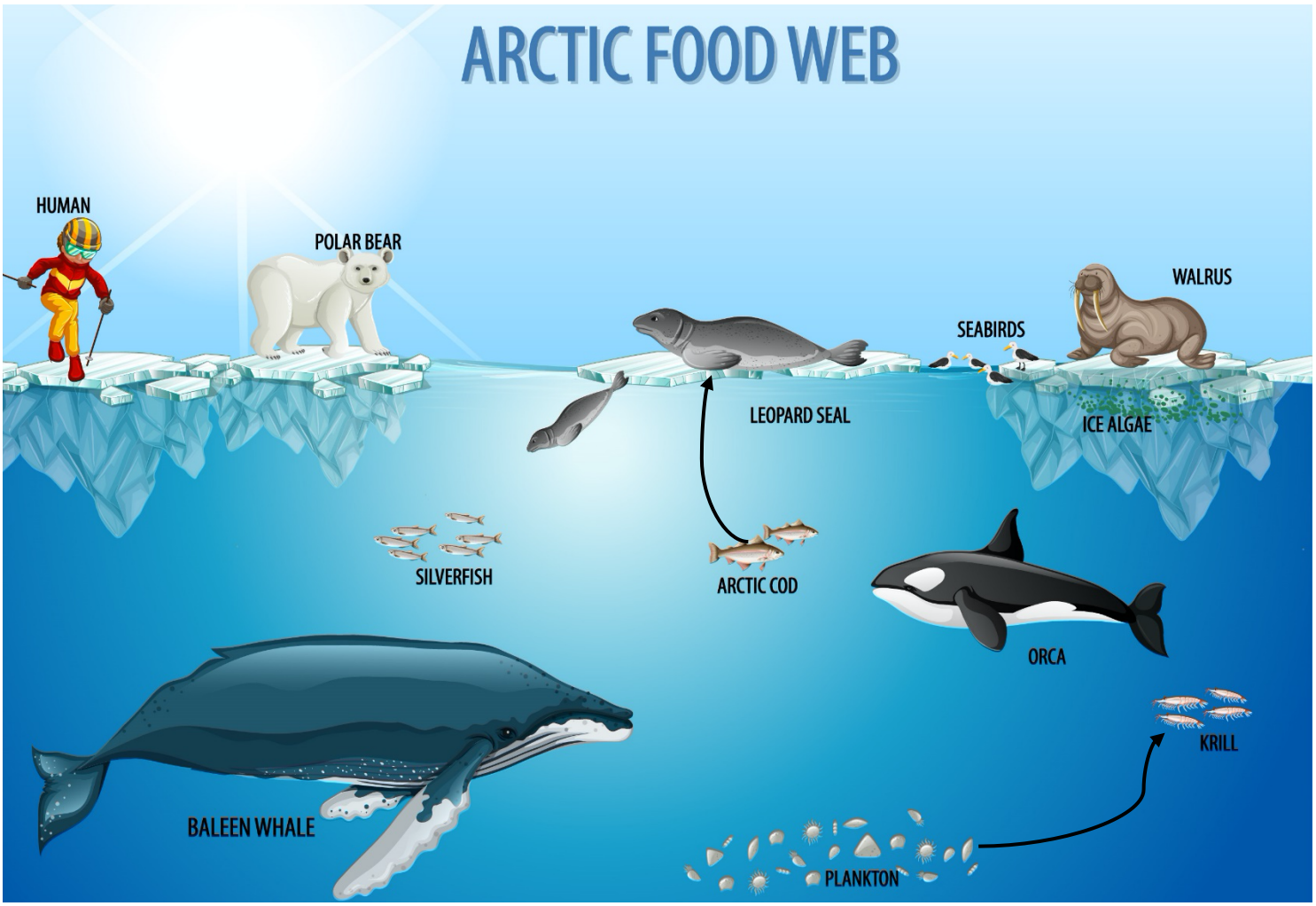
Q: Can you name the three oceans that Canada is surrounded by?
A: Pacific Ocean, Atlantic Ocean, and Arctic Ocean.

ANSWER KEY:



Food Webs & Energy Flow

Organisms in a community are linked through what they eat and what eats them.
Fill in the food web chart below with arrows corresponding to the animal's role in the food web as predator or prey. **Hint! The arrows move in the direction of energy flow. Example: see arrow going from Arctic Cod to Leopard Sea since the seal eats the cod*



Did you know?

Canada is surrounded by 3 different oceans! Can you name all of them?

TIME	ACTIVITY	LOCATION	MATERIALS
30 mins	2. Vertical Migration	Indoor	Printed worksheet

Vertical Migration

GOAL: Introduce the concept of vertical migration and its importance.

PREPARATION: Print worksheet (page 5) and watch video (under 7 mins) made by the Catalina Island Marine Institute (CIMI).

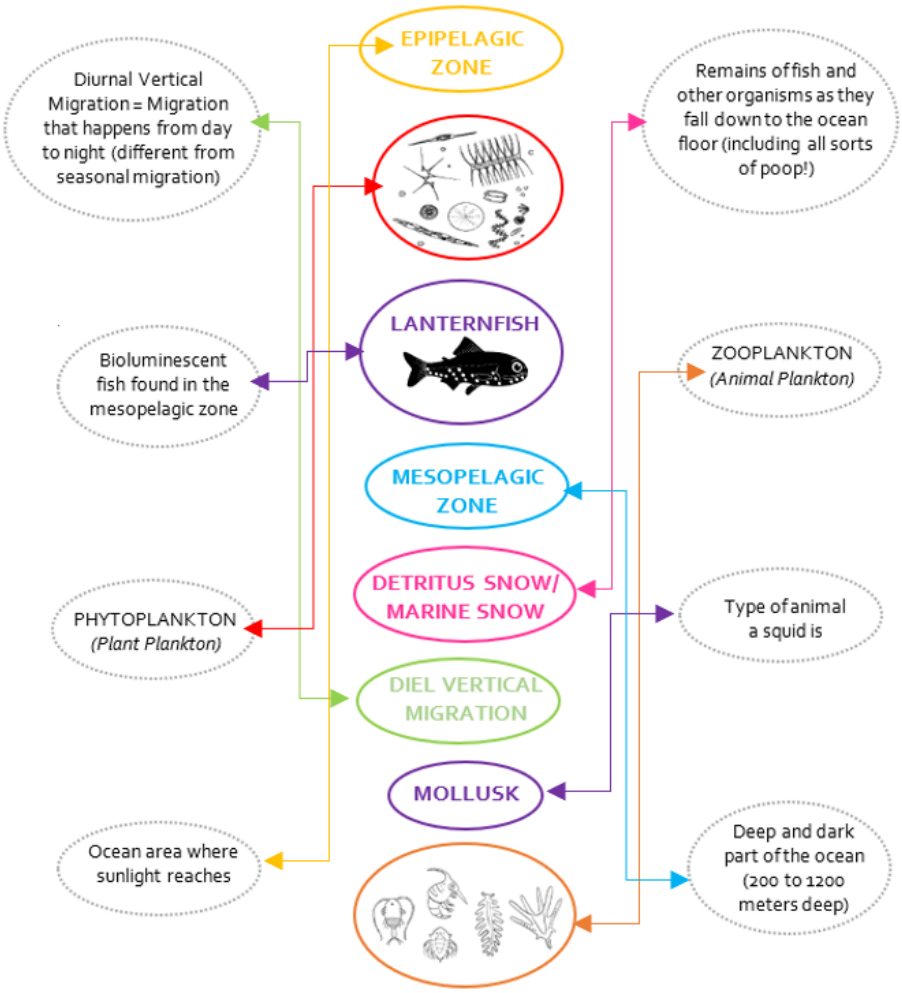
https://www.youtube.com/watch?v=r5I4jOiX4Uo

LESSON PLAN: Watch video! Match the concepts below based on the video you watched. Students can do this on their own, in groups, or as a class.

CONTENT: "Migration" means going from one place to another. Ask students to give examples of animals that migrate (birds, turtles, whales, butterflies, caribou, salmon). Ask students why they think animals migrate. The main reason is **food**. Seasonal migrations happen when animals move to another area (sometimes another continent!) to seek food. However, not all migration works the same way.

Diurnal vertical migration happens every day (therefore not seasonal). "Vertical" refers to the animals moving from the bottom of the sea to the top of the sea. This means they stay in the same location geographically, but move up and down to seek food.

ANSWER KEY:



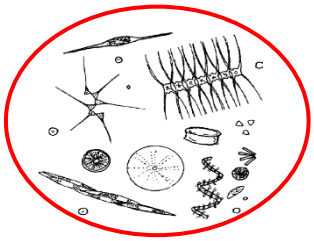
Vertical Migration

Vertical Migration refers to the dislocation/commute of animals vertically, meaning from the bottom of the sea to the top of the sea, without moving laterally (to the side). The main reason it happens is to find food! Match the words and images below with their concepts, based on the video from the Catalina Island Marine Institute.

EPIPELAGIC ZONE

Diurnal Vertical Migration = Migration that happens from day to night (different from seasonal migration)

Remains of fish and other organisms as they fall down to the ocean floor (*including all sorts of poop!)*



LANTERNFISH

Bioluminescent fish found in the mesopelagic zone

ZOOPLANKTON *(Animal Plankton)*

MESOPELAGIC ZONE

DETRITUS SNOW/ MARINE SNOW

PHYTOPLANKTON *(Plant Plankton)*

Type of animal a squid is

DIEL VERTICAL MIGRATION

MOLLUSK

Ocean area where sunlight reaches

Deep and dark part of the ocean (200 to 1,200 meters deep)

TIME	ACTIVITY	LOCATION	MATERIALS
1 hour	3. The "Invisible" MVP: Plankton!	Indoor or outdoor	Printed worksheet + craft materials below

The "Invisible" MVP: Plankton!

GOAL: To introduce students to **PLANKTON** and their crucial role as the base of the food web.
MVP = "Most Valuable Player" in sports and often receive awards.

PREPARATION: Gather the following materials for each student:

- Sponge pieces
- Popsicle sticks
- Small googly eyes
- Pipe cleaners
- Clothes pin
- 2L transparent pop bottles
- Scissors
- Colourful rubber elastics
- Straws
- Toothpick
- Paper clips
- Colourful beads

Lesson Source: Teach ocean science

Lesson Source: https://bit.ly/37G6TDf

LESSON PLAN: Students will create their own plankton creature made of the materials they have available. The plankton needs to float inside their pop bottle once it is filled halfway with water. Illustrations on the pop bottle are encouraged. Their plankton will be made with a variety of materials; some will add weight to the plankton (lowering it in their pop bottle "ocean"), and other materials will allow it to float to the top of the ocean. Students are to explore the materials and their properties (foam floats, wood floats, pin adds weight, etc.). Students may add googly eyes and other decorations to make a fun plankton!

CONTENT: Ask students if they have heard the word "Plankton" before. If so, ask them to describe what it is. "Plankton" is a term used to describe any animal that drifts in the sea, meaning they cannot swim against the ocean currents and waves. They are mostly microscopic and serve as the very base of the food web. This means that many animals depend on plankton directly or indirectly. Phytoplankton are eaten by zooplankton, and zooplankton are eaten by small forage fish, baleen whales, bivalve mollusks (clams and mussels), crustaceans (crabs, lobsters, shrimp), corals, etc. These, in turn, are eaten by bigger fish (tuna, sharks, rays) and other animals such as octopus, squid, marine birds (seagulls, kingfishers, herons), marine mammals (seals, sea lions, orcas), and many more. There are 2 different types of plankton: phytoplankton (plant-plankton) and zooplankton (animal-plankton).

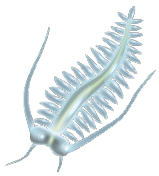
STEP 1: Cut and remove the top of your pop bottle. Make sure to not leave any pointy edges behind!

STEP 2: Assemble pieces of different materials to form your plankton!

STEP 3 (optional): To add complexity to the activity, ask the students to build both a PHYTOPLANKTON (in green tones) ***and*** a ZOOPLANKTON. The phytoplankton needs to float above the zooplankton, but the zooplankton cannot touch the bottom of the pop bottle.

ANSWER KEY (FOR PAGE 8):

Zoea Larvae:
Crab Larvae



Polychaete:
Marine Worm

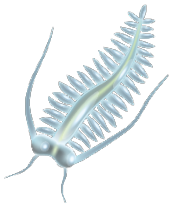
Veliger:
Marine Snail Larvae

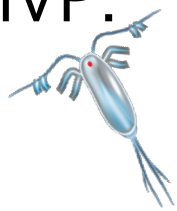
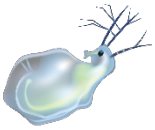
Copepod:
Microscopic Crustacean

Daphnia:
Water flea

Krill:
Small Crustacean

- What floating materials did you use? Examples: sponge, toothpick, straws.
- What sinking materials did you use? Examples: paper clips, rubber elastics, pipe cleaners.

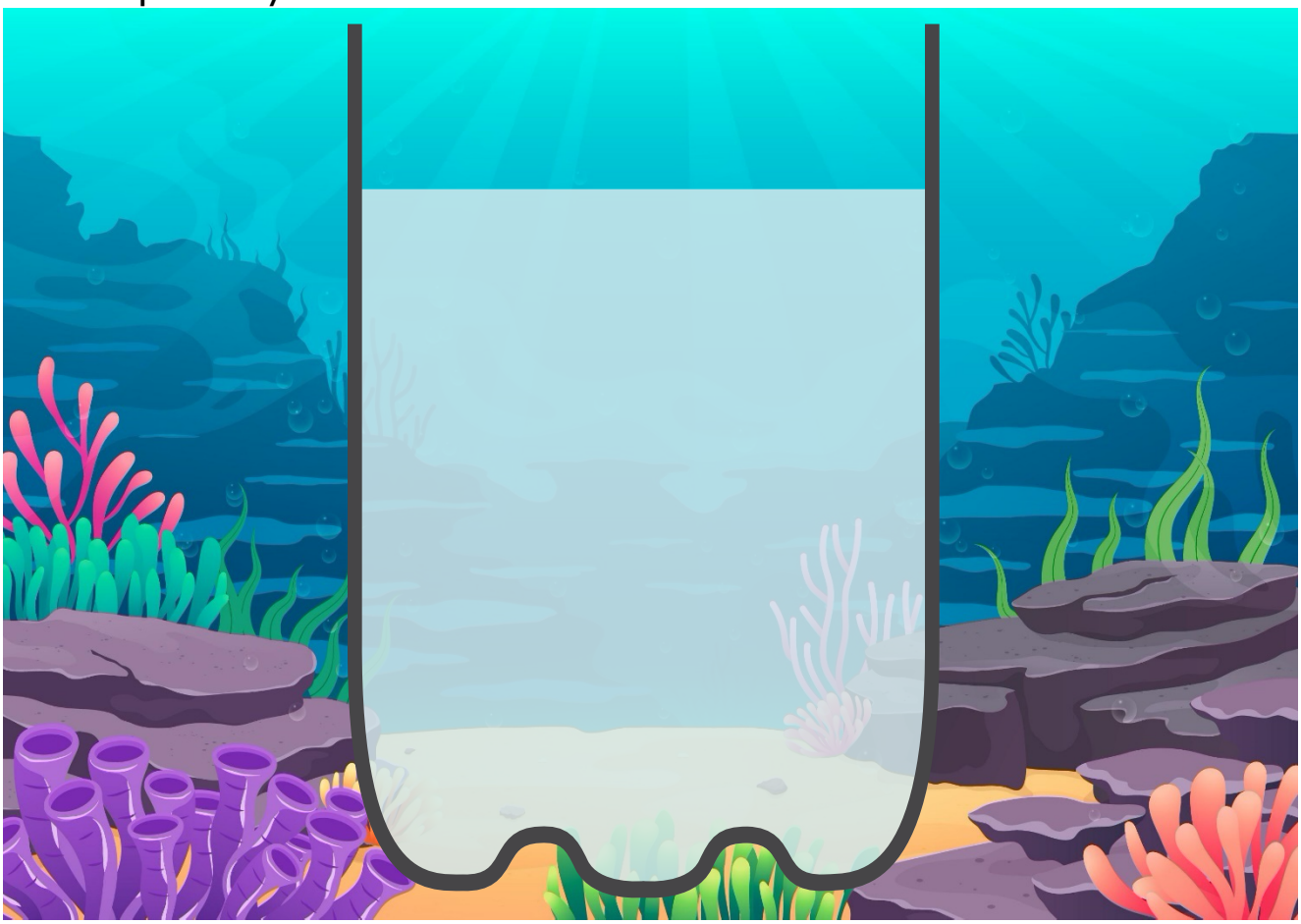




The "Invisible" MVP: Plankton!

This is Plankton, the "villain" from the SpongeBob cartoon. **Did you know** that he exists in real life?! The character is based on a cyclops copepod, a microscopic crustacean zooplankton (measuring 1 to 2mm)! Circle which **ONE** of the six zooplankton critters on the top of this page corresponds to Plankton!

- What floating materials did you use? _____
- What sinking materials did you use? _____

Draw the plankton you created:



TIME	ACTIVITY	LOCATION	MATERIALS
45 mins	4. Trophic Structures	Indoor	Printed worksheet

Trophic Structures

GOAL: Introduce the concept of Trophic Structures, which is the **energy transfer** between animals.

PREPARATION: Print worksheets page 11 and page 12.

LESSON PLAN: Ask students to match the illustrations (page 12) and glue/tape them in their corresponding place in the food web template in the worksheet from page 11.

CONTENT: What does "Trophic" mean? *Greek trophikos, from trophē 'nourishment'*
Trophic structures = transfer of energy through the food web

Primary Producers in the ocean: where everything begins!
Primary production is the creation of new organic matter (glucose) from inorganic substrates (sunlight), and it is this organic matter (glucose) that serves as the base of the food web for most marine consumers ("eaters").

The organisms responsible for oceanic primary production include a wide diversity of marine plants and algae. While many people may be more familiar with the larger seagrasses and macroalgae (seaweeds), by far the greatest amount of photosynthesis in the ocean comes from microscopic algae, the Phytoplankton.
Source: https://rwu.pressbooks.pub/webboceanography/chapter/7-1-primary-production/

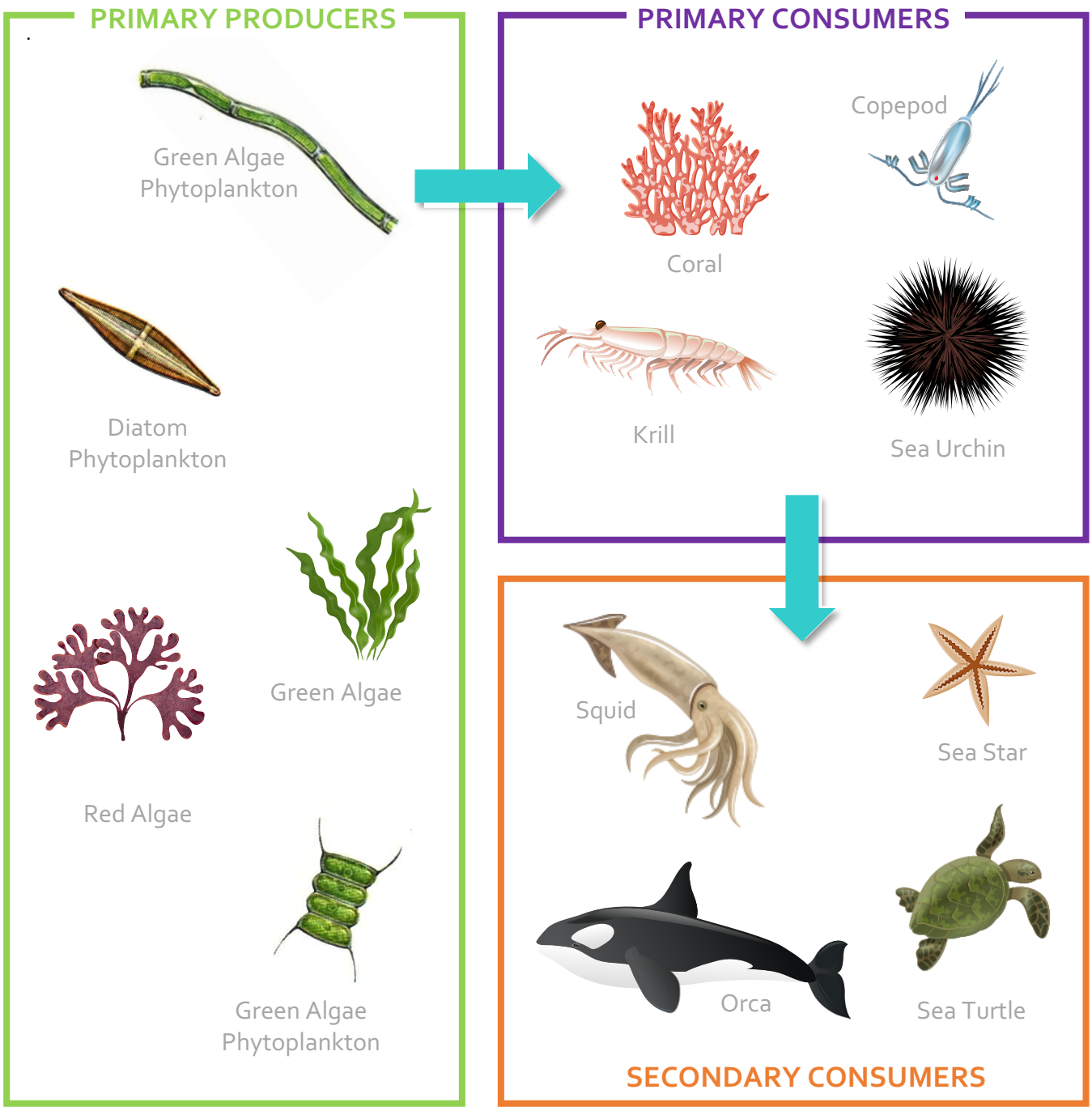
Primary Consumers in the ocean: the first to eat other things (more specifically, plants)!
A primary consumer is an organism that eats a primary producer, which includes most zooplankton, sea snails, sea urchins, sea sponges, etc.
Source: https://oceantracks.org/library/general-ecology/energy-and-food-webs

Secondary Consumers in the ocean: the first to eat other animals!
A secondary consumer is an organism that eats a primary consumer, and includes fish species that feed on the zooplankton.
Source: https://oceantracks.org/library/general-ecology/energy-and-food-webs

**There are also "Tertiary Consumers" and "Quaternary Consumers" - but we won't be covering them in this booklet.

Trophic Structure

ANSWER KEY:



What do the arrows represent? Energy transfer from one organism to the other.

Trophic Structure

Cut out the illustrations and place them (by gluing or taping it) inside the box with their respective ecological role.

PRIMARY PRODUCERS

Primary producers are AUTOTROPHIC, which means that they acquire their energy from sunlight.

PRIMARY CONSUMERS

Primary consumers are herbivores, they feed on plants.

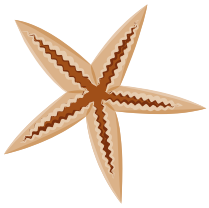
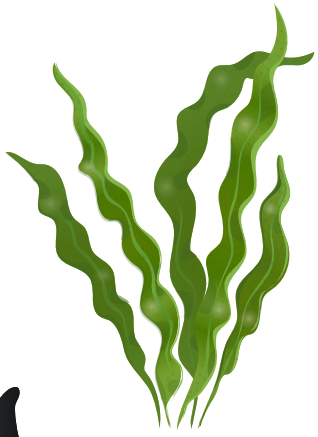
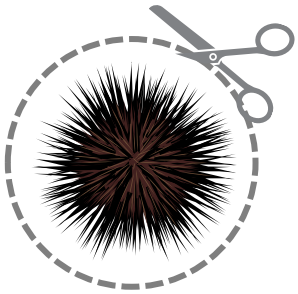
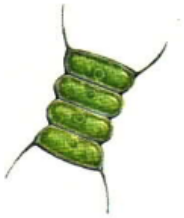
.

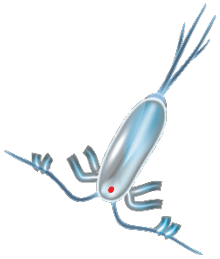
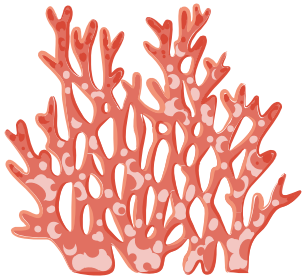
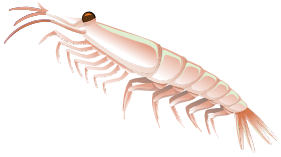
Secondary consumers prey on other animals.

SECONDARY CONSUMERS

What do the arrows between groups represent? _____

Trophic Structure Illustrations




TIME	ACTIVITY	LOCATION	MATERIALS
1.5 hours	5. Conclusion	Outdoor	Printed worksheet

Conclusion

GOAL: Students review all introduced topics by observing their surroundings, identifying and classifying the creatures they see.

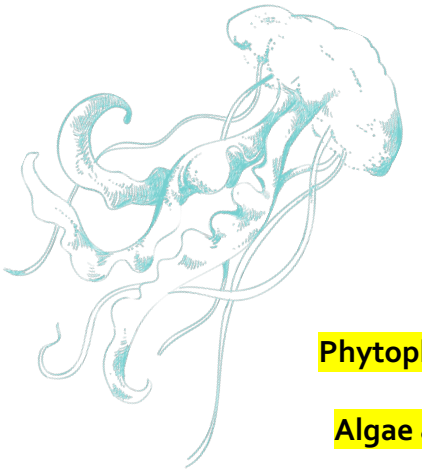
PREPARATION: Print checklist worksheet (page 14), bring clipboards (optional) and a pen/pencil.

LESSON PLAN: Ask students to fill in the checklist based on what they've learned throughout these lessons about marine food webs. This can be done at a nearby beach.

CONTENT: Guide the students with information about the food web they see in the intertidal zone of the visited beach. Example: Barnacles are filter feeders, they eat zooplankton and phytoplankton, etc.

ANSWER KEY:

Everyday **MICROPLASTICS** = glitter, styrofoam, dryer lint (polyester, nylon), fishing net pieces, jewelry beads, toy stuffing beads.



PRIMARY PRODUCER	PRIMARY CONSUMER	SECONDARY CONSUMER
Phytoplankton	Mussels & Clams	Seagulls
Algae & Kelp	Sea snails	Sea Stars
Cyanobacteria	Zooplankton	Sharks & Stingrays
	Barnacles	Seals & Sea Lions
	Crabs	Whales & Orcas
	Small fish	Octopuses & Squids

Marine Food Web Checklist

Survey a nearby beach and look for all items in the checklist below!

SURVEY INFO

Date of Survey:

Name of Surveyor(s):

Location:

Weather:

Time:

☐ Identify two (2) **marine birds**

_____ _____

☐ Find a big rock (bigger than 2 feet wide) and count how many **different species/creatures** you see on and under it.

How many did you see? _____

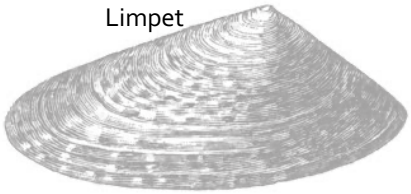
☐ Identify three (3) types of **algae** and/or **kelp** (can name them by colour)

_____ _____ _____

☐ Find one (1) **sea anemone** (cnidarian – "cousin" of jellyfishes)

Sea Anemone

☐ Find one (1) **limpet** (mollusk – cousin of snails and clams)



Limpet

Some small fish eat plankton! We know that already. But **did you know** that some small fish may confuse teeny tiny pieces of plastic, called **MICROPLASTIC** for plankton!? They don't expect to have any plastic in the sea. Additionally, animals' vision isn't always the same as a humans' vision. Give 3 examples of everyday microplastic threats to the ocean that you see on the beach and give examples of animals that are at risk of confusing it with food.

_____

Name an organism that you'd like to have seen, but you need scientific equipment to do so, such as microscopes or diving submarines:

What is its role in its ecosystem?

Fill the blank spaces below with examples of organisms you see:

_____ → _____ → _____

PRIMARY PRODUCER — PRIMARY CONSUMER — SECONDARY CONSUMER

_____ → _____ → _____

PRIMARY PRODUCER — PRIMARY CONSUMER — SECONDARY CONSUMER

Show us your results! Snap a picture and share it with us on social media,
or email it to the MABR Coordinator at
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