



# SYMBIOSIS

This lesson plan developed by:

North American Marine Environment Protection Association



## Overview:

In this lesson, students learn about different types of symbiotic relationships between organisms and how those relationships benefit, have no effect on, or negatively affect certain organisms. Using the symbiosis cards, students will explore different symbiotic relationships between organisms and have to match their organism to its symbiont.

## Materials:

- Set of symbiosis cards for every student
- White board and markers (optional)

## Set-up Prior to Activity:

Print and cut out symbiosis cards.

## Duration:

45 minutes

## Physical Activity:

Low

## Background:

Ecosystems are extremely complex systems that are made up of interrelationships between species and their environments. If organisms have a symbiotic relationship, it means they live in close physical association with one another. In many cases, symbiotic relationships are imperative to an organism's survival. There are a variety of types of symbiotic relationships. The three discussed in this lesson are mutualism, commensalism and parasitism.

# Symbiosis (cont.)

## Vocabulary:

- **biodiversity:** the variety of life in the world or a particular habitat or ecosystem
- **ecosystem:** a community of living things, non-living elements, and their interrelationships
- **symbiosis:** an interaction between organisms living in close physical association
- **mutualism:** a relationship between organisms that is beneficial for both organisms
- **commensalism:** a relationship between organisms where one organism benefits and the other is neither benefited nor harmed
- **parasitism:** a relationship between organisms where one organism benefits and the other is harmed

## Activity:

### Part 1: Introduction to Symbiotic Relationships

1. Begin the activity by asking the students what an ecosystem is. After taking answers, explain to them that an ecosystem is “a community of living things, non-living things and their interrelationships.”
2. Ask the students what types of relationships organisms have with each other. Answers may include predator-prey, parent and offspring, etc. If they have some difficulty with the question, prompt them by asking if there are some organisms that live near or on each other? How do they interact with one other? The term “symbiosis” may be unfamiliar to the students, so shift the discussion in that direction by providing an example, i.e. a crocodile and Plover Bird. They have a symbiotic, mutualistic relationship, meaning they both benefit from each other. The Plover eats parasites and leftover food in the crocodile’s mouth. The bird gets food, while the crocodile gets its mouth cleaned. Mutualists can be described as “teammates,” commensalists as “neighbors,” and parasites as “thieves.” You may want to write these terms on the board.

### Part 2: Play with the Symbiosis Cards

1. After going over each of the terms, shuffle the Symbiosis Cards and give one to each student (if there is an odd number of students, give yourself a card, ensuring everyone has a symbiont).
2. Once everyone has a card, explain to the students that someone else in the class has a symbiotic relationship with them, and that they should find their “symbiont” by talking to other group members about what their organism has or needs. If students think they have found their symbiont, have them check that it is correct and then write their organisms on the board with a circle around it.

## Discussion:

1. Once all of the pairs are written on the board, have students talk in pairs or small groups about what type of symbiotic relationship they believe those organisms have. Is it mutualism, commensalism or parasitism? To assist them, the descriptions on each card can be read aloud to the class.
2. To take this further, students can even create their own examples of symbiotic

# Symbiosis (cont.)

relationships with made up organisms and share them with their peers.

3. After determining what type of symbiotic relationship each of the students have with their symbiont, initiate a discussion about symbiosis and ecosystems.

For example, you may ask:

- What could happen to an organism if its “symbiont” went extinct?
  - How do you think symbiotic relationships affect the health of an ecosystem?
  - What do you think are some characteristics of healthier ecosystems?
4. It is important to stress that if one organism is threatened or endangered, it can directly (and indirectly) affect the presence of many other organisms in that ecosystem. All species in an ecosystem are connected, and maintaining those relationships is crucial to the sustainability of that ecosystem. Generally speaking, healthy ecosystems will have a greater variety of organisms, or biodiversity.

## Answers:

- **Anemone & Clownfish** (mutualism) - Clownfish is protected by anemone and receives food scraps, anemone is defended from predators and parasites
- **Barnacle & Whale** (commensalism) - Barnacle latches onto whale and benefits when whales swim into plankton-rich waters to feed
- **Whale Shark & Remora** (commensalism) - Remora travels with shark & eats scraps, shark is unaffected
- **Spider Crab & Algae** (mutualism) - Algae lives on crab’s back, helping crab blend into environment
- **Cleaner Shrimp & Grouper** (mutualism) - Cleaner shrimp consumes organisms and parasites in grouper’s mouth
- **Shrimp & Bubble Coral** (commensalism) - Shrimp uses bubble coral for camouflage and protection in coral crevices
- **Fish Lice & Salmon** (parasitism) - Fish serves as host for lice
- **Crab & Sea Urchin** (commensalism) - Crab holds sea urchin and uses it for protection
- **Sea Lamprey & herring** (parasitism) - Sea lamprey attaches to host, feeding on it
- **Blind Shrimp & Goby** (mutualism) - Shrimp gets protection from Goby who keeps an eye on predators, Goby uses shrimp’s burrow for protection from predators
- **Eagle Ray & Jack** (commensalism) - Eagle ray digs up sand to get to shellfish, Jack eats small fish that are exposed as a result
- **Coral & Zooxanthella Algae** (mutualism) - Coral provides algae with protected environment and CO<sub>2</sub>, algae produce oxygen and help the coral remove wastes

## Ocean Literacy Principles:

Ocean literacy is an understanding of the ocean’s influence on us, and our impact on the ocean. There are seven [Ocean Literacy Essential Principles](https://www.oceanliteracyprinciples.org/) that all people of our blue planet should have an opportunity to learn and understand. This activity touches upon the following Essential Principles:

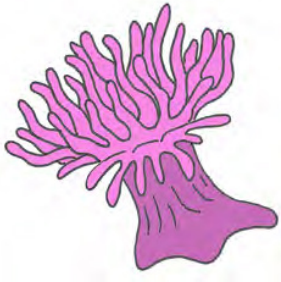
5. The ocean supports a great diversity of life and ecosystems
6. The ocean and humans are inextricably interconnected

## Symbiosis (cont.)

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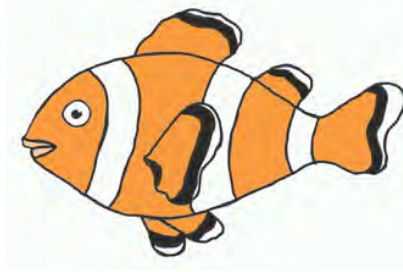
### **Further Your Impact with Sailors for the Sea Powered by Oceana:**

As sailors and water-lovers, you are among the first to notice changes to our seas such as fewer marine animals, more pollution and damaged marine habitat. Through our Green Boating initiative, Sailors for the Sea Powered by Oceana provides opportunities for you and your community to address pressing ocean health issues. As a Green Boater, you will be provided with the information, resources and access to combat marine plastic pollution, prevent habitat destruction, source responsible seafood and protect marine animals. From demanding plastic-free alternatives to choosing sustainable seafood, your voice and actions are an important part of restoring the abundance of our oceans and protecting marine habitats. [Join our growing Green Boating Community today.](#)



### ANEMONE

- Has stinging tentacles that ward away predators
- Provides place to live



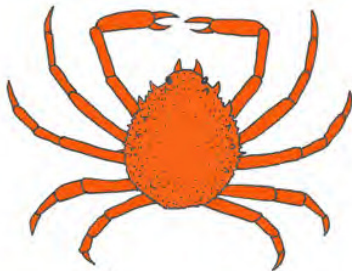
### CLOWNFISH

- Needs place to live that provides protection



### BARNACLE

- Filter feeder that depends on availability of plankton for food
- Latches on to moving organisms



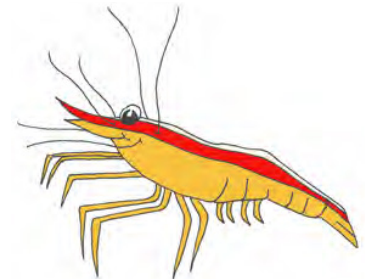
### SPIDER CRAB

- Needs protection from predators
- Uses camouflage to blend into the environment



### ALGAE

- Tends to grow on stationary things, but can also grow on certain animals, camouflaging them from predators



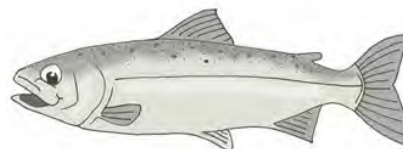
### CLEANER SHRIMP

- Eats parasites and organisms from the mouths of fish



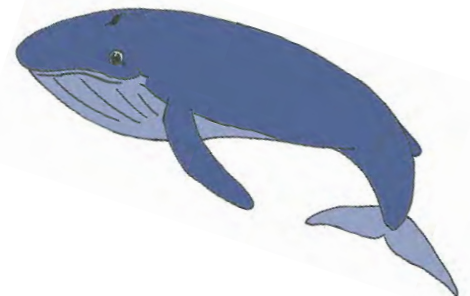
### FISH LICE

- Feeds off of skin and blood of fish



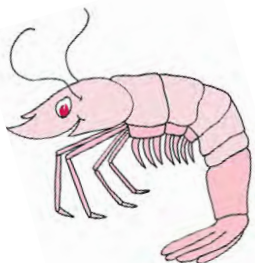
### SALMON

- Saltwater fish that has skin and blood that certain organisms feed off of



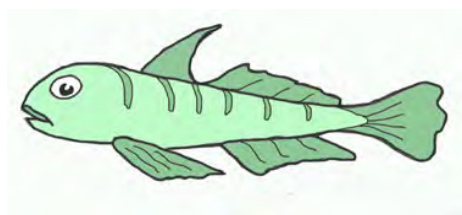
### WHALE

- Large mammal that often swims into plankton-rich waters to feed



### BLIND SHRIMP

- Needs help keeping an eye out for predators
- Digs burrows for protection from predators



### GOBY

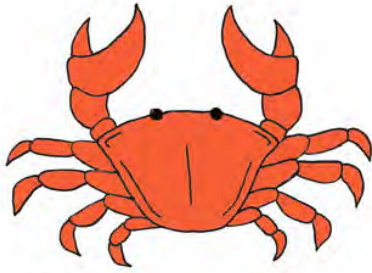
- Good at keeping an eye out for predators
- Needs a place for protection



### EAGLE RAY

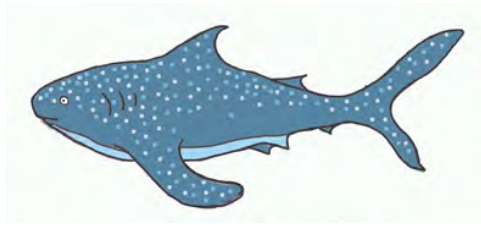
- Digs up sand to find shellfish to eat, exposing smaller fish





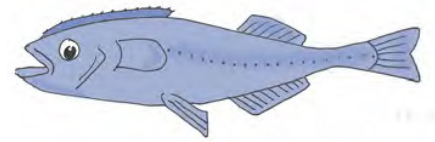
### CRAB

- Has claws it can use to hold things
- Needs protection from predators



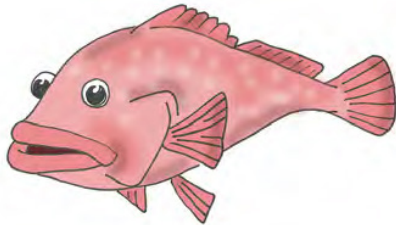
### WHALE SHARK

- Leaves scraps of food behind while feeding



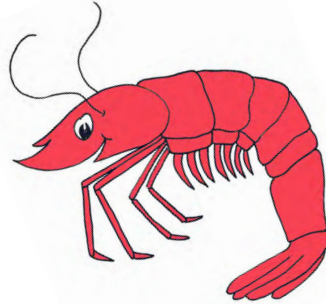
### REMORA

- Consumes scraps of food left behind from other organisms



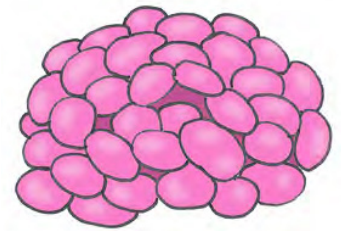
### GROUPE

- Has parasites and organisms in its mouth



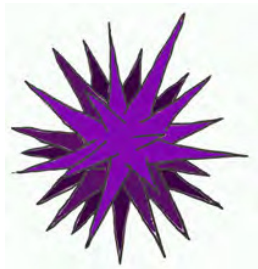
### SHRIMP

- Needs protection from predators
- Can use camouflage by hiding



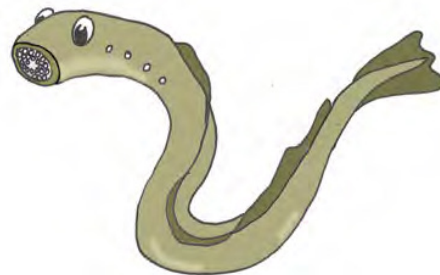
### BUBBLE CORAL

- Provides place for smaller organisms to hide or blend in



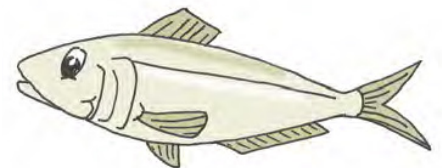
### SEA URCHIN

- Has spines that shields it from predators
- Can be transported by other organisms



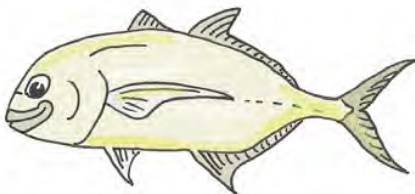
### SEA LAMPREY

- Feeds on fish by using its mouth to attach to its host
- Consumes blood



### HERRING

- Saltwater fish that contains blood



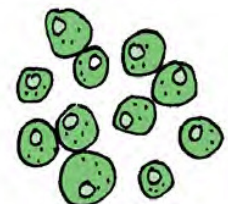
### JACK

- Eats small fish that hide in the sand



### CORAL

- Produces Carbon Dioxide
- Needs Oxygen
- Provides hard, protected environment for organisms



### ZOOXANTHELLA ALGAE

- Produces Oxygen
- Needs Carbon Dioxide
- Needs hard place to live for protection