

BIOSPHERE BOOKLETS

Lesson Plans & Activities

MARINE FOOD WEBS

SUMMARY/OVERVIEW

Grades:
6-7

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:

- Experience and interpret the local environment
- Observe, measure, and record data
- Make observations aimed at identifying their own questions about the natural 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
20 mins
30 mins
1 hour
45 mins
1.5 hours

ACTIVITY
1. Introduction – What are Food Webs?
2. Vertical Migration
3. The “invisible” MVP: Plankton!
4. Trophic Structures
5. Conclusion

LOCATION
Indoor
Indoor
Indoor OR Outdoor
Indoors
Outdoors

MATERIALS
Printed worksheet
Internet, printed worksheet
Craft items (see page 6)
Printed worksheet, scissors, glue
Printed worksheet, clipboard, pen

TIME
20 mins

ACTIVITY
1. Introduction – What are Food Webs?

LOCATION
Indoor

MATERIALS
Printed worksheet

Introduction: What are 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 the correct arrows corresponding to the predator-prey interactions of the animals.

*Hint! The arrows move in the direction of energy flow.

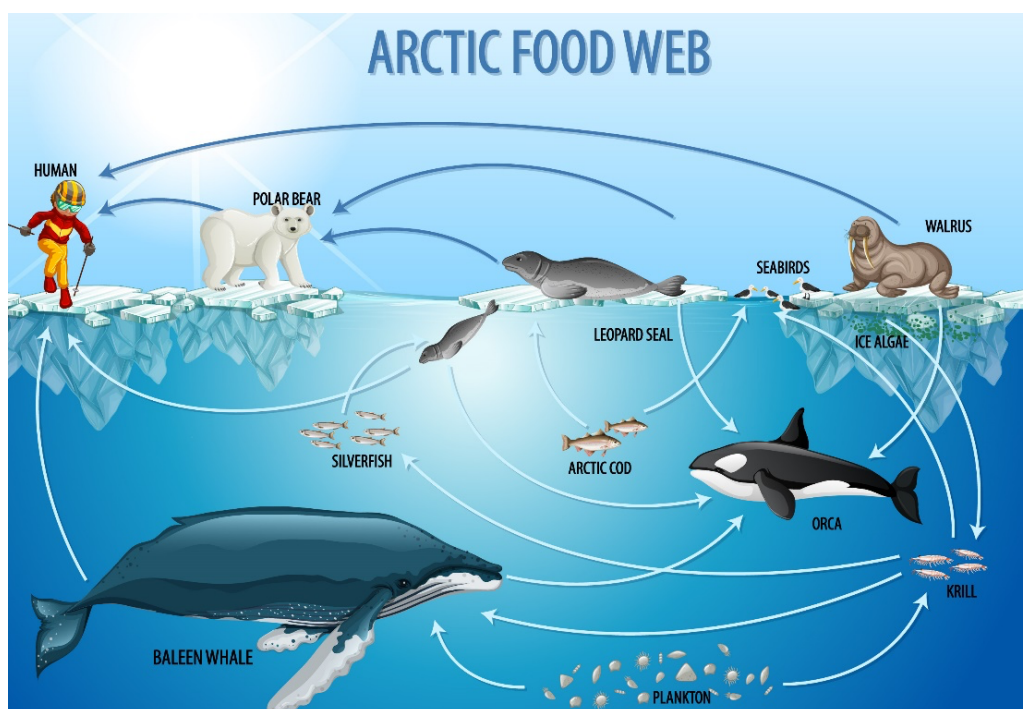
CONTENT: Organisms in a community are linked through what they eat and what eats them.

Q: Can you name the three oceans that Canada is surrounded by?

A: Pacific Ocean, Atlantic Ocean, and Arctic Ocean.

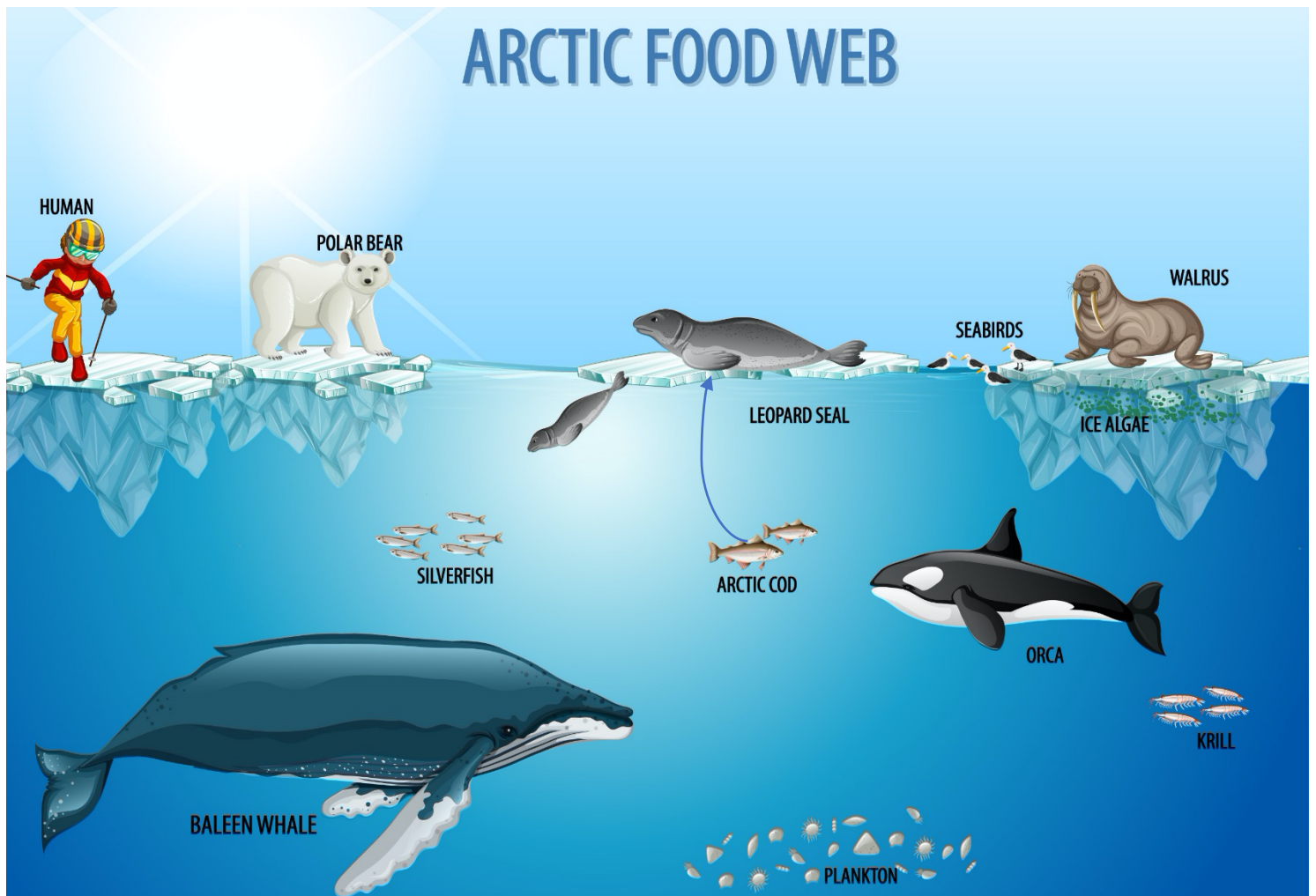
Fill in the food web chart below (page 3) with arrows corresponding to the animal's role in the food web as predator or prey. In a Food Web, the main direct consequence is the transfer of energy in nature, from the prey to whichever predator is eating it.

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. Ex. See arrow going from Arctic Cod to Leopard Seal since the seal eats the cod.*



Did you know?

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

TIME
30 mins

ACTIVITY
2. Vertical Migration

LOCATION
Indoor

MATERIALS
Printed worksheet

Vertical Migration

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

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

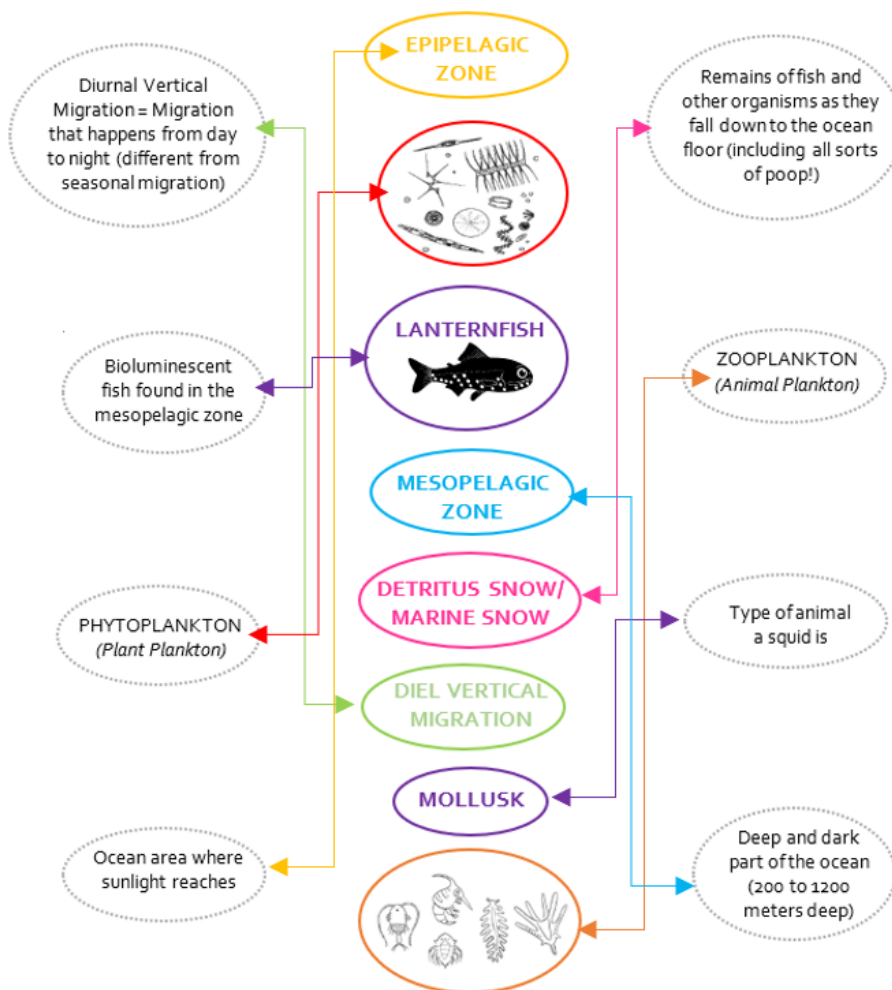
<https://www.youtube.com/watch?v=r5I4jOiX4Uo>

LESSON PLAN: Watch video! Match the concepts below based on the video you watched.

CONTENT: "Migration" means going from one place to another. Ask students to give examples of animals that migrate (Examples: 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) and "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:



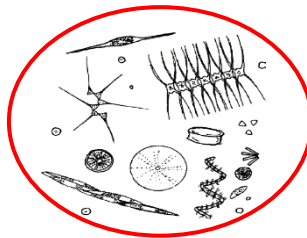
Vertical Migration

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.

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

EPIPELAGIC ZONE

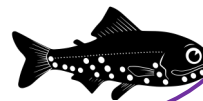
Remains of fish and other organisms as they fall down to the ocean floor (*including all sorts of poop!*)



Bioluminescent fish found in the mesopelagic zone

LANTERNFISH

ZOOPLANKTON
(*Animal Plankton*)



MESOPELAGIC ZONE

PHYTOPLANKTON
(*Plant Plankton*)

DETRITUS SNOW/
MARINE SNOW

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

1 hour

ACTIVITY

3. The “invisible” MVP: Plankton!

LOCATION

Indoor or outdoor

MATERIALS

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
(Or ask them to bring in):

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



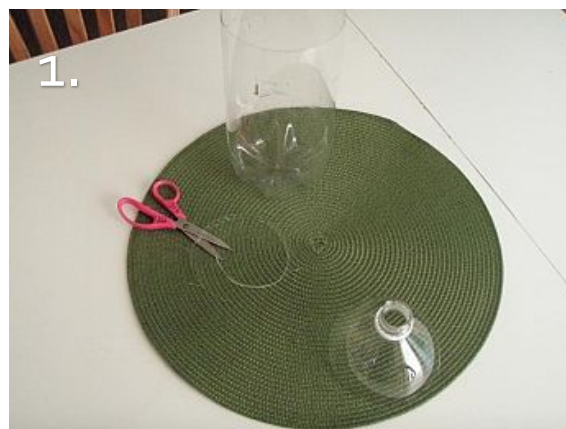
Lesson
Source:

Teach
ocean
science

https://teachoceanscience.org/teaching_resources/education_modules/plankton_-_aquatic_drifters/teach/

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 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!

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!



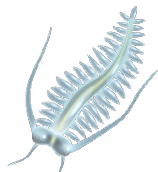
STEP 3 (optional): To add complexity to the activity, ask the students to build both a PHYTOPLANKTON (in green tones) ***and*** a ZOOPLANKTON. The phytoplankton created needs to float above the zooplankton, but the zooplankton cannot touch the bottom of the pop bottle.

CONTENT: Ask the students if they have heard of 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).

ANSWER KEY (FOR PAGE 8):



Zoea Larvae:
Crab Larvae



Polychaete:
Marine Worm



Veliger:
Marine Snail Larvae



Copepod:
Microscopic Crustacean

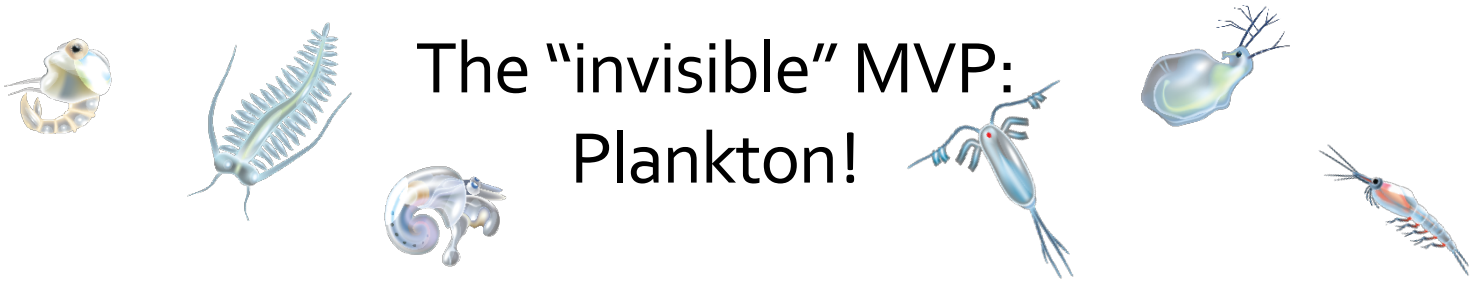


Daphnia:
Water flea



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.**



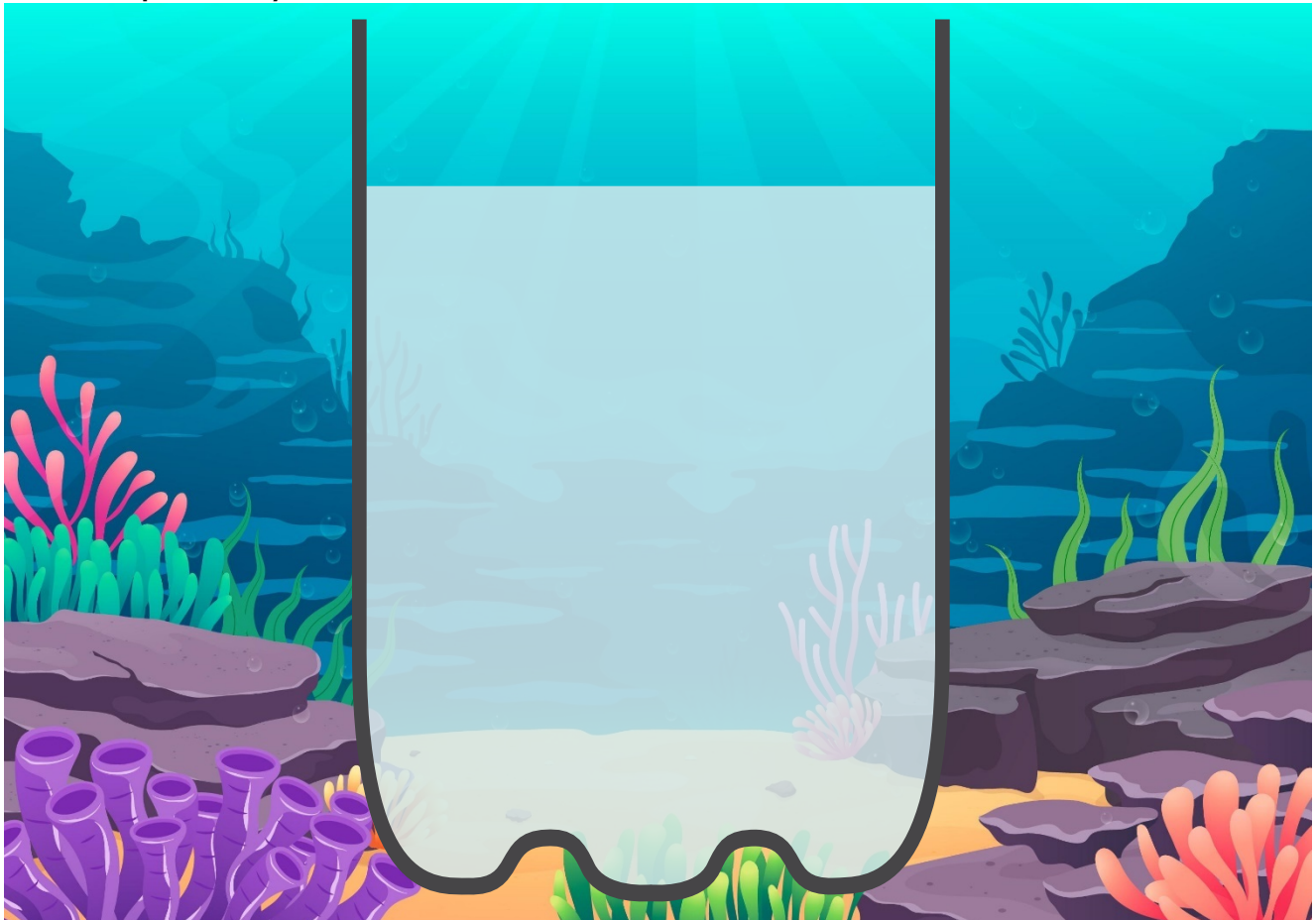
The “invisible” MVP: Plankton!



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
45 mins

ACTIVITY
4. Trophic Structures

LOCATION
Indoor

MATERIALS
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: Introduce the concept of Trophic Structures. 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)!

The 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!

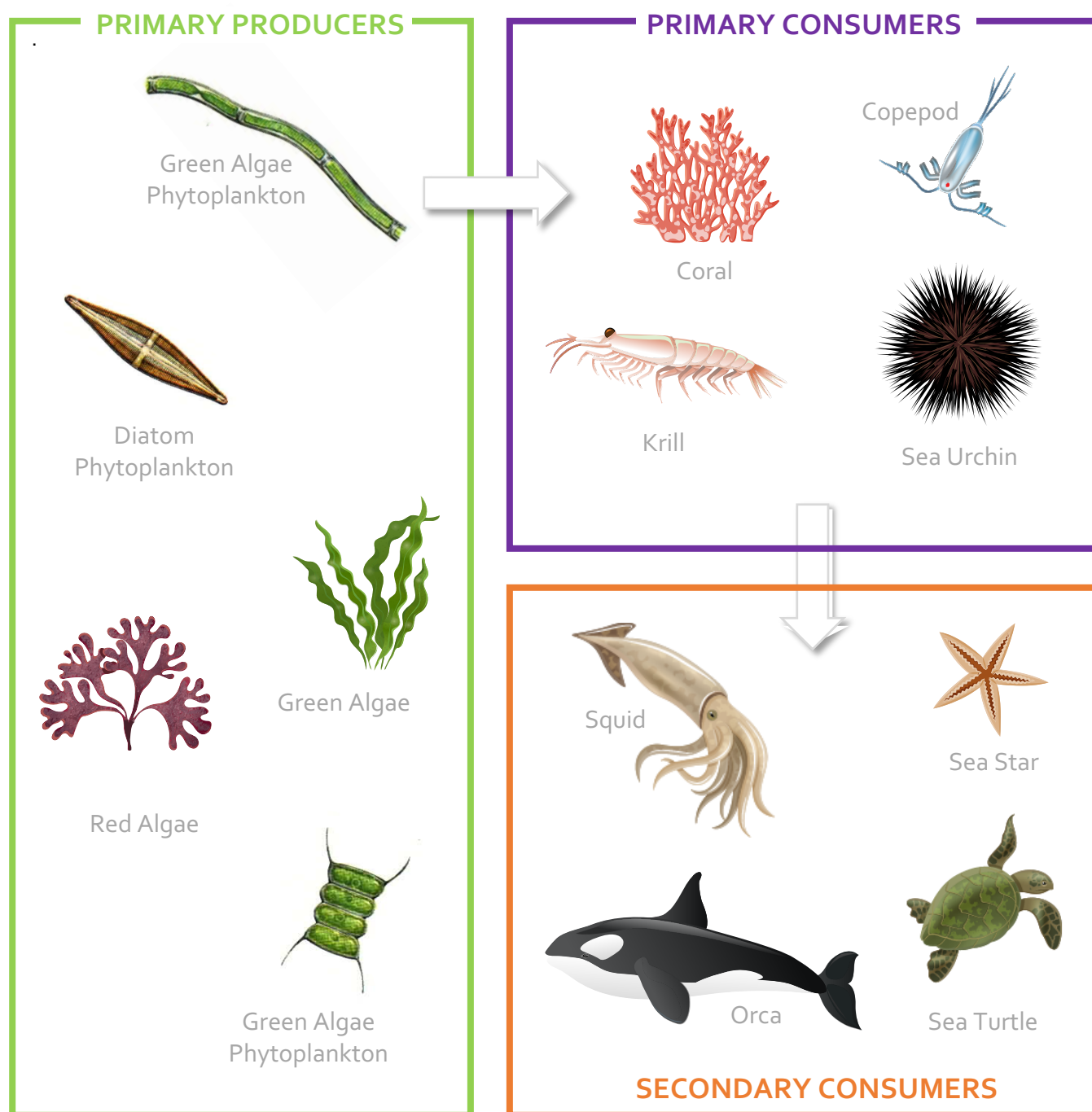
The secondary consumer is an organism that eats a primary consumer, and includes fish species that feed on the zooplankton

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

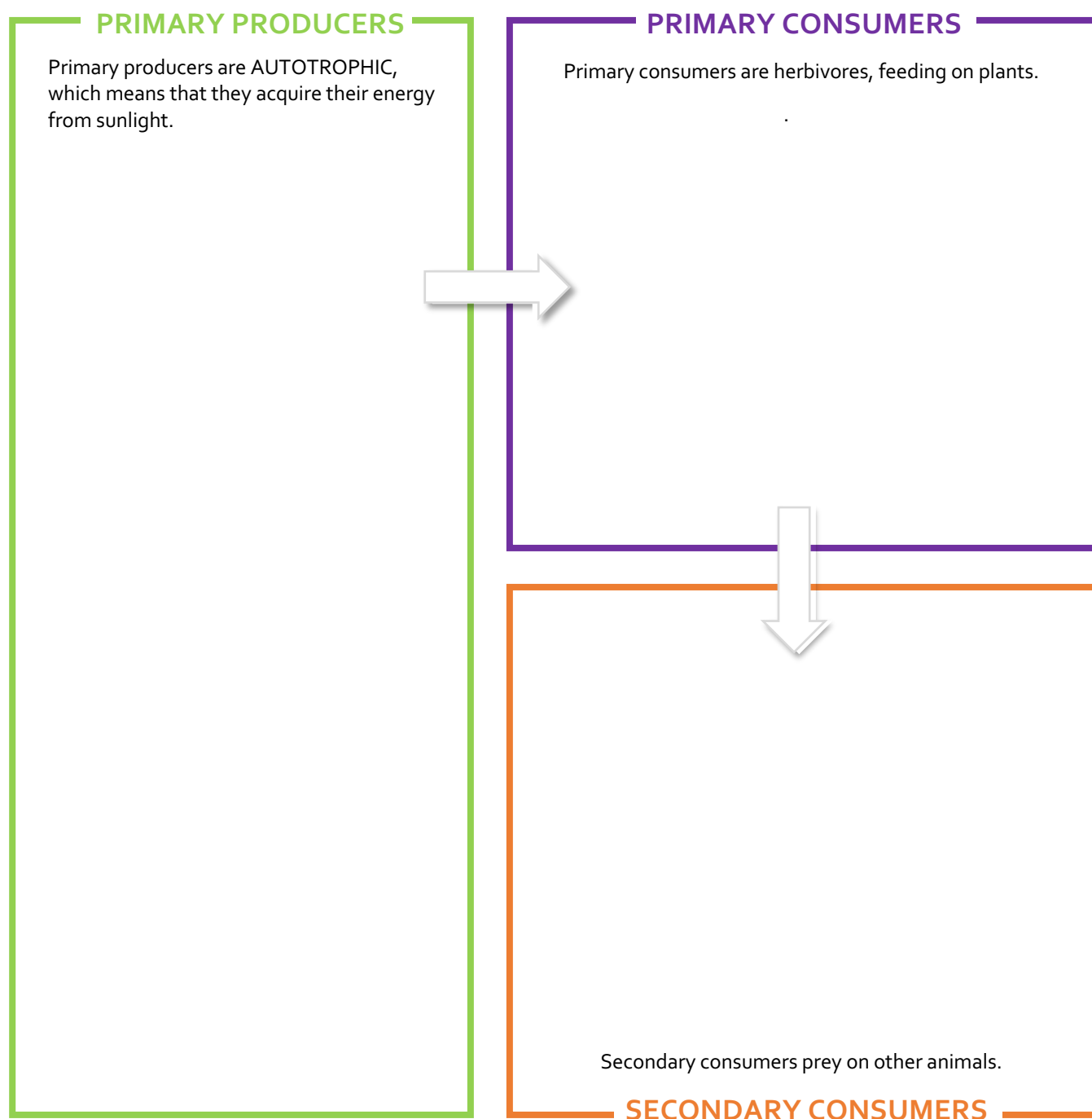
ANSWER KEY:



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

Trophic Structure

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



What do the arrows represent? _____

Trophic Structure Illustrations



TIME
1.5 hours

ACTIVITY
5. Conclusion

LOCATION
Outdoor

MATERIALS
Printed
worksheet

Conclusion

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

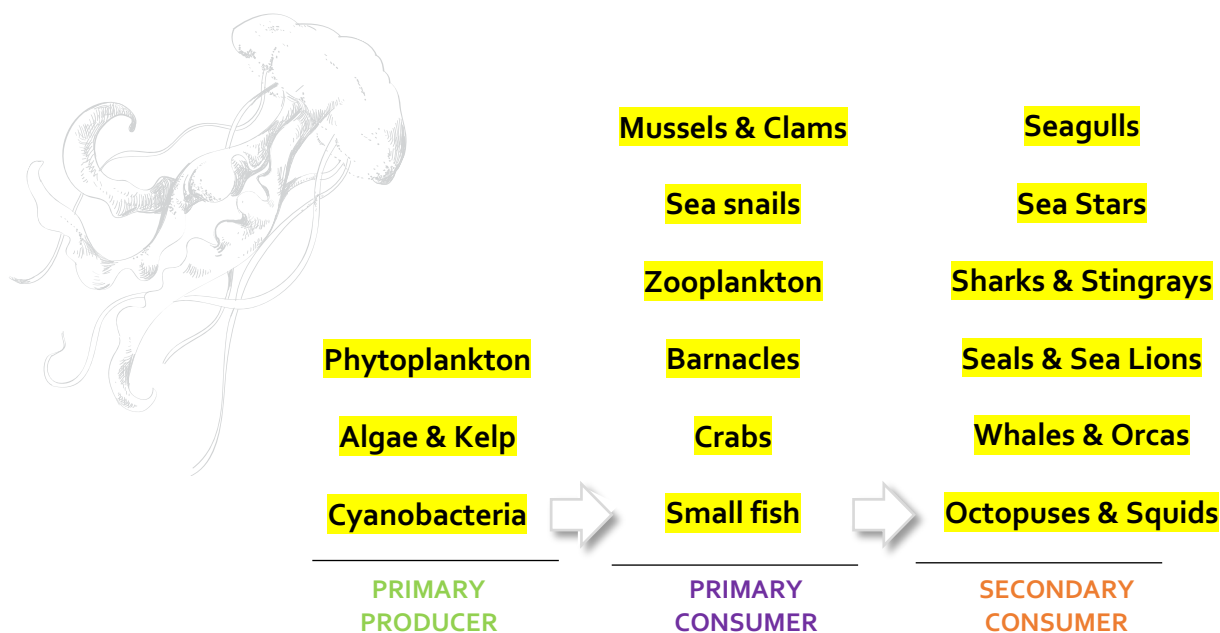
PREPARATION: Print checklist worksheet (page 14), bring clipboards (optional) and a pen/pencil.

LESSON PLAN: Ask the 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.



Marine Food Web Checklist

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

- ☐ Identify two (2) **marine birds**

- ☐ Find a big rock (bigger than 2 feet wide) and count how many **different species** you see under and on it.
How many did you see? _____
- ☐ Identify three (3) types of **algae** and/or **kelp**

- ☐ Find one (1) **sea anemone** (cnidarian – “cousin” of jellyfishes)
- ☐ Find one (1) **limpet** (mollusk – cousin of snails and clams)

SURVEY INFO

Date of Survey:

Name of Surveyor(s):

Location:

Weather:

Time:

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, another animals' vision isn't always the same as a humans' vision. Give 3 examples of everyday microplastics threats to the ocean that you see on the beach and give 2 examples of animals that are at risk of confusing it with food.



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

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?

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
✉ mandy.hobkirk@viu.ca

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