

LESSON 3 Human Impact on Coral Reefs

Lesson at a Glance

In this lesson students will have a class discussion on the ecological importance of coral reefs and their value to humans. That discussion will lead the class to examine the threats to reefs both by humans and by nature. The students are then broken into small cooperative groups where they will work together to learn about human impacts affecting the health of coral reef habitats.

Lesson Duration

Three 45-minute periods

Essential Question(s)

How do human activities on land and in the marine environment impact the health of coral reefs?

How can people help to preserve and protect the coral reef habitat?

Key Concepts

- Coral reefs have an important ecological role in marine and coastal environments.
- Coral reefs are a valuable resource for people. Human activities on land and in the marine environment can have a negative impact on coral reefs.

Instructional Objectives

- I can describe how society is influenced by technologies (land and ocean-based fields).
- I can examine the ways people modify the coastal and marine environments, and explain the effects of these changes on the coral reef habitat.
- I can give examples of how people can take action to protect the coral reef habitat.

Related HCPS III Benchmark(s):

Science SC 3.1.1
Pose a question and develop a hypothesis based on observations.

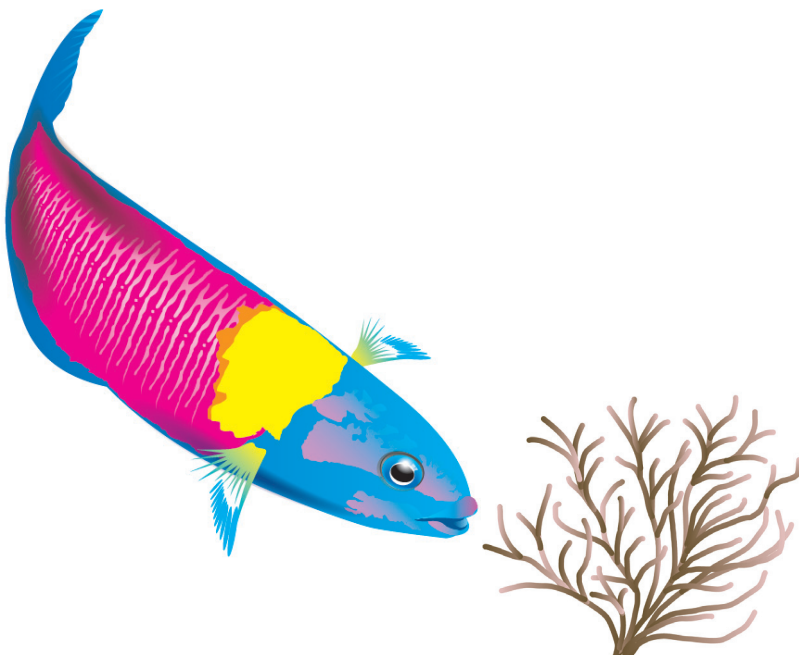
Science SC 3.1.2
Safely collect and analyze data to answer a question.

Science SC 3.2.1
Describe ways technologies in fields such as agriculture, information, manufacturing or communication have influenced society.

Language Arts: LA. 3.4.1
Write in a variety of grade appropriate formats for a variety of purposes and audiences.

Language Arts: LA: 3.5.2
Use significant details and relevant information to develop meaning.

Social Studies SS 3.7.4
Examine the ways in which people modify the physical environment and the effects of these changes.



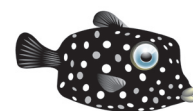
Assessment Tools

Topic		Scientific Inquiry	
Benchmark SC.3.1.1		Pose a question and develop a hypothesis based on observations	
Rubric			
Advanced	Proficient	Partially Proficient	Novice
Pose a question and develop a hypothesis based on logical inferences and observations	Pose a question and develop a hypothesis based on observations	Pose a question or develop a hypothesis partially based on observations	With assistance, pose a question or develop a hypothesis

Topic		Scientific Inquiry	
Benchmark SC.3.1.2		Safely collect and analyze data to answer a question	
Rubric			
Advanced	Proficient	Partially Proficient	Novice
Summarize and share analysis of data collected safely to answer a question	Safely collect and analyze data to answer a question	With assistance, safely collect and analyze data	With assistance, safely collect data and attempt to analyze data

Topic		Science, Technology, and Society	
Benchmark SC.3.2.1		Describe ways technologies in fields such as agriculture, information, manufacturing, or communication have influenced society	
Rubric			
Advanced	Proficient	Partially Proficient	Novice
Compare how technologies in various fields have influenced society	Describe ways technologies in fields such as agriculture, information, manufacturing, or communication have influenced society	Identify, with assistance, ways that technologies have influenced society	Recall that technologies have influenced society

Topic		Range of Writing	
Benchmark LA.3.4.1		Write in a variety of grade-appropriate formats for a variety of purposes and audiences, such as: <ul style="list-style-type: none"> • stories with a beginning, middle, and end and poems with sensory details • short reports on content area topics • pieces related to completing tasks • friendly letters • responses to literature • pieces to reflect on learning and to solve problems 	
Rubric			
Advanced	Proficient	Partially Proficient	Novice
Insightfully adapt writing to grade-appropriate formats for a variety of purposes and audiences	Adapt writing to grade-appropriate formats for a variety of purposes and audiences	Write with some adaptation to grade-appropriate formats for a variety of purposes and audiences	Write with little adaptation to grade-appropriate formats for a variety of purposes and audiences



Topic		Design	
Benchmark LA.3.5.2		Organize information by introducing it, elaborating on it, and drawing a conclusion about it	
Rubric			
Advanced	Proficient	Partially Proficient	Novice
Organize information in a highly effective way by smoothly introducing it, elaborating on it, and drawing a conclusion about it	Organize information by introducing it, elaborating on it, and drawing a conclusion about it	Partially organize information with a limited introduction, body, or conclusion	Ineffectively organize information with an unclear introduction, body, or conclusion

Topic		Environment and Society	
Benchmark SS.3.7.4		Examine the ways in which people modify the physical environment and the effects of these changes	
Rubric			
Advanced	Proficient	Partially Proficient	Novice
Examine the ways in which people modify the physical environment, and evaluate the effects of these changes.	Examine the ways in which people modify the physical environment, and explain the effects of these changes.	Examine the ways in which people modify the physical environment, or the effects of these changes.	Ineffectively examine the ways in which people modify the physical environment, or the effects of these changes.

Assessment/Evidence Pieces

Lesson

- Student Worksheet *Reef Threats Natural or Human*
- Student Responses to *Human Impact on Coral Reefs* worksheets

Materials Needed

Teacher	Class	Group	Student
<ul style="list-style-type: none"> • Method to present PowerPoint • Large piece of butcher paper 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Student Worksheet <i>Reef Threats Survey</i> (#1-6) • Student Worksheet <i>Human Impact on Coral Reefs</i> • Different color post-its • Pens for each group 	<ul style="list-style-type: none"> • Student Worksheet <i>Reef Threats Natural or Human</i>

Instructional Resources

PowerPoint: *Human Impacts on Our Coral Reefs*

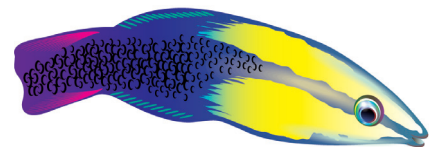
Teacher Reading: *Human Impact on Coral Reefs*

Student Worksheet: *Reef Threats Natural or Human*

Teacher Answer Key: *Reef Threats Natural or Human*

Student Worksheet: *Reef Threats Survey* (#1-6)

Student Worksheets: *Human Impact on Coral Reefs Information Sheet (Sedimentation, Water Pollution, Over-Fishing, Climate Change, Careless Recreation, Marine Debris)*



Student Vocabulary Words

climate change: too much carbon dioxide entering the atmosphere than can be removed by photosynthetic organisms, results in air and water temperatures becoming much warmer and potentially disastrous impacts on environmental conditions, climate and life on earth.

conservation: the planned and careful management of natural resources, such as coral reefs and marine life, to prevent exploitation, destruction, or neglect.

coral bleaching: when water temperatures get too warm, corals lose their zooxanthellae.

crown of thorns: a sea-star that eats corals.

deforestation: cutting down the trees, leaving the ground barren and making it easier for erosion to occur.

erosion: the wearing away of rock, soil, sediments by wind and rain.

human threats: caused by people.

marine debris: rubbish, made by people, that is dumped, blown by winds, or washed into the ocean from land, beaches, boats, and large ships.

moorings: an object that is attached to the bottom of the ocean that a boat can tie to.

natural threats: caused by nature.

nutrients: come from fertilizers and from sewage. Too many nutrients can cause increased algae growth which can cause the water to get cloudy.

overfishing: fishing a population of fish faster than that population can replace itself.

physical damage to reefs: corals being broken and directly killed.

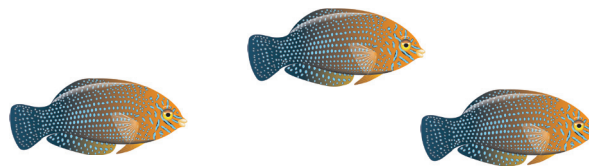
runoff: rain and other erosion factors (sediments) that flow from the land to the reefs carrying a variety of damaging material (e.g. pesticides, herbicides, oil, sewage).

sediments: dirt that washes down on the reef.

thermal pollution: rise in water temperature.

technology: increases in population spur the development of new, faster, larger, more efficient equipment or techniques to keep up with increased demand for foodstuff, goods, services for human subsistence.

zooxanthellae: tiny microscopic algae that live inside corals and produce food through photosynthesis, giving most of the food to the corals.



Lesson Plans

Lesson Preparation

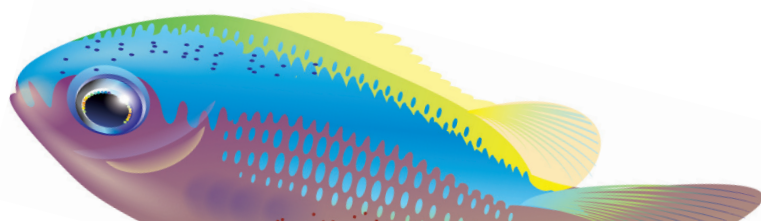
- Review the Science Background in the Unit Overview and Teacher Reading *Human Impact on Coral Reefs*.
- Preview the PowerPoint presentation *Human Impacts on Our Coral Reefs*, make arrangements to project it.
- Review and make copies of Student Worksheet *Reef Threats Natural or Human and Reef Threats Survey (#1-6)*, one per student in each group.
- Review and makes copies of student worksheet *Human Impact on Coral Reefs Information Sheet (Sedimentation, Water Pollution, Over-Fishing, Climate Chnage, Careless Recreation, Marine Debris)* one per group.
- Add to Word Wall.

I. Threats to Coral Reefs

- A. Brief review of the ecological importance of coral reefs (e.g. habitat for many organisms, prevent coastal erosion, create sand for beaches) and their value to humans (from previous lessons in the Coral Reef Unit or prior knowledge e.g. recreation, food resource, economic reasons) charting for the class if necessary.
- B. Introduce the term hypothesis and define it as, “an idea that can be tested by an experiment or observation” (ScienceSaurus, 2005). Explain that hypotheses are based on observations and questions leading up to an investigation, and may be stated in either of the following formats: “if...then..” or “if...then....because...” As an example, show the students a picture of an opihi. Ask students to make observations of its adaptive structures/behaviors as well as the environmental conditions it needs to survive. Demonstrate to students that using the “if...then...” format, an example of a hypothesis could be: “If an opihi breathes air and needs moisture to survive, then it may live in the middle zone.”
- C. Ask student pairs to study an organism that they have learned about in this unit. (Suggestion: The teacher may want to write a list of organisms on the board to help students choose an organism specific to this unit.) On a sheet of notebook paper have each pair make observations based on their current knowledge of the organism and the following questions:
 1. What specific environmental conditions does this organism need to survive?
 2. What behaviors might this organism have that might be determined by its environment?
- D. Using “if...then...” format, assist student pairs to create a hypothesis for their organism. Ask the pairs to share their hypotheses with the class and state where they hypothesize this organism exists within the beach habitats.
- E. The student pairs will research their organism to answer the previous two questions posed as they made their observations (Step C) and figure out if their hypothesis was supported.
- F. After the pairs have completed their research have them make a drawing of their organism creating caption that states their hypothesis and whether it was supported or refuted. If their hypothesis was supported have them explain why it was supported. If their hypothesis was refuted have them explain why.
- G. Ask student pairs to briefly share their research, stating whether their findings “support” or refute their hypothesis. The pairs will then place their organism in the proper place in the beach habitat mural.

II. Human Impact Issues

- A. Clarify the difference between natural and human threats to our coral reefs. Show the PowerPoint, *Human Impacts to Our Coral Reefs*.
- B. Have students complete the worksheet *Reef Threats Natural or Human*. Then compare natural vs. human threats to the coral reefs by discussing the results students came up with on their worksheet.
- C. Split the class up into 6 groups of students. The *Reef Threats Survey* student worksheet covers six different topics (Sedimentation, Water Pollution, Over-fishing, Climate Change, Careless Recreation and Marine Debris). Each student in the group will receive a copy of one of these worksheets. Each group will focus on the topic shown on the worksheet they are given. The group will observe the drawing on their worksheet carefully and generate several research questions related to their specific issue. Select one of the questions and formulate a hypothesis to answer the question.



- D. Provide each group with one copy of the appropriate *Human Impact on Coral Reefs Information Sheet* to help them collect data to answer their question and validate their hypothesis. If necessary, allow time for teams to conduct additional research/data collection to answer their research question.
- E. Have groups orally share facts and concerns related to their specific marine issue, using questions on teacher reading sheet to facilitate the class debrief.
- F. All groups should then brainstorm things people can do to help protect coral reefs from the six different human impact issues covered in the lesson. Assign each group a different color paper (or pen) to hold them accountable for thinking through each different issue. Write ideas on post-its and/or a large class chart (butcher paper) to share before starting the culminating activity.

Post the 6 different info sheets at the top of the class chart and have groups post their ideas under the respective impact issue.

#1	#2	#3	#4	#5	#6
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LESSON 3 Teacher Reading

Human Impact on Coral Reefs

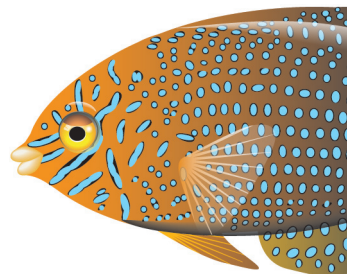
Coral reefs have an important role in the marine and coastal environments. They provide valuable habitat (food and shelter) for a great diversity of plants and animals, including important breeding and nursery grounds for many marine organisms. Over 7,000 species of marine organisms are supported by Hawai‘i’s coral reefs, including invertebrates, fishes, sea birds, sea turtles, and marine mammals. Because of the geographic isolation of the Hawaiian Islands, 25% of the organisms inhabiting Hawai‘i’s reefs are endemic, which means they can only be found here and nowhere else on Earth (Francis & Bingham, 2007, Welcome section, para. 1.). Coral reefs also provide protection from coastal erosion by acting as natural breakwaters for big waves and storms. Also, the breakdown of corals and other organisms living in the reef habitat creates beaches, which are an important resource for the survival of many coastal organisms, including endangered sea turtles and monk seals.

Coral reefs are an important environmental and economic resource for people. In addition to shoreline protection, reefs provide food, recreational and employment opportunities, and are a potential source for new medicines. Coral reefs also provide economic benefits to coastal communities from tourism. In early Hawai‘i, coral reefs were also utilized as resources for food, tools, recreation, and economy. Historically, the islands were divided into *ahupua‘a*, land divisions running from the mountains to the sea. Coral reefs were managed within each *ahupua‘a* by resource managers (*konohiki*), people familiar with the resources of the *ahupua‘a* (*kahuna* and *kapuna*), and strict laws restricting the use of the resources (*kapu system*). The people living in each *ahupua‘a* benefited socially and economically (through trading with other *ahupua‘a*) from the resources available in a healthy reef. Ancient Hawaiians were able to maintain healthy coral reefs through careful management of resources. Today, different departments in county, state, and national government agencies manage the coral reef environment, however the human population and technologies have grown, placing more impact on the coral reef habitat.

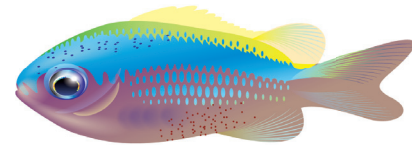
A majority of the problems threatening coral reefs in Hawai‘i are the direct (and indirect) result of human activities on land, and in the marine environment. Marine debris, water pollution, sedimentation, over-fishing, careless recreation, and global warming are some examples of human-caused threats to the coral reef habitat. (NOTE: These human impact issues are described in detail in the Student Readings.) Each of these threats has a significant impact on the health of coral reefs. Coral reefs grow very slowly and can take hundreds of years to form. If damage to coral reefs continues at the current rate, over half of all reefs in the world could disappear in our lifetimes. Currently, millions of acres of reef have already been severely damaged or destroyed. Through education, awareness, and action, people can help to preserve and protect coral reefs.

Questions to facilitate the class debrief:

- Define *your human impact issue*.
- What effect does *your human impact issue* have on coral reefs. Explain.
- Explain what people can do to help protect the coral reef habitat from *your human impact issue*.



LESSON 3 Teacher Answer Key



Reef Threats Natural or Human

Read the statements about coral reefs below. Put an **N** next to the natural threats, and an **H** next to the human threats..

- H** 1. Marine debris can impact coral reef habitats.
- H** 2. Construction near reef flats can cause siltation and smother the corals.
- N** 3. Natural predators, such as crown of thorns and parrotfish, eat the corals.
- H** 4. Snorkelers and divers can damage the reef by hitting the corals with their fins. Anchors can also damage the coral.
- H** 5. Collecting tropical fish for personal use or resale damages the reef.
- N** 6. Tropical storms and hurricanes can break the corals down.
- H** 7. Illegal fishing and over-fishing can spoil the reef ecosystem.
- N** 8. Currents can smother corals with sediments.
- H** 9. Chemical and thermal waste, fertilizers, and sewage affect the water quality.
- H** 10. Temperature increases caused by climate change may cause coral bleaching.

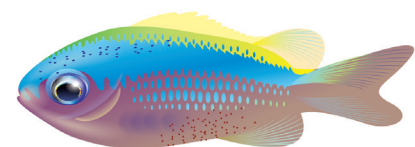
LESSON 3

Reef Threats Natural or Human

Name _____ Date _____

Read the statements about coral reefs below. Put an **N** next to the natural threats, and an **H** next to the human threats.

- _____ 1. Marine debris can impact coral reef habitats.
- _____ 2. Construction near reef flats can cause siltation and smother the corals.
- _____ 3. Natural predators, such as crown of thorns and parrotfish, eat the corals.
- _____ 4. Snorkelers and divers can damage the reef by hitting the corals with their fins. Anchors can also damage the coral.
- _____ 5. Collecting tropical fish for personal use or resale damages the reef.
- _____ 6. Tropical storms and hurricanes can break the corals down.
- _____ 7. Illegal fishing and over-fishing can spoil the reef ecosystem.
- _____ 8. Currents can smother corals with sediments.
- _____ 9. Chemical and thermal waste, fertilizers, and sewage affect the water quality.
- _____ 10. Temperature increases caused by climate change may cause coral bleaching.

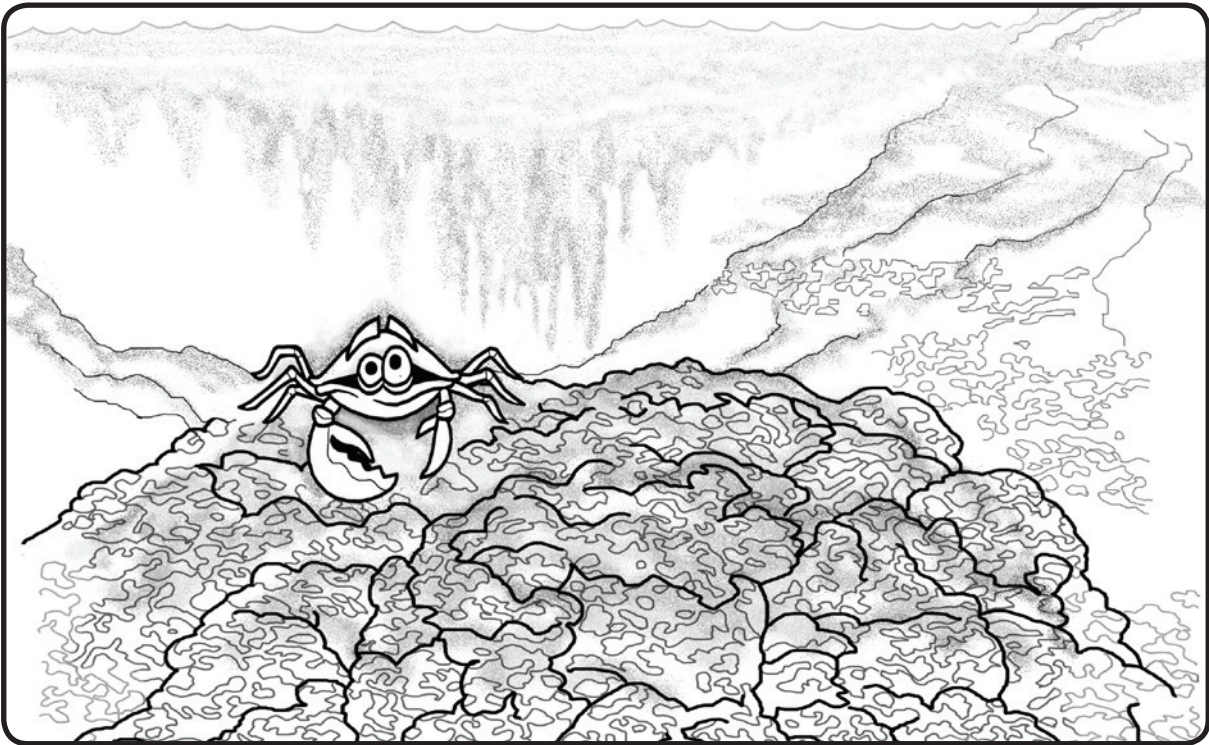


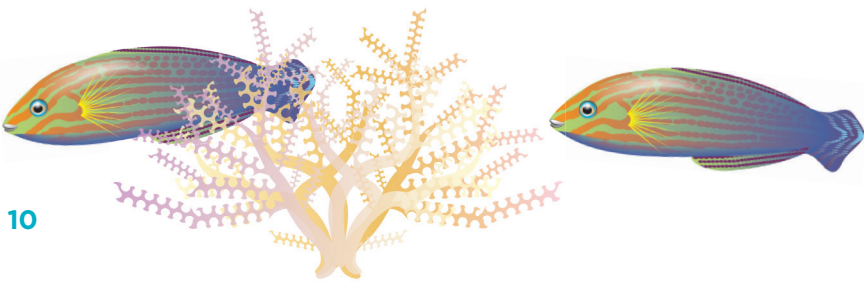
LESSON 3

Reef Threat Survey #1 - Sedimentation

Name _____ Date _____

Directions: Carefully observe the drawing and record questions you might ask about the events you see that show sedimentation. Can you make a hypothesis that will help you research and answer one of your questions?



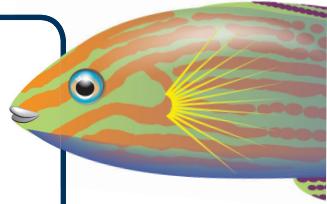
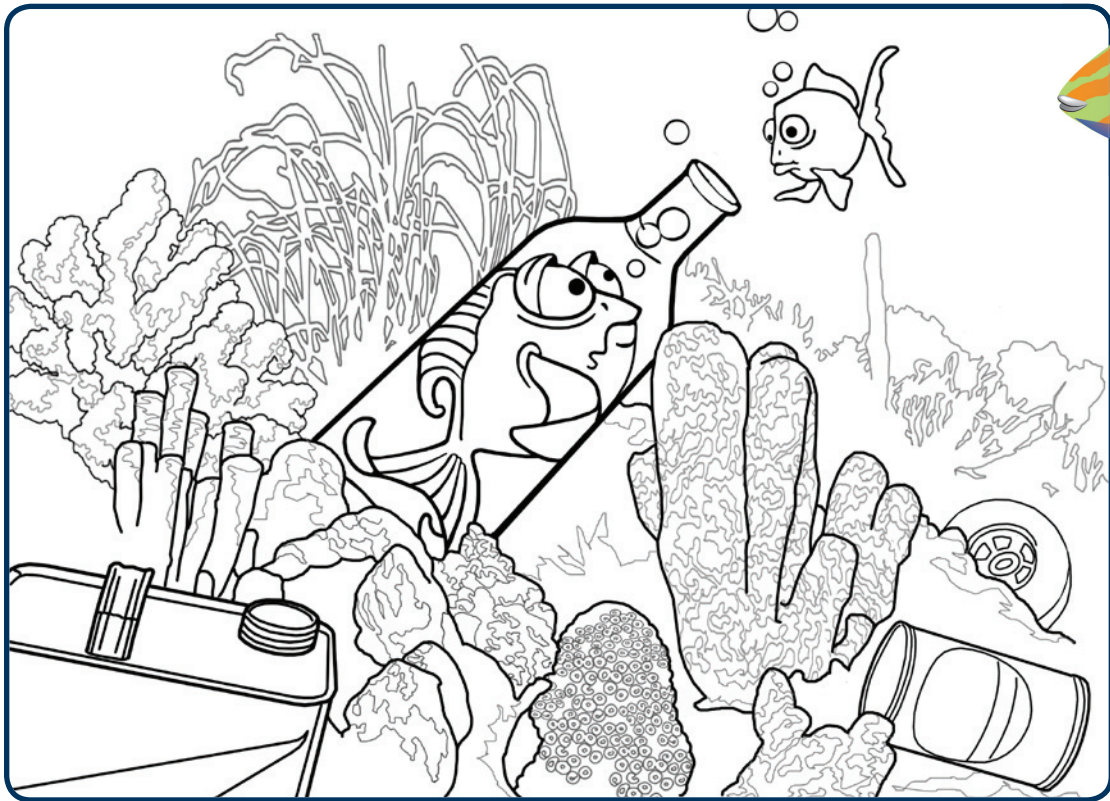


LESSON 3

Reef Threat Survey #2 - Water Pollution

Name _____ Date _____

Directions: Carefully observe the drawing and record questions you might ask about the events you see that show water pollution. Can you make a hypothesis that will help you research and answer one of your questions?

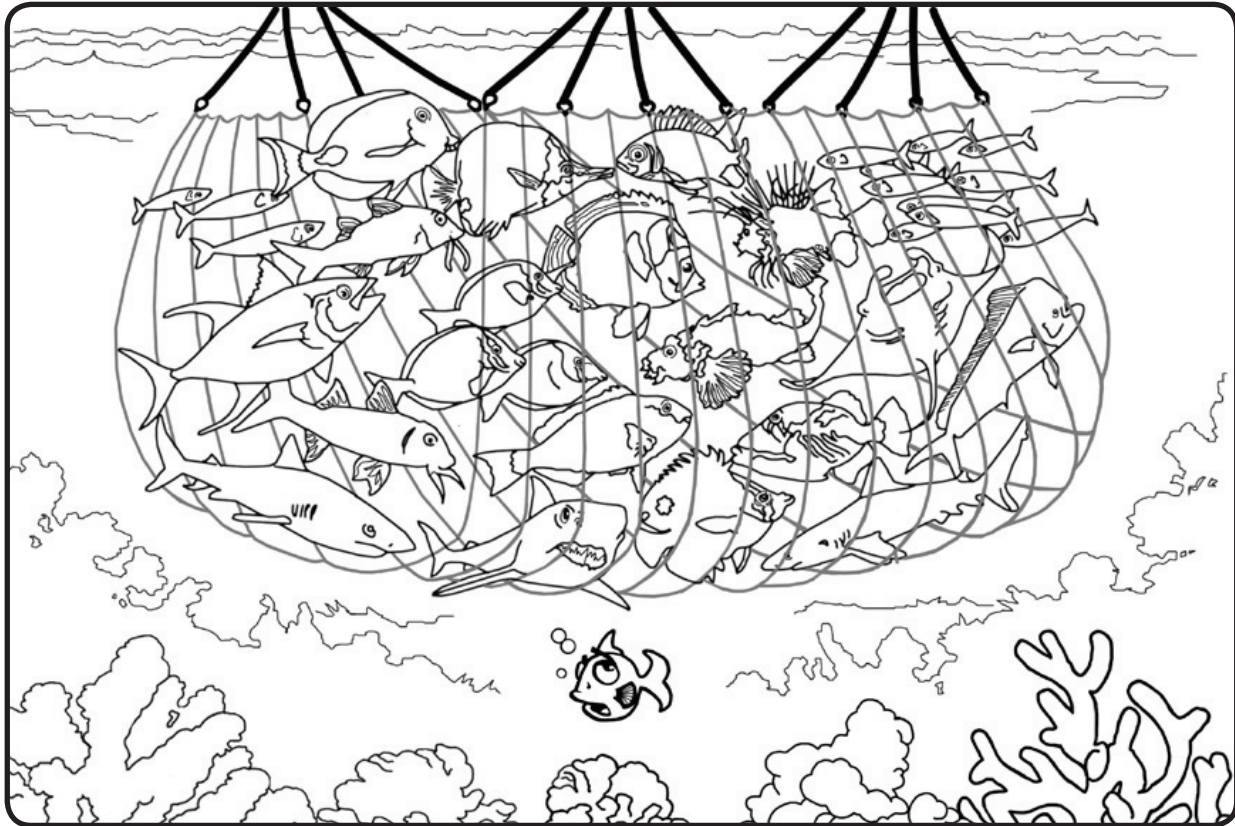


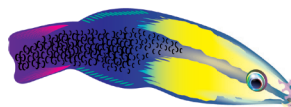
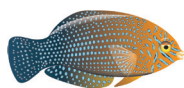
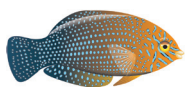
LESSON 3

Reef Threat Survey #3 - Over-Fishing

Name _____ Date _____

Directions: Carefully observe the drawing and record questions you might ask about the events you see that show overfishing. Can you make a hypothesis that will help you research and answer one of your questions?



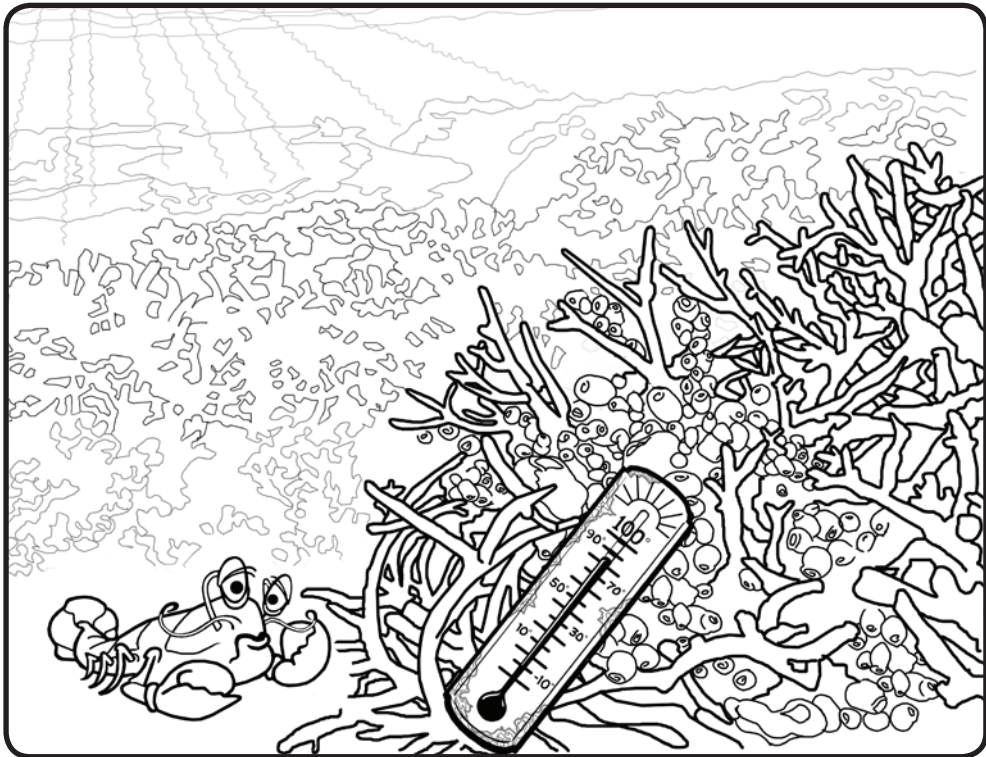


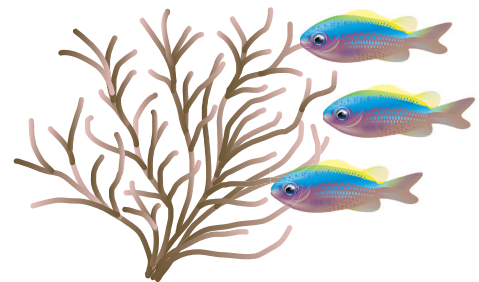
LESSON 3

Reef Threat Survey #4 - Climate Change

Name _____ Date _____

Directions: Carefully observe the drawing and record questions you might ask about the events you see that show climate change. Can you make a hypothesis that will help you research and answer one of your questions?



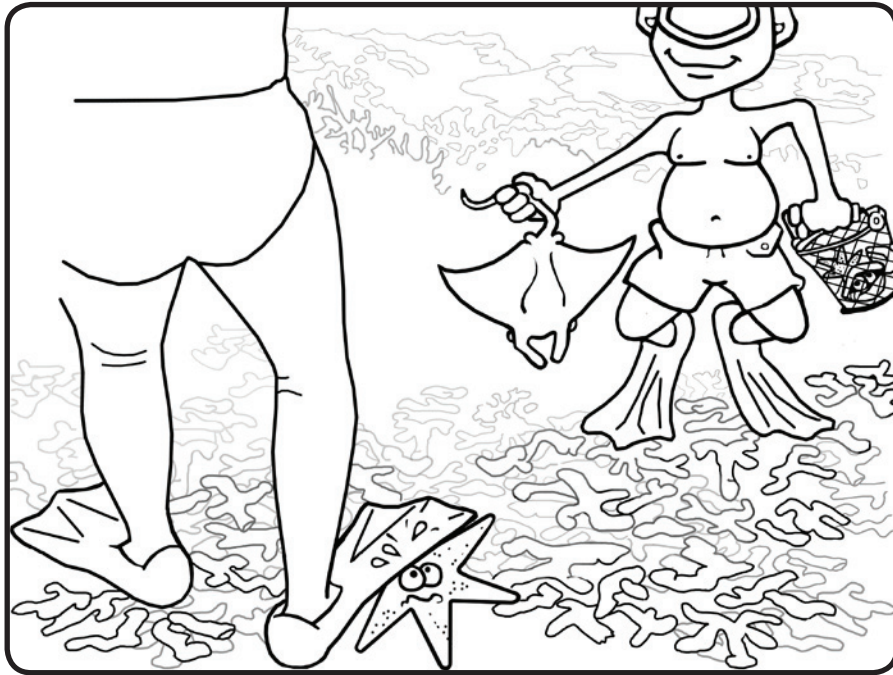


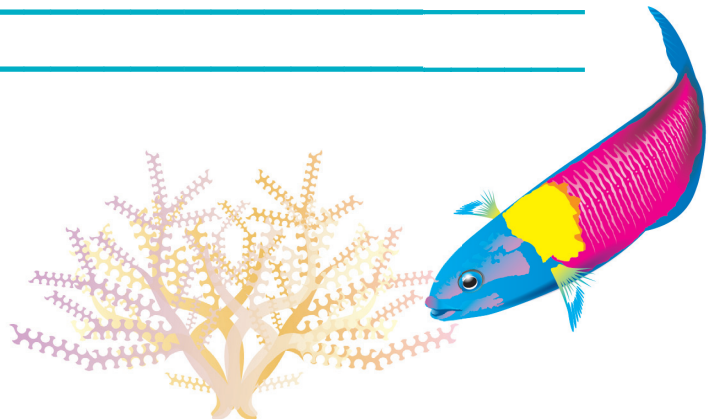
LESSON 3

Reef Threat Survey #5 - Careless Recreation

Name _____ Date _____

Directions: Carefully observe the drawing and record questions you might ask about the events you see that show careless recreation. Can you make a hypothesis that will help you research and answer one of your questions?



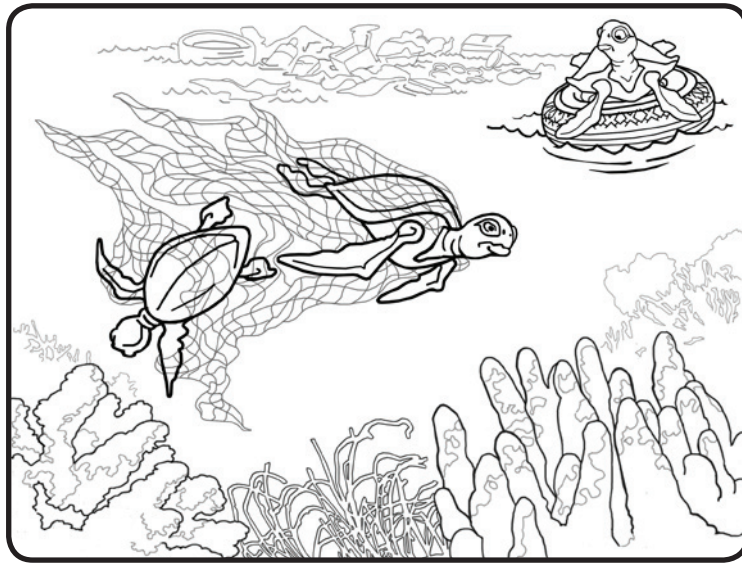


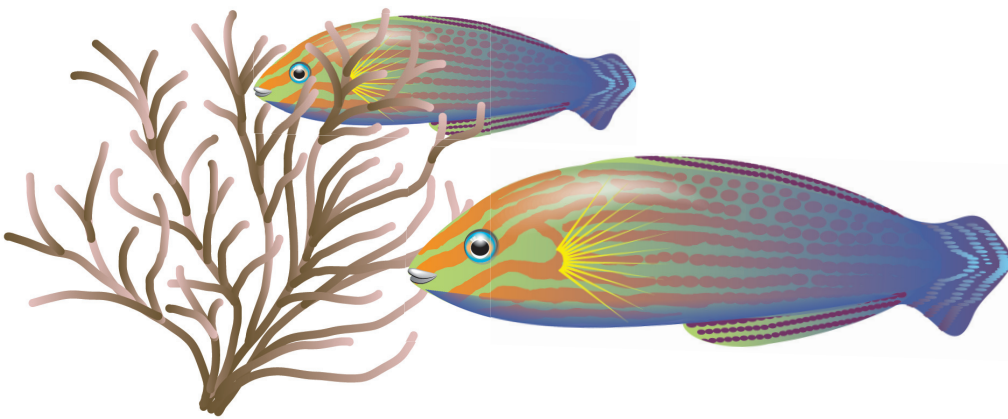
LESSON 3

Reef Threat Survey # 6 - Marine Debris

Name _____ Date _____

Directions: Carefully observe the drawing and record questions you might ask about the events you see that show marine debris. Can you make a hypothesis that will help you research and answer one of your questions?





LESSON 3

Human Impact on Coral Reefs Information Sheet Group 1: Sedimentation

Instructions:

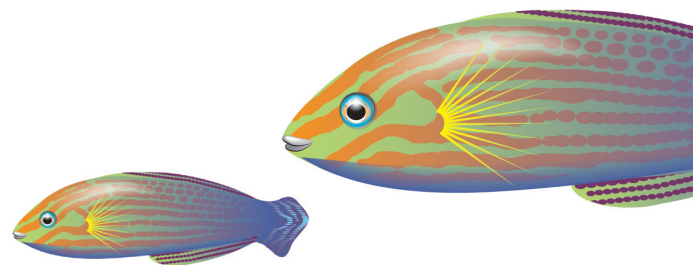
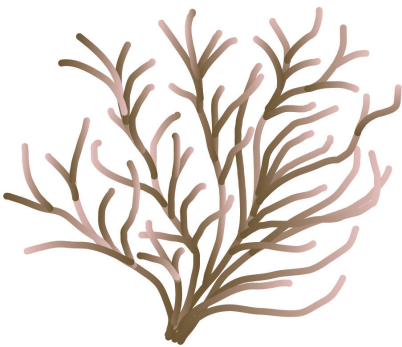
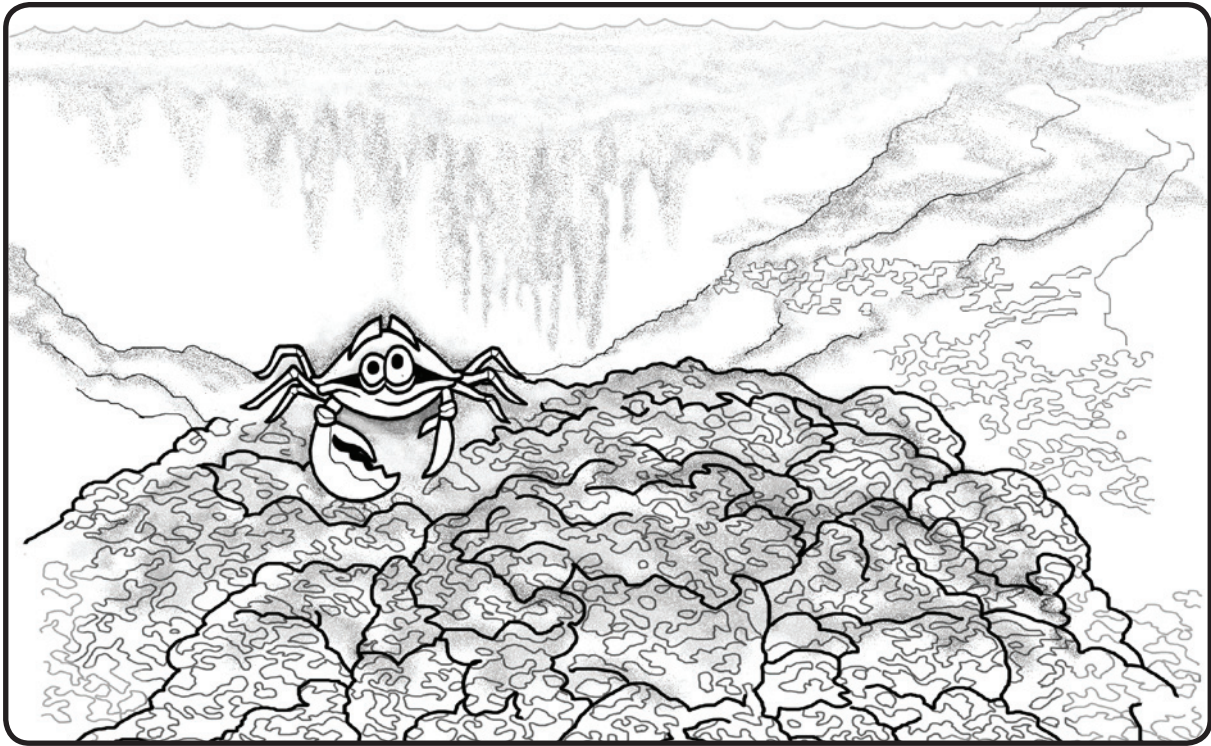
Use the following information to help answer your questions and hypothesis

Sedimentation occurs when sediments found on land (soil, silt, and sand) enter the ocean causing the water to become very murky. Sediment can be blown into the ocean by the wind, or washed into the ocean when it rains. During a storm, rainwater flows downhill into rivers and streams, and eventually enters the ocean. This water is called runoff, because it is “running off” the land. Storm water runoff washes sediments from land into the ocean.

The activities of people near the shore can cause sedimentation. Clearing land to build roads, homes, resorts, and other buildings along the coast loosens the soil and other sediments. Plowing the land to grow large crops on farms or in gardens also loosens sediments. Wind and rain carry the loosened sediments from the construction sites and farms to the ocean. Sediments are also loosened from land by dredging (scooping up the seafloor) during construction of seawalls, docks, harbors, and marinas. Waves and currents carry this sediment to the coral reef.



Sedimentation is a major threat to the coral reef habitat. Clearing land to build roads, homes, resorts, and other buildings along the coast removes important trees and other plants that hold the soil in place, and keep it from getting washed into the ocean. When sediment covers the coral reef, it blocks sunlight from reaching the algae (*zooxanthellae*) in coral polyps. *Zooxanthellae* need sunlight to make food for the coral to survive. If the coral cannot remove all of the sediment with its protective mucous layer, it may starve. This can take away food and shelter from other reef animals that depend on coral for survival. Sedimentation affects the entire coral reef habitat!



LESSON 3

Human Impact on Coral Reefs Information Sheet Group 2: Water Pollution

Instructions:

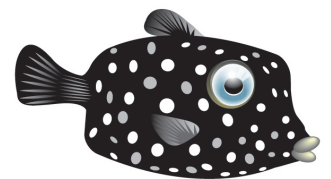
Use the following information to help answer your questions and hypothesis.

Harmful materials used by people on land and at sea can enter the ocean and cause the water to become polluted. During a storm, rainwater flows downhill into rivers and streams, and eventually enters the ocean. This water is called runoff, because it is “running off” the land. Storm water runoff washes harmful materials people use on land into the ocean.

Businesses and households use harmful materials every day that are carried to the ocean as runoff. Farms, golf courses, resorts, and homes use chemicals to help plants grow (fertilizers), chemicals to control insect problems (pesticides), and chemicals to kill weeds (herbicides). Petroleum products, such as oil and gas, can leak from cars, and be washed into the ocean during rains. Storm water runoff can also carry many pollutants including animal waste from farms. The detergents (soaps and chemicals) people use to wash their cars can run off into the ocean. Water pollution is also caused by boats, which can dump or leak oil, fuel, sewage, and other harmful materials into the ocean.

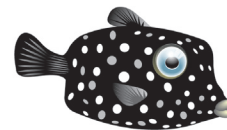


Water pollution is a major threat to the coral reef habitat. Harmful materials that are spilled into the ocean by boats, dumped down storm drains, or carried to the ocean from land after it rains are threats to the coral reef habitat. Coral polyps need clean water to survive and will release their *zooxanthellae* if they become stressed (uncomfortable) by water pollution. Fertilizers and sewage (from people and animals) add extra nutrients to the seawater, causing algae on the reef to grow very quickly. Too much algae can block sunlight from reaching the *zooxanthellae* inside coral polyps. Reef organisms depend on corals for food and shelter. Corals depend on the *zooxanthellae* in the coral polyps for food. *Zooxanthellae* in the coral polyps depend on the sunlight. Water pollution affects the entire coral reef habitat!



LESSON 3

Human Impact on Coral Reefs Information Sheet Group 3: Over-fishing



Instructions

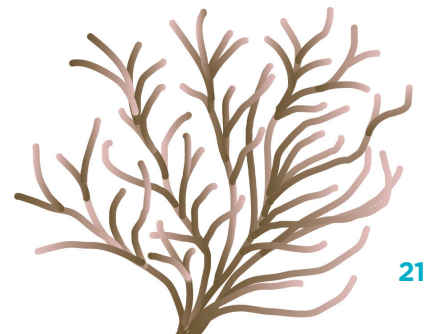
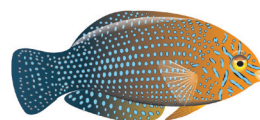
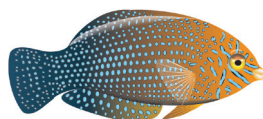
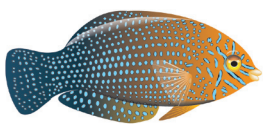
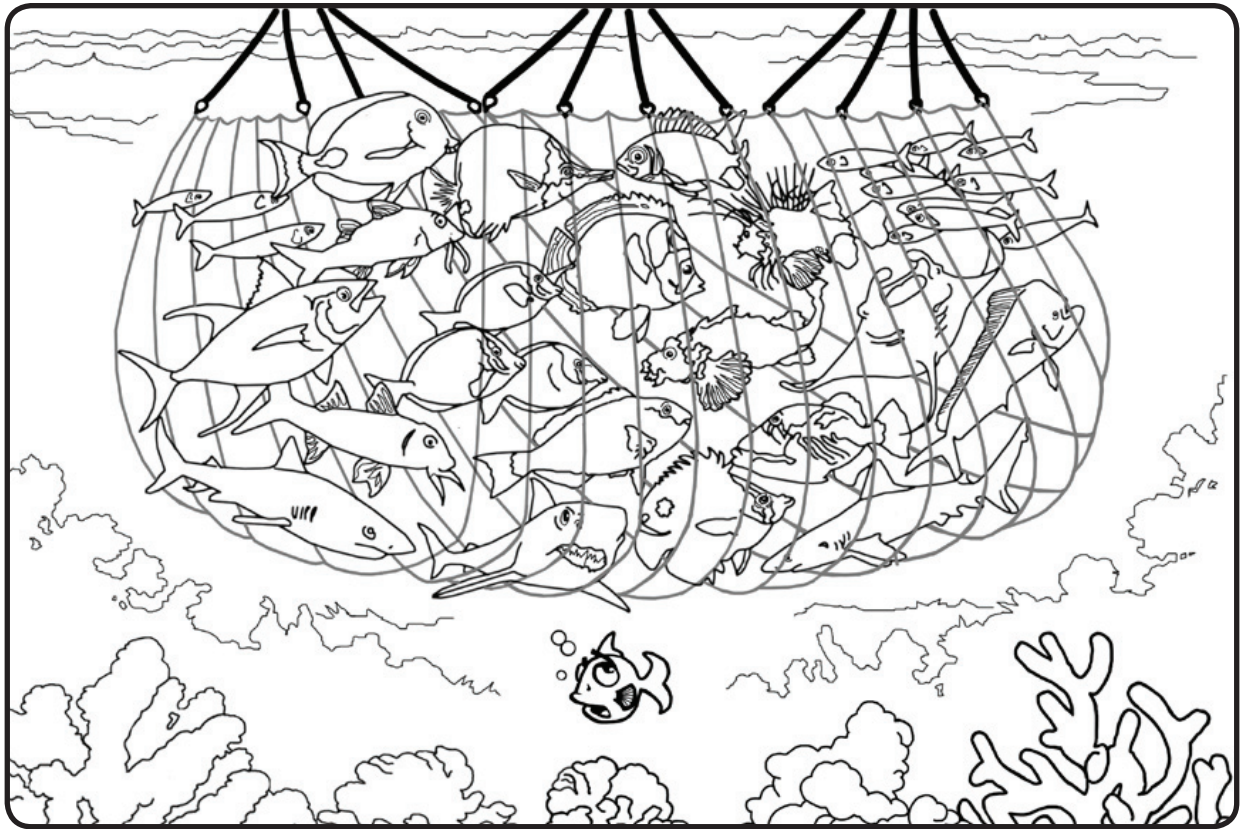
Use the following information to help answer your questions and hypothesis

Over-fishing is when people take more fish from the ocean than the ocean can produce. Fish must grow old enough to give birth, in order for more fish to be available in the ocean. People catching (or collecting) too many young and old fish, so that the fish population gets smaller and smaller, cause *over-fishing*. People catch, or collect fish for food, entertainment, or to place them in aquariums.

Large fishing boats catch fish that people buy in stores and restaurants all over the world. These boats use big nets, and long lines with many hooks, to catch tons of fish in a short period of time. In some areas, fishermen use poisons and dynamite to capture fish. When they spray the poison (cyanide), or blow up the water with dynamite, it stuns the fish, which rise to the surface where they can be easily collected. People fishing from land, canoes, kayaks, small boats, or diving can also take more fish than can be replaced. When many people fish in the same area of the coral reef, over time, the fish population will decrease.



Over-fishing is a major threat to the coral reef habitat. More fish are being caught to feed more people and collect for aquariums as the human population gets larger. Fish that fishermen are not trying to catch also get caught in the nets, on the hooks, and accidentally stunned by poisons and dynamite. Many of the fish thus caught are very young, and do not get the chance to grow old enough to give birth, and add to the fish population. This means there are less fish available in the ocean to provide food for other marine organisms. Some fish eat algae growing on the coral reef. When there are less of these types of fish, the algae can grow too thick, which can smother the coral reef. Over-fishing affects the entire coral reef habitat!



LESSON 3

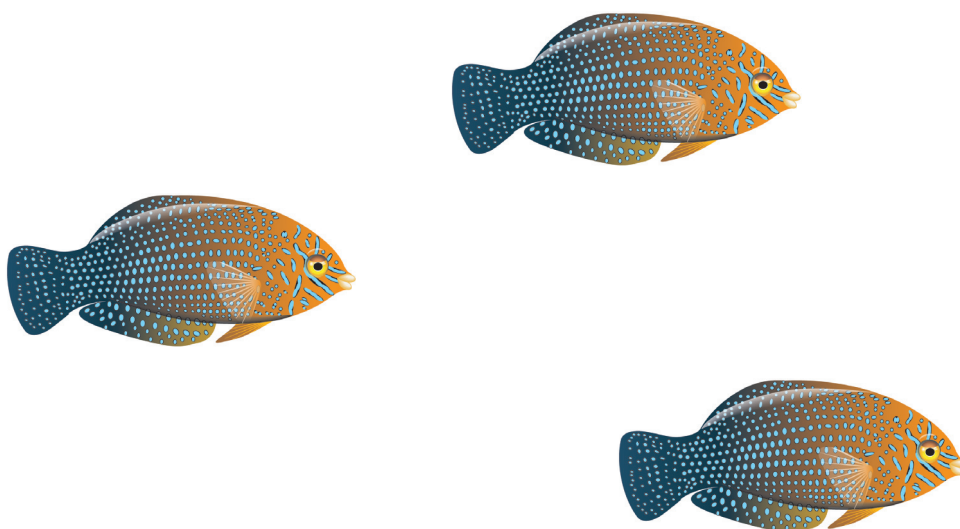
Human Impact on Coral Reefs Information Sheet Group 4: Climate Change

Instructions:

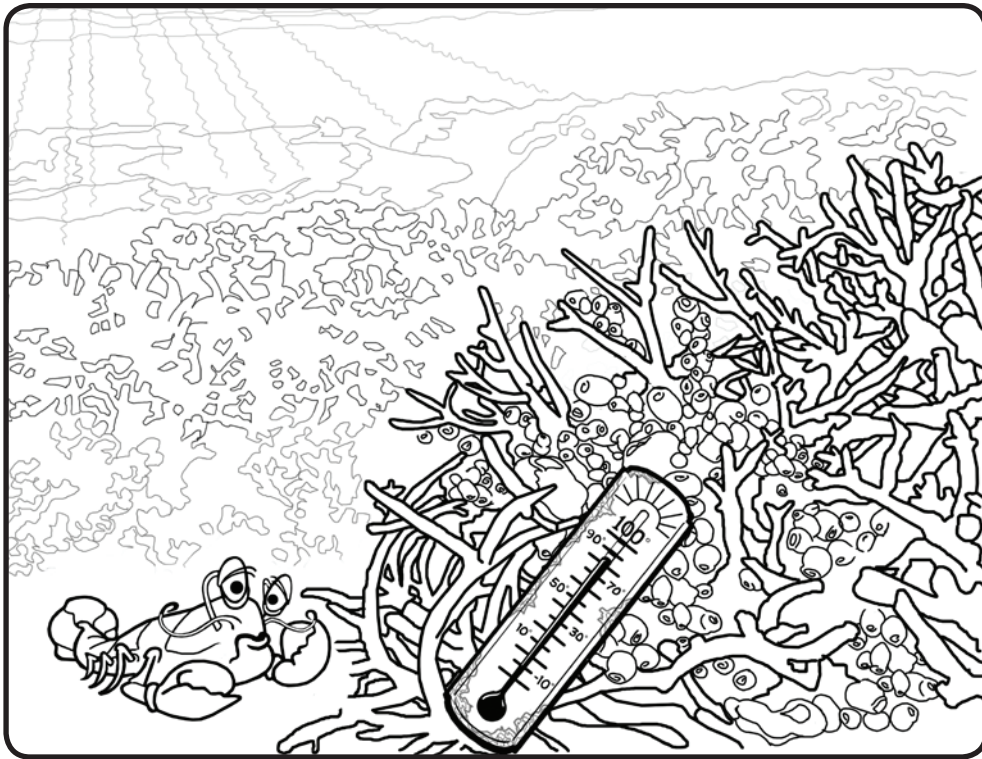
Use the following information to help answer your questions and hypothesis

The layer of air surrounding the Earth (called atmosphere) is made of different types of gases. One of these gases is carbon dioxide (CO_2). CO_2 is like a giant blanket for Earth. It traps heat from the sun, and helps keep Earth warm. Trees and other plants take CO_2 from the air, and use it to make food and oxygen. This helps to control the amount of CO_2 in the air so that Earth does not get too warm. When more CO_2 enters the atmosphere than can be removed by trees, Earth's air and water become much warmer. This is called global warming.

There are many activities that people do that put large amounts of CO_2 into the atmosphere. Automobiles, ships, factories, and power plants add CO_2 to the atmosphere by burning fossil fuels (oil and gas). CO_2 from the exhaust and smoke enters the atmosphere, trapping heat from the sun and making Earth hotter. People also cut down forests for lumber, and to clear the land to build houses, resorts, and businesses. Many scientists believe that as the Earth gets warmer, it can cause the sea level to rise and the ocean temperatures to become warmer.



Global warming is a major threat to the coral reef habitat. Rising temperatures can cause large glacial ice sheets to break off, and this raises the level of the seawater. This can be bad for coral reefs because corals need shallow water to survive. The corals that grow slowly may starve because the water is too deep for sunlight to reach them. *Zooxanthellae* (algae inside the coral polyps) need the sunlight to make food for the coral. *Zooxanthellae* also give corals their beautiful colors. If the ocean becomes too warm, it can stress the corals, and cause the polyps to release their *zooxanthellae*. This is called coral bleaching because, without colorful *zooxanthellae*, the coral appears white. Other reef organisms depend on healthy coral for habitat (food and shelter). Global warming affects the entire coral reef habitat!



LESSON 3

Human Impact on Coral Reefs Information Sheet Group 5: Careless Recreation

Instructions:

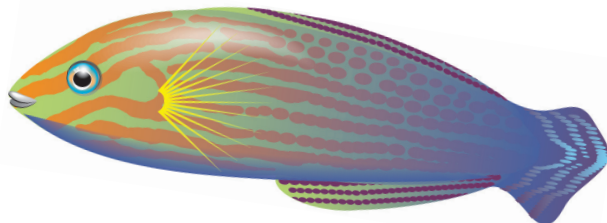
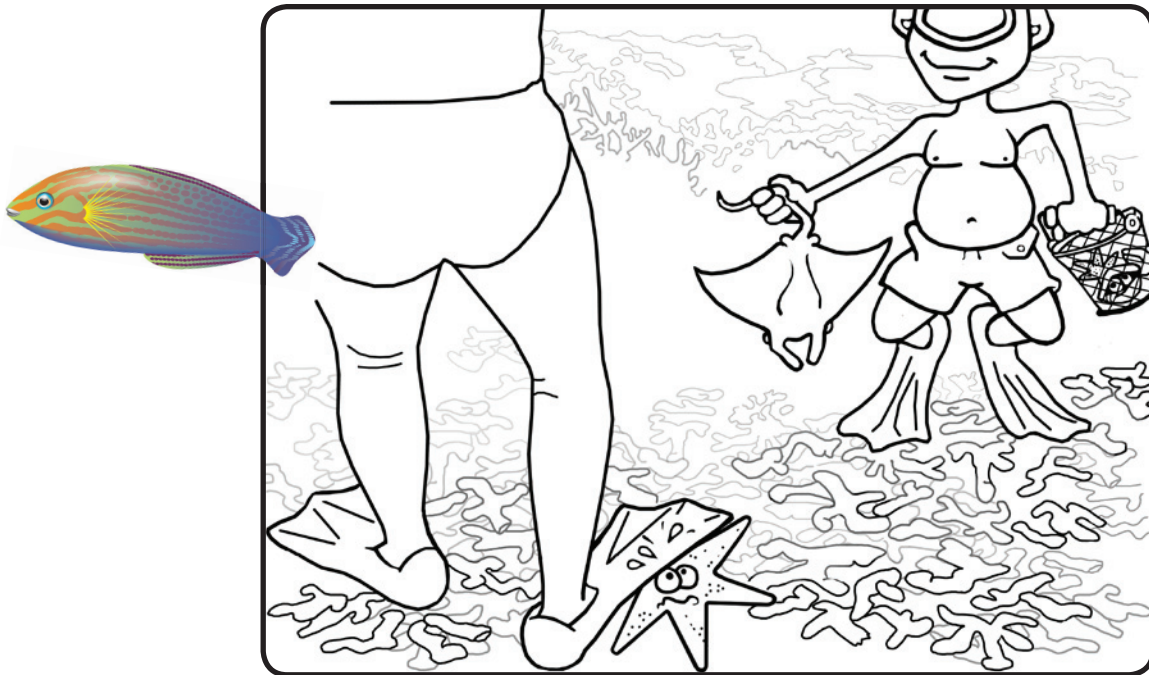
Use the following information to help answer your questions and hypothesis

The coral reef is a great place for recreation (entertainment). People from all over the world come to Hawai'i to snorkel and scuba dive to see the colorful and amazing plants and animals that live in the coral reef habitat. Other types of recreation at the reef include boating, fishing, and surfing. When people cause damage to the coral reef while having fun, either on purpose or accidentally, it is considered careless recreation.

There are many careless things people do while having fun at the coral reef. Those who SCUBA dive, snorkel, or spearfish can, if they are not careful, accidentally kick coral with their long fins. Surfers sometimes accidentally touch coral during a wipeout. People also touch coral on purpose. Divers will often hold onto coral to help stay in one place, so they can get a better look at reef animals. Snorkelers will sit, or stand on coral to rest. Fishermen walk, and stand on coral to get to the good fishing holes. People visiting tidepools, or collecting organisms, stand on or touch the coral. Boats can also be careless near the coral reef. Boats can drop heavy anchors on coral, drive over the coral in shallow water, or lose control and crash into the reef.



Careless recreation is a major threat to the coral reef habitat. Careless boating, diving, fishing, and other types of recreation can cause damage to coral reefs, especially in areas where many people visit. When people kick, touch, or stand on the reef, it can break off pieces of coral or crush the fragile coral polyps. Corals need the zooxanthellae to make food, and other reef animals depend on the coral for food and shelter. Touching coral also can scrape off the protective mucous layer coral needs to help remove sediment and protect against disease. When coral is damaged or dies, there is less habitat (food and shelter) available for other reef organisms. Careless recreation affects the entire coral reef habitat!



LESSON 3

Human Impact on Coral Reefs Information Sheet Group 6: Marine Debris

Instructions:

Use the following information to help answer your questions and hypothesis.

Marine debris is rubbish (made by people) that is dumped or washed into the ocean. Litter left on the streets, beaches, and on mountains by careless people can be blown into the ocean by the wind, or washed into the ocean during heavy rains. Can you think of types of litter seen on streets and beaches? Which litter might get blown, or washed into the coral reef habitat?

Much marine debris is dumped into the ocean near shore by small boats, or far from shore by large ships and fishing boats. Fishing gear and other litter from boats is blown, or dumped overboard into the ocean. Fishing boats catch the fish people buy in stores and restaurants with large gill nets and long fishing lines. These nets and lines can be lost, or dumped at sea. Ocean currents bring marine debris to the Hawaiian Islands from all over the world.

Marine debris that ends up in the coral reef habitat can cause damage to the reef, and the organisms that live there. Marine debris can cover the reef, blocking sunlight from reaching the algae (zooxanthellae) inside the coral that polyps need to make food. Fishing nets and lines can drag across the reef causing large areas of coral to be damaged. This can take food and shelter away from reef organisms. Monk seals, sea birds, and sea turtles depend on the reef for food. They often get entangled in marine debris (fishing nets, fishing lines, plastic bags, and six-pack holders) attached to the reef. If they cannot get free, these animals will starve (cannot move to capture food), or drown (cannot move to the surface to breathe). Some animals mistake plastic and other floating marine debris for food. They can get very sick, and often die from eating marine debris.

