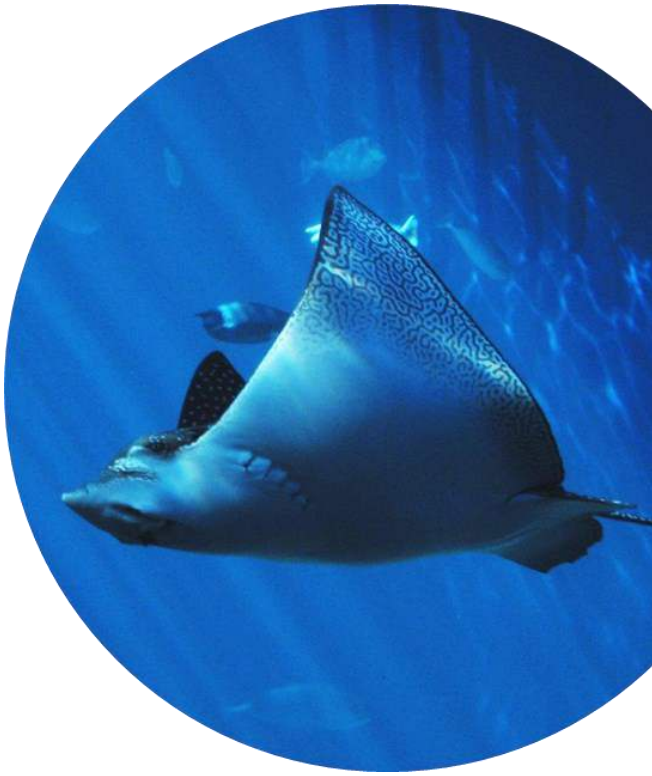
Name: _____

MAUI OCEAN CENTER

THE HAWAIIAN AQUARIUM



# Maui Ocean Center Learning Worksheet

# Seventh Grade

Our mission is to foster understanding,
wonder and respect for Hawai'i's Marine Life.

**Based on benchmarks SC.6.3.1, SC. 7.3.1, SC. 7.3.2, SC. 7.5.4**

# INTERDEPENDENT RELATIONSHIPS
# RELATIONSHIPS

A food web (or chain) shows how each living thing gets its food. Some animals eat plants and some animals eat other animals. For example, a simple food chain links plants, cows (that eat plants), and humans (that eat cows). Each link in this chain is food for the next link. A food chain always starts with plant life and ends with an animal.

Plants are called producers (they are also autotrophs) because they are able to use light energy from the sun to produce food (sugar) from carbon dioxide and water.

Animals cannot make their own food so they must eat plants and/or other animals. They are called consumers (they are also heterotrophs). There are three groups of consumers.

- Animals that eat only plants are called herbivores.
- Animals that eat other animals are called carnivores.
- Animals and people who eat both animals and plants are called omnivores.

Decomposers (bacteria and fungi) feed on decaying matter. These decomposers speed up the decaying process that releases minerals back into the food chain for absorption by plants as nutrients.

Do you know why there are more herbivores than carnivores?

In a food chain, energy is passed from one link to another. When a herbivore eats, only a fraction of the energy (that it gets from the plant food) becomes new body mass; the rest of the energy is lost as waste or used up (by the herbivore as it moves). Likewise, when a carnivore eats another animal, only a portion of the energy from the animal food is stored in its tissues. In other words, organisms along a food chain pass on much less energy (in the form of body mass) than they receive.

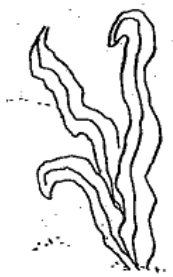
# FOOD WEBS

Draw a food web using the following organisms:

Sea Lettuce (limu)- green alga
Sea Hare (kualakai)- feeds on algae
Cauliflower coral (koʻa)- a hard coral with zooxanthellae
Orange cup coral– hard coral without zooxanthellae
Tiger sharks– feeds on fish and other animals
Yellowfin tuna 9ahi)- eats fish, squid and crustaceans
Achilles tang (pakuʻikuʻi)- eats green algae
Spiny lobster– crustacean, scavenger, eats anything!
Humans– eats a varied diet of fish, meat and vegetables
Phytoplankton– microscopic green algae
Zooplankton– feeds on phytoplankton

# CREATE A FOOD WEB

**Create a marine food web. Be sure to begin each food web with a Producer (plant) and end each food web with a Decomposer (such as shrimp, crabs, or marine bacteria). Each food web should have at least four levels.**



Label the Producers (P), Consumers (C), and Decomposers (D) in your food chain.

Why do all food webs begin with a plant?

_____

_____

What is the role of Consumers in a food web?

_____

_____

Why are Decomposers so important in a food web?

_____

_____

How does energy move through food webs?

_____

_____.

# INTERDEPENDENCE

**We just examined food chains and how animals depend on each other to gain nutrients and energy. Keep in mind how animals interact with and depend on other organisms for their own survival.**

Visit our Open Ocean Exhibit and observe some of the apex predators, like the sharks. Explain the importance of a predator in a biological community.

_____

_____

_____

_____.

Give an example of two animals you observed at the Maui Ocean Center that have benefited from each other? What were they doing to help each other survive?

_____

_____

_____.

Why does a parasite depend on other animals?

_____

_____

_____.

# SYMBIOTIC RELATIONSHIPS & ENERGY TRANSFER

Coral reefs play an important role in Hawai'i's marine ecosystem. A diverse number of organisms rely on coral reefs for food as well as shelter. Symbiotic relationships are observed in many marine organisms. Figure 2. illustrates the relationship between coral organisms and zooxanthellae algae. Explore our Living Reef building and answer the following questions about energy transfer between these two organisms.

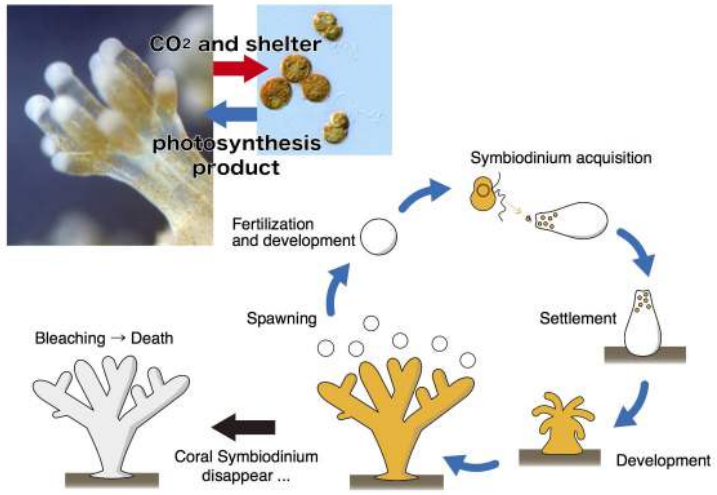



Figure 2. A symbiotic relationship between corals and Symbiodinium

1. Describe how each organism benefits from this symbiotic relationship between coral and algae?

_____

_____

_____.

2. What source of energy does the symbiotic algae use to produce the food and oxygen for the polyp?

_____.

3. Roughly what % of its food does the zooxanthellae provide the coral with?

_____.

4. Coral secretes a hard skeleton made out of limestone or calcium carbonate. What contributes to the formation of this structure?

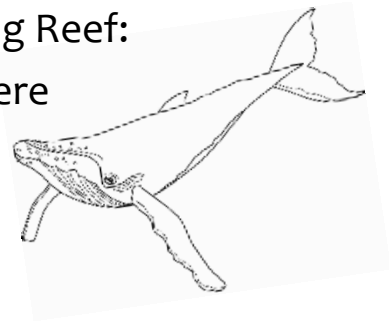
_____

_____

_____.

# CORAL REEF DWELLERS

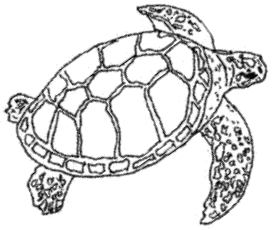
Find two animals living in different sections of The Living Reef: surge and deep reef. Draw these animals and write where you're likely to see them and why.



Animal 1

Animal 2

Marine animals live in different places, some prefer the surge zone with lots of waves, other the deep reef with very few waves.



# FISH ADAPTATIONS

## BACKGROUND

The tropical oceans of the world are home to fish, mammals, and birds as well as a myriad of invertebrates. Many beautiful and fragile animals have adapted to the warm waters of coral reefs. Because the reefs offer natural protection to many of the fish, many interesting adaptations have taken place. The result is some of the most bizarre and beautiful creatures found in the sea.

## ADAPTATIONS

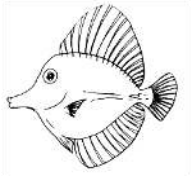
Why do you think the Frogfish looks the way it does? Adaptations appear over time because certain shapes and colors create camouflage which protect an organism from its predators. Looking like a piece of sponge or coral can help the Frogfish avoid being another animal's lunch!

## ACTIVITY

Each student will choose one fish from any exhibit. They will write down its name, observe the animal in its environment for at least 15 minutes and record their observations on the worksheet. They will take their information and compile it in a short report.

## ASSESSMENT

Completed reports will give specific details about the behavior and characteristics of the individual fish and how it survives in its environment.



## RESOURCES

On the next two pages you will find some common adaptations in fish and how they use these adaptations to survive in their environment.

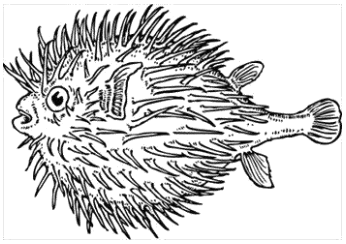
# ADAPTATIONS IN FISH

| Body Parts | Adaptation | Purpose |
|---|---|---|
| **Mouth** | At the end of the snout, symmetrical | Open water feeder |
| | Angled downward/longer upper jaw | Feeds on prey below it, bottom feeder |
| | Angled upward/longer lower jaw | Feeds on prey about it, surface feeder |
| | Strong jaws– teeth | Preys on other fish |
| | Sucker– shaped | Eats small plants and animals |
| | Barbells | Feeds off bottom, senses food in murky water |
| | Duckbill jaws | Grasps its prey |
| | No teeth | Eats plankton |
| | Very large mouth | Surrounds prey |
| **Fins** | Large, forked caudal fin | Strong, fast swimmer |
| | Spines on fins | Protection, more difficult to swallow, can be poisonous |
| | Large pelvic fins | Bottom dweller |
| | Small pelvic fins | Open water swimmer |
| **Body Shape** | Round | Difficult to swallow, slow swimmer |
| | Flat bottomed | Feeds on the bottom |
| | Long, eel-like | Hides in rocks and weeds |
| | Torpedo shaped | High speed swimmer |
| | Flat from side to side | Almost invisible from the front of rear, feeds above and below |
| | Flat from top to bottom | Hides on the bottom |
| | Hump backed | Stable in fast moving water |

# ADAPTATIONS IN FISH

| Body Parts | Adaptation | Purpose |
|---|---|---|
| Eyes | Both on the same side of the head | Lies flat on the bottom of the ocean |
| | Small | Shallow water fish |
| | Large | Usually deep water fish |
| Scales | Large | Uses its scales for protection |
| | Small | Fast swimmer |
| Coloration | No markings | Swims in the open water |
| | Stripes | Hides in seaweeds and grasses |
| | Mottled | Hides in rocks or on the bottom |
| | Countershading– dark on top, light on bottom | Less visible to predators above and below |
| | Stripe through eye | Helps to camouflage fish by hiding |
| | False eye spot | Predator will attack tail giving fish a greater chance to escape |

# ADAPTATIONS IN FISH



**Follow A Fish**

**Sketch your animal. Be sure to include unusual markings.**

Common Name: _____

Hawaiian Name: _____

APPEARANCE:

What does it look like?

Color:

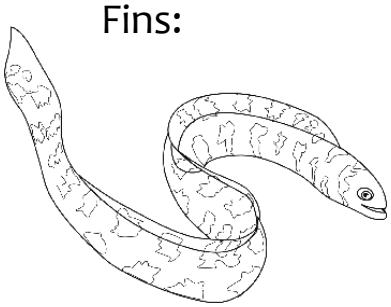
Body Shape:

Markings:

Size:

Texture:

Fins:



# ADAPTATIONS IN FISH

**Follow A Fish**

Behavior– How does your fish behave?

Swimming pattern:

Does your fish have any defense mechanisms?

Does it travel alone or with others?

Where in the tank does it go?

Notes:

Conclusion:

How do this fish's characteristics enable it to live in its environment?