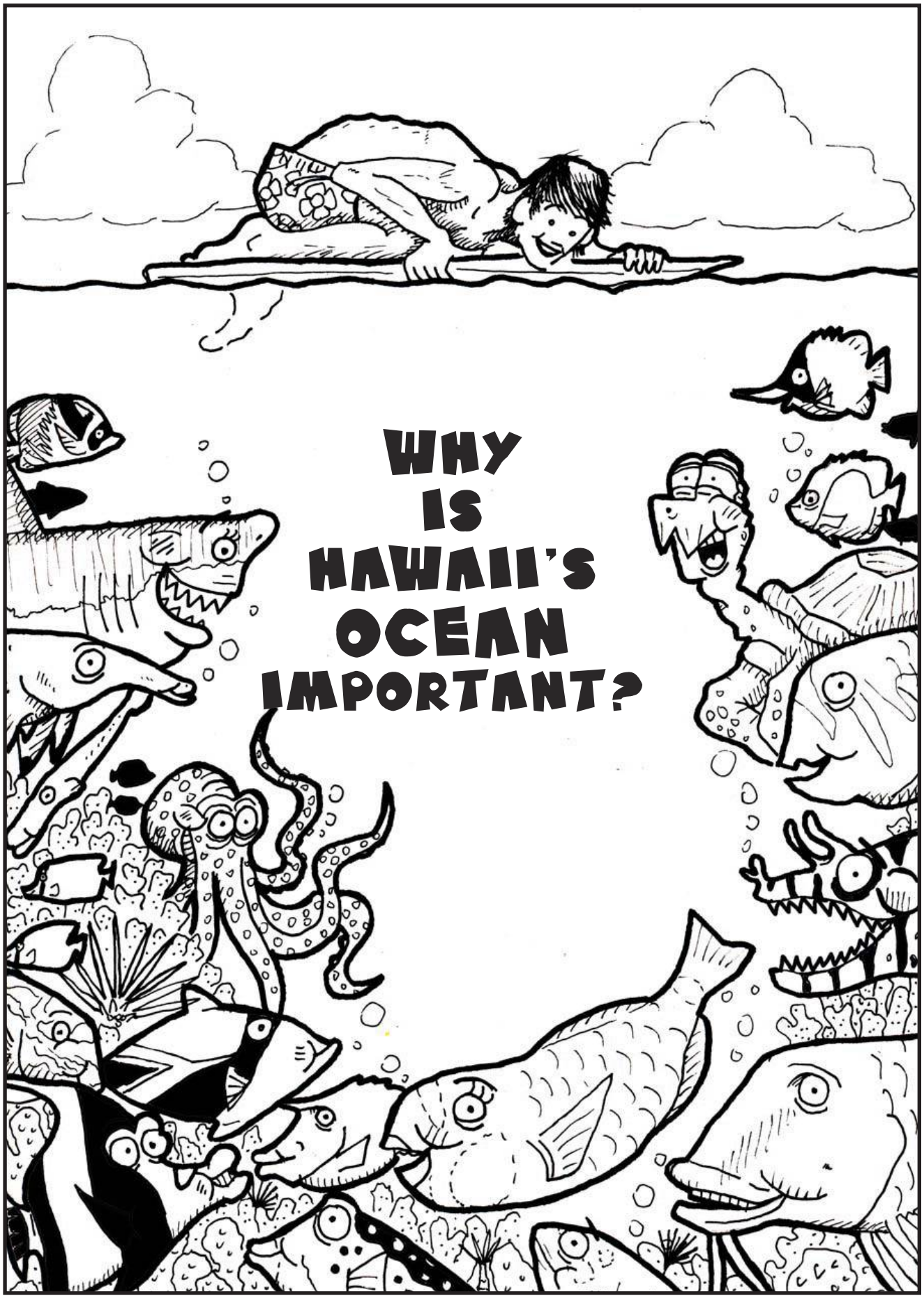


ILLUSTRATION BY BEN LUEDERS

A KEIKI ACTIVITY BOOK

WHY IS HAWAII'S OCEAN IMPORTANT?

TOOTHPASTE, POKE, PUKA SHELL NECKLACES, MEDICINE AND RAIN ARE JUST SOME OF THE THINGS THAT COME FROM THE OCEAN.

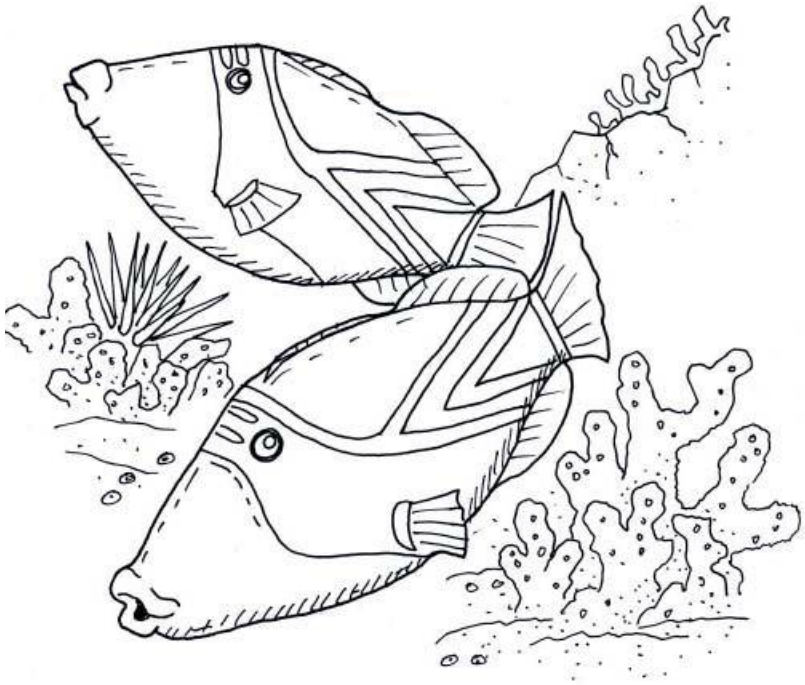
IN MANY WAYS--MORE THAN WE KNOW--WE ARE CONNECTED TO THE OCEAN. WITHOUT IT, WE COULD NOT SURVIVE. AND GUESS WHAT? THE OCEAN DEPENDS ON US TOO!

EVERYTHING WE DO, INCLUDING WATERING THE GRASS, THROWING AWAY RUBBISH AND SNORKELING, HAS A HUGE EFFECT ON THE SEA AND THE CREATURES WHO LIVE THERE.

ANYTHING THAT GOES DOWN A DRAIN IN YOUR HOUSE OR NEIGHBORHOOD EVENTUALLY MAKES ITS WAY TO THE OCEAN.

GRABBING OR STANDING ON CORAL CAN KILL IT, NOT TO MENTION THREATENING THE ANIMALS AND PLANTS LIVING THERE.

IT'S EASY TO SEE THAT BY TAKING GOOD CARE OF THE OCEAN, WE TAKE GOOD CARE OF OURSELVES.



HUMUHUMUNUKUNUKUAPUAA (BEN LUEDERS)

WHAT IS WRONG WITH THIS REEF?

CAN YOU FIND AND COLOR 21 THINGS WRONG WITH THIS REEF?

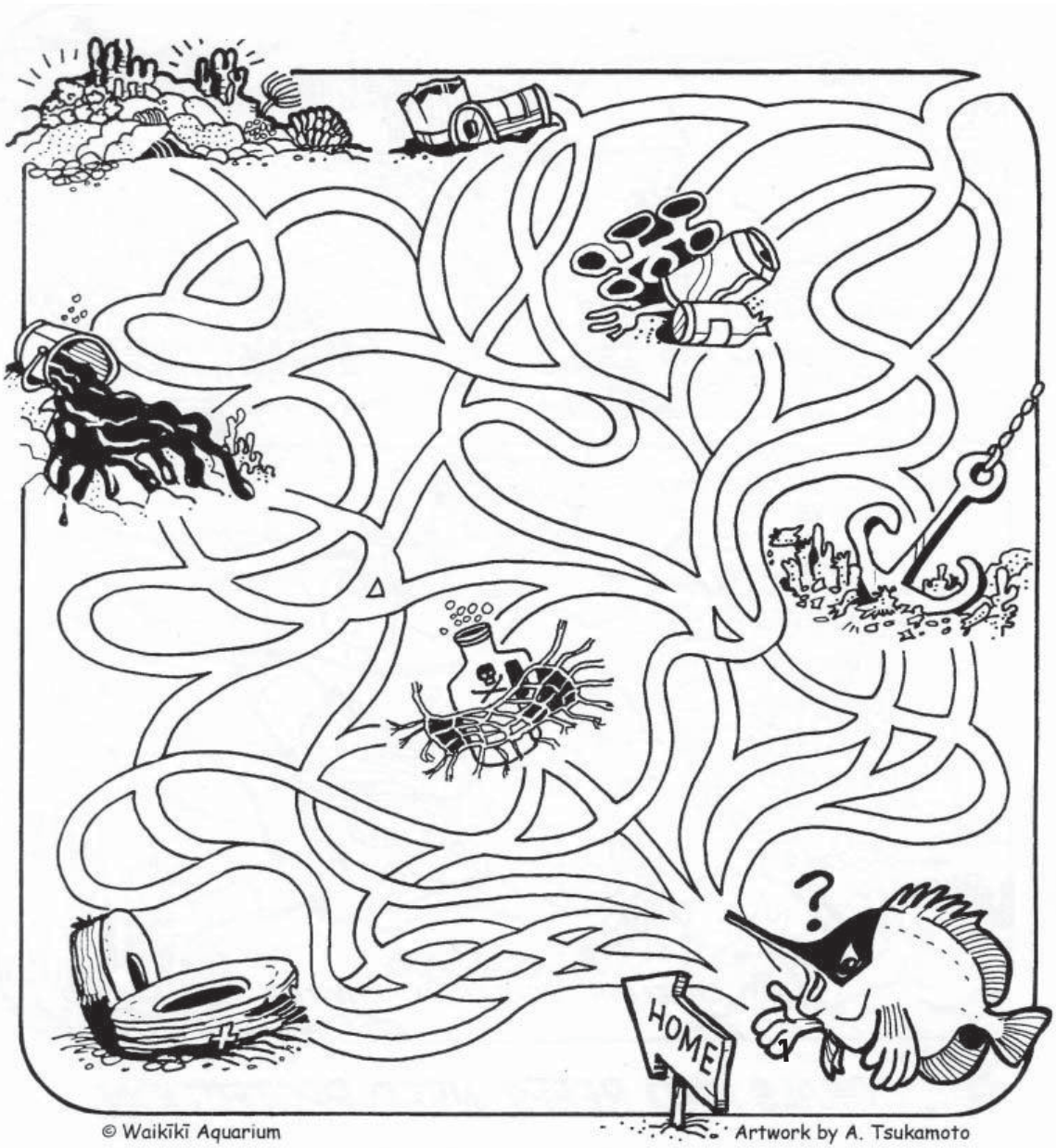
ANSWERS ARE AT THE BOTTOM OF THIS PAGE.

MARINE DEBRIS (BEN LUEDERS)

Answers: baseball, surfboard, hat, tire, 2 bottles, clock, bottle cap, fishing pole, snorkel mask, golf ball, anchor, barrel of toxic waste, 6-pack plastic ring, glasses, broom, soda can, football, rubber slipper, boot, hammer, nails

KEEP OUR OCEAN CLEAN

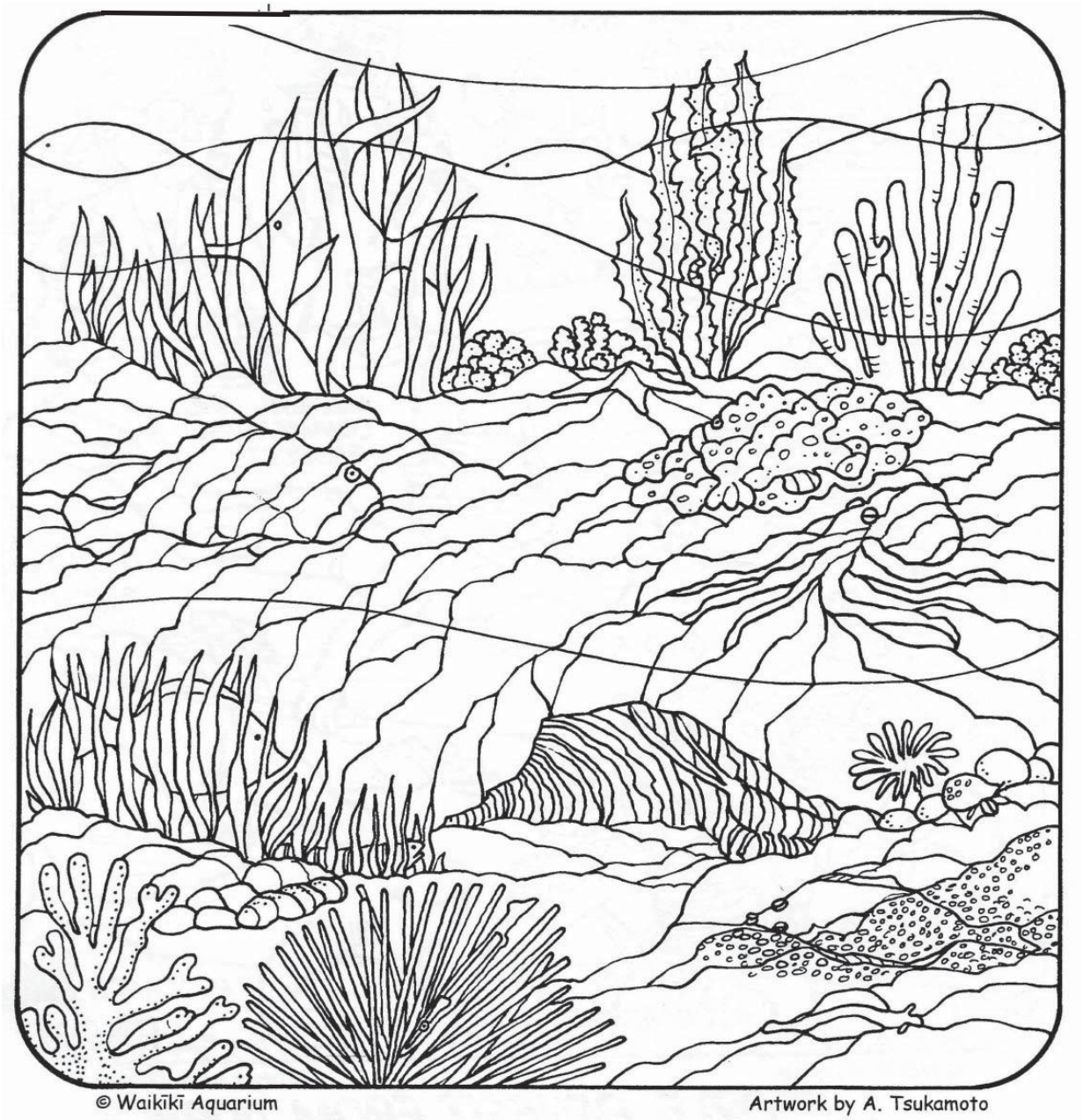
HELP THE LAUWILIWILINUKUNUKUOIOI FIND ITS WAY HOME WHILE KEEPING AWAY FROM THE POLLUTION.



Artwork by A. Tsukamoto

THE REEF IS ALIVE!

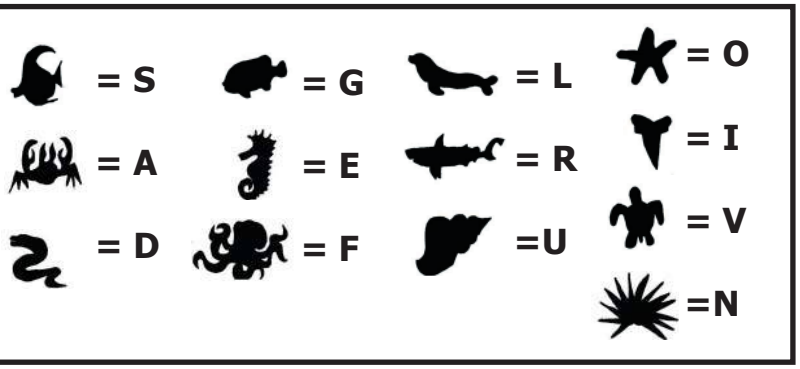
CORALS ARE LIVING ANIMALS, NOT ROCKS. CAN YOU FIND AT LEAST 12 ANIMALS LIVING AMONG THE CORAL AND ALGAE?

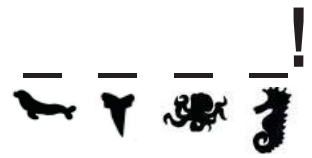


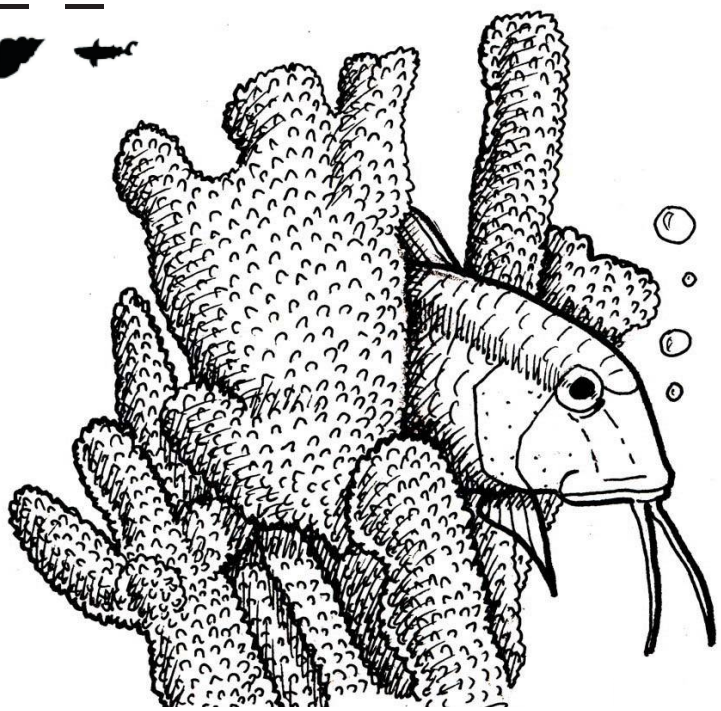
Answers: wrasse (3), moorish idol, sea star, sea horse, trumpetfish, scorpionfish, anglerfish, octopus, surgeonfish, lizardfish, spiny lobster, featherduster worm, hermit crab, coral goby, shrimpfish, flounder, sea slug and more.

SECRET CODE

UNLOCK THE SECRET MESSAGE HIDING IN THESE SPECIAL CODE SYMBOLS. USE THE CHART ON THE RIGHT TO REPLACE THE SHAPES BELOW WITH THE LETTER EQUAL TO IT.







GOATFISH (BEN LUEDERS)

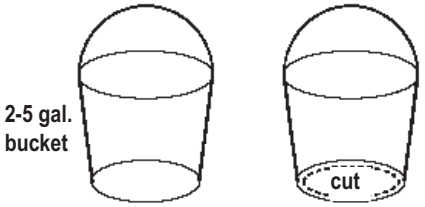
Answer: A living reef gives our islands life!

MAKE A LOOK BOX

IMPORTANT: THIS ACTIVITY REQUIRES THE HELP OF A RESPONSIBLE ADULT. WHEN USING THE BOX PLEASE TAKE CARE NOT STEP ON THE CORAL. HAVE FUN AND ENJOY OUR BEAUTIFUL OCEAN!

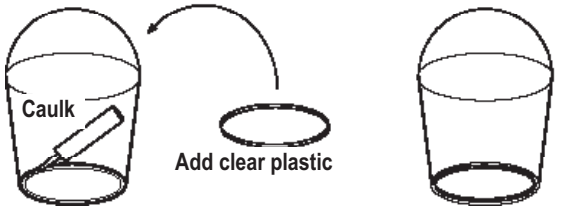
1. Determine the size of the look box. For children, we favor 1 gallon buckets. Adults may wish to have a 2 - 5 gallon bucket. You can get these buckets* from paint or hardware stores.

***Other options exist as well. Kitchen buckets are often too flimsy and containers with low edges tend to swamp, but plastic flower pots and other tall-sided containers make acceptable look boxes.**



2. Cut out the bottom of the bucket with a coping or thin bladed saw. Leave a ¼ - ½ inch lip.

3. Lay down a bead of clear silicone caulk on the inside of the lip.



4. Insert a piece* of clear acrylic (e.g., Plexiglas ®) or plastic. Press down to get a good seal. You do not have to clean up the excess caulk that squeezes out (it will probably just smear anyway).

***You can get a piece of 3/16 inch acrylic cut to your required dimensions via any of the local plastic companies. Check the Yellow Pages for companies or you can cut your own sheet of plastic purchased from a hardware store.**

5. Allow the caulk to dry for 24 hours.

6. Check for leaks by filling the bucket. If it leaks, you can either start over or add a bead of caulk to the inner and outer edges of the acrylic. Remember to treat all marine life with respect. If you do use the look box for holding marine life, place only one animal in the bucket at a time.

*** BE A GOOD REEF VISITOR AND HAVE FUN! ***

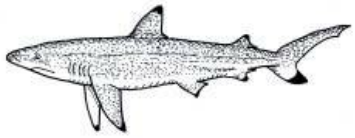
NORTHWESTERN HAWAIIAN ISLANDS WORD SEARCH

HOW MANY OF THESE WORDS CAN YOU FIND? WORDS CAN BE BACKWARDS, FORWARDS, DIAGONAL AND, EVEN, BACKWARDS AND DIAGONAL.

ISLANDS
KURE
LAYSAN
MOKUMANAMANA
PEARL

GEOLOGY
ATOLL
CORAL
SAND
SEA MOUNT
VOLCANO

PLANTS AND ANIMALS
LIMU
LOULU
MONK SEAL
SANCTUARY



M	N	A	S	Y	A	L	V	A	S	L	K
B	O	A	L	A	K	O	Q	L	A	L	U
S	N	K	E	R	L	N	A	E	N	O	R
D	C	S	U	C	A	R	O	Z	C	T	E
L	A	W	A	M	O	E	G	G	T	A	I
L	L	N	G	C	A	D	P	O	U	L	G
V	O	S	T	N	D	N	Q	P	A	A	V
H	G	U	E	E	E	W	A	X	R	C	N
X	R	O	L	U	M	I	L	M	Y	S	J
G	M	B	S	U	Y	J	W	D	A	L	W
P	O	L	A	E	S	K	N	O	M	N	N
S	E	A	M	O	U	N	T	W	H	K	A

MARK HECKMAN

BLACKTIP REEF SHARK AND LIMU KOHU (BEN LUEDERS)

NORTHWESTERN HAWAIIAN ISLANDS WORD SEARCH ANSWERS

ISLANDS

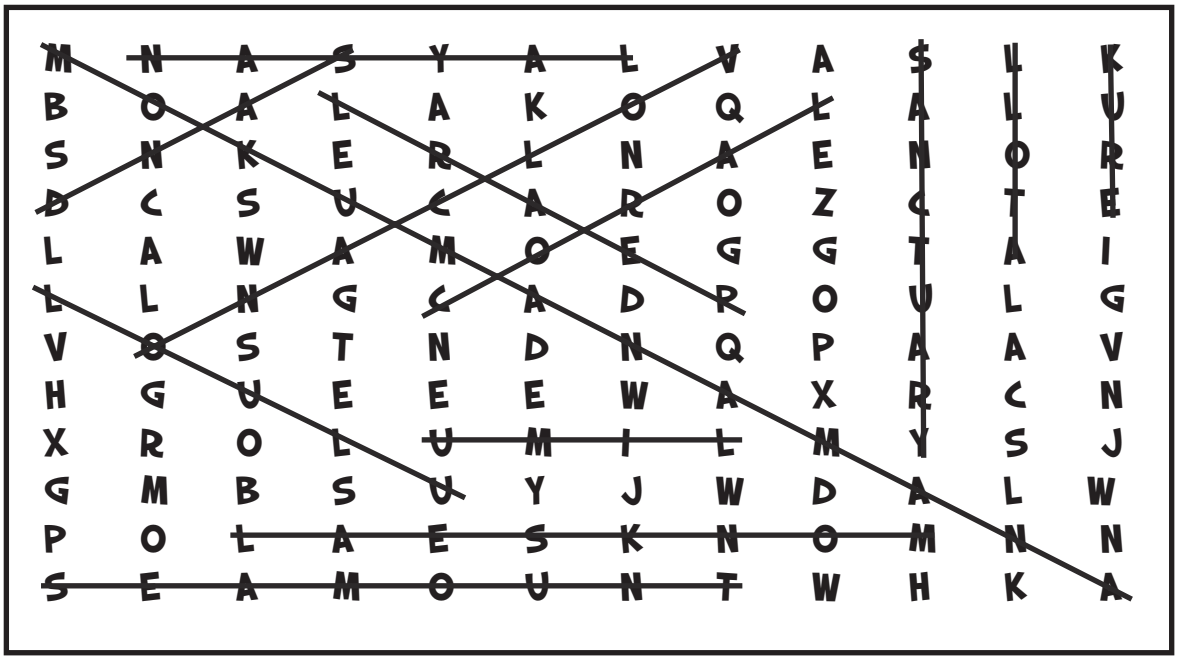
KURE ATOLL IS THE LAST IN THE CHAIN AND A TRUE ATOLL.
LAYSAN ISLAND HAS ONE OF FIVE NATURAL LAKES IN THE STATE.
MOKUMANAMANA IS THE ORIGINAL HAWAIIAN NAME FOR NECKER ISLAND, ONE OF THE FIRST TWO ISLANDS IN THE NORTHWESTERN HAWAIIAN ISLAND CHAIN.
PEARL AND HERMES REEF IS ONE OF THE MORE NORTHERN IN THE CHAIN. HAWAIIAN PEARL OYSTERS WERE HARVESTED HERE UNTIL TOO MANY WERE TAKEN.

PLANTS AND ANIMALS

LIMU IS THE HAWAIIAN WORD FOR SEAWEED.
LOULU PALMS ARE ENDEMIC TO HAWAII.
THE HAWAIIAN MONK SEAL IS ENDEMIC TO HAWAII.
SANCTUARY IS A SAFE PLACE FOR PLANTS AND ANIMALS TO LIVE.

GEOLOGY

ATOLL IS A RING-SHAPED CORAL ISLAND THAT ENCLOSES A LAGOON.
CORAL IS AN ANIMAL THAT CREATES A HARD SKELETON. A COLLECTION OF CORAL CAN FORM REEFS OR ISLANDS.
WHITE SAND IS MADE UP OF GROUND UP CORAL, SEASHELLS, ALGAE AND EVEN TINY SKELETONS.
SEA MOUNT IS AN ISLAND BENEATH THE SEA.
VOLCANOES CREATED THE ISLAND CHAIN BY SPILLING OUT MOLTEN LAVA.



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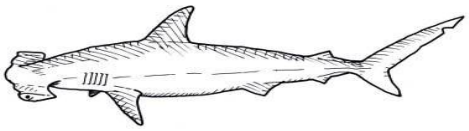
www.coastalscience.noaa.gov/education/hibook.pdf

GUESS WHOSE SHARK TEETH!

EACH SPECIES OF SHARK HAS A DISTINCT SHAPE TO THEIR TEETH. USING JUST ONE TOOTH, SCIENTISTS CAN IDENTIFY THE SHARK TO WHICH IT BELONGS!

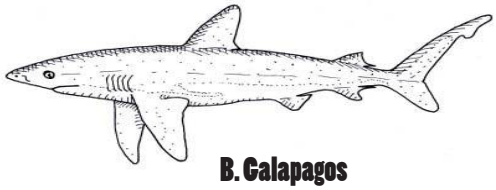
DIRECTIONS: MATCH THE SHARK TEETH ON THE LEFT TO THE SHARK THAT THEY BELONG TO ON THE RIGHT.

1.

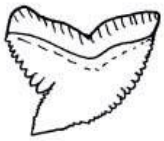


A. Scalloped Hammerhead

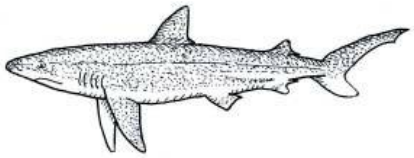
2.



B. Galapagos

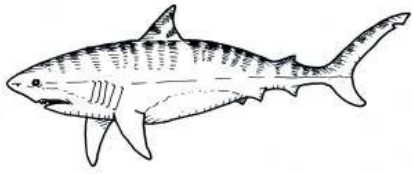


3.



C. Grey Reef

4.



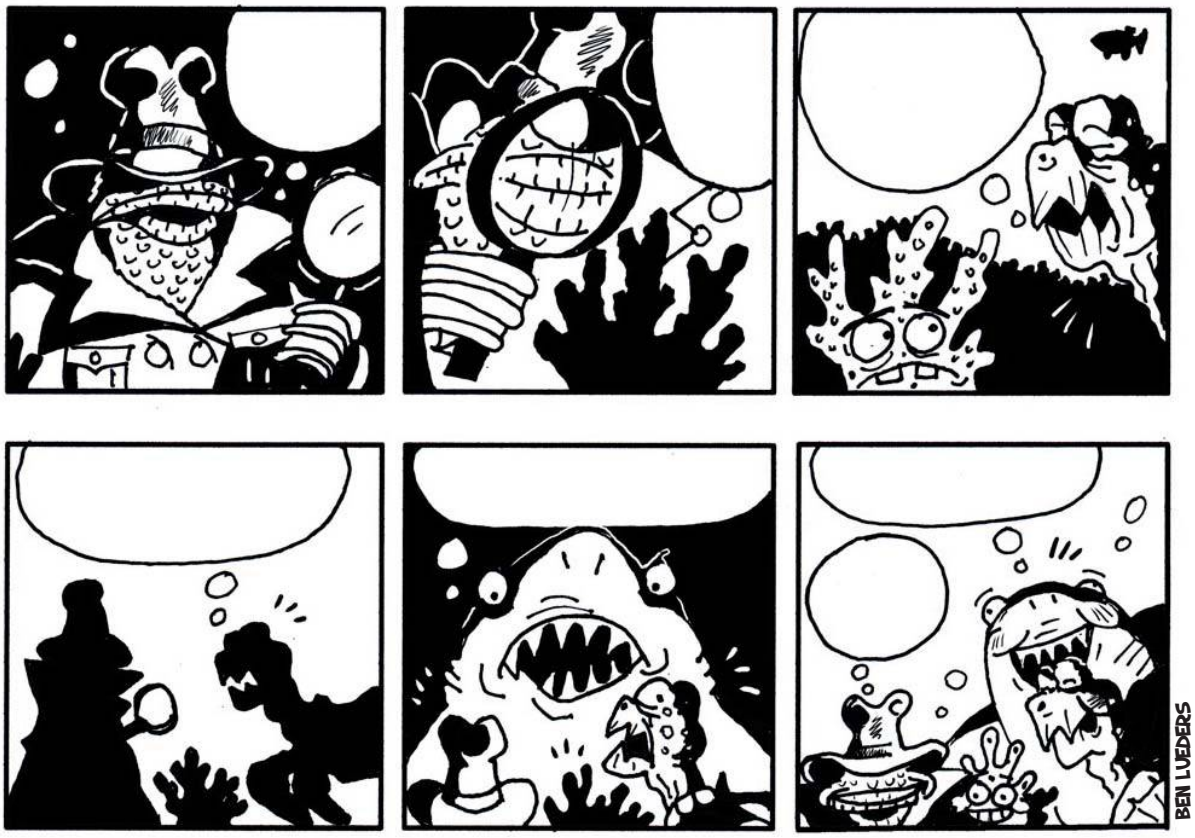
D. Tiger

ILLUSTRATIONS BY BEN LUEDERS

Answers: 1.B, 2.A, 3.D, 4.C

WRITE YOUR OWN COMIC STRIP

IF THEY COULD TALK, WHAT WOULD SEA CREATURES SAY TO EACH OTHER? TAKE A LOOK AT THIS OCEAN SCENE AND WRITE THINGS THEY WOULD SAY.



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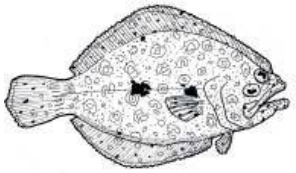
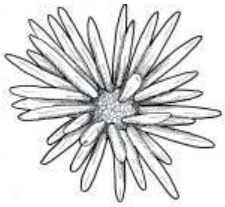
MATCHING GAME: LARVAE TO ADULT

WHEN MANY SEA CREATURES HATCH FROM THEIR EGG, THEY ARE CALLED LARVAE. OFTEN, LARVE LOOK DIFFERENT FROM THE ADULTS THEY WILL BECOME.

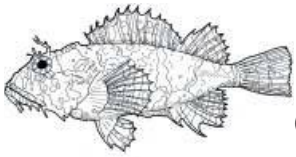
CAN YOU MATCH THE ADULTS ON THE LEFT WITH THEIR LARVAL FORM ON THE RIGHT? ANSWERS ARE AT THE BOTTOM OF THIS PAGE.



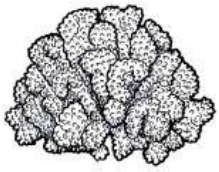
A. Flounder



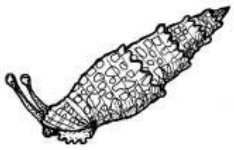
B. Pencil Urchin



C. Scorpionfish



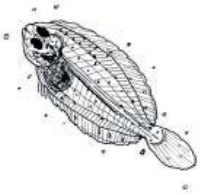
D. Cauliflower Coral



E. Sea Snail

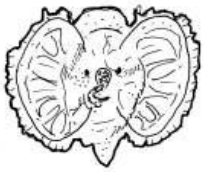
1.

2.



3.

4.



5.

Answers: A.2, B.5, C.1, D.3, E.4

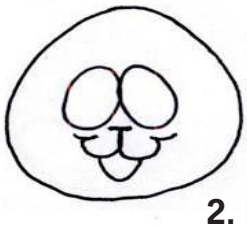
ILLUSTRATIONS BY BEN LUEDERS

HOW TO DRAW A MONK SEAL

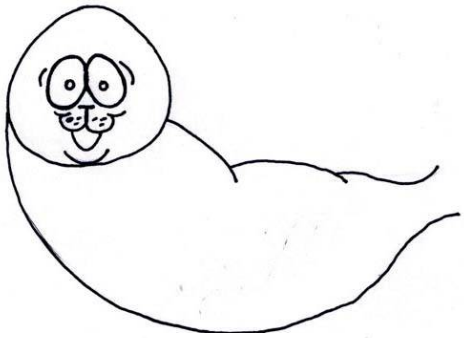
DIRECTIONS: USE A PENCIL, FOR YOU WILL HAVE TO ERASE A LINE AT THE END.WHEN YOU ARE FINISHED, YOU CAN TRACE OVER THE PENCIL LINES IN PEN OR COLOR YOUR SEAL.

1. Draw two oval eyes.

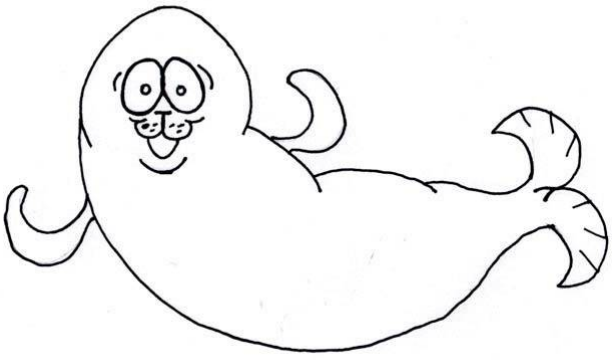
There are fewer than 1500 Hawaiian monk seals left in the world. Baby monk seals (called pups) make a "mwaa, mwaa, mwaa" sound when calm and a loud "aaah" or "gaah" when scared. Adults make a "bubbling" sound when alarmed.



2. Draw the face, nose and mouth.



3, Draw dots in and next to the eyes. Draw a chin and dots for whiskers near the nose. Draw the body.



4. Draw flippers and a tail. Erase the bottom portion of the head leaving the chin. You are finished!

ILLUSTRATIONS BY BEN LUEDERS

WHALE IDENTIFICATION

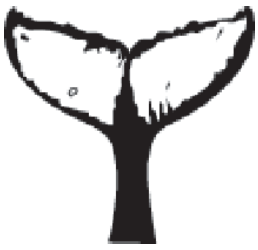
SCIENTISTS IDENTIFY INDIVIDUAL HUMPBACK WHALES BY STUDYING THEIR TAILS, WHICH ARE ALSO KNOWN AS FLUKES. THE SCALLOPING, COLOR PATTERNS AND SCARS ON THE UNDERSIDE OF THE FLUKES ARE AS UNIQUE AS YOUR FINGERPRINTS.

APPROXIMATELY 5,000 HUMPBACK WHALES MIGRATE TO THE WARM, PROTECTED WATERS OF HAWAII EACH YEAR, MAKING HAWAII A GREAT PLACE FOR WHALE RESEARCHERS TO LEARN MORE ABOUT THIS ENDANGERED SPECIES.

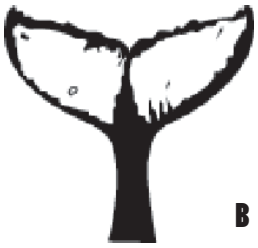
MATCH THE NUMBERED FLUKES ON THE LEFT WITH THE FLUKES ON THE RIGHT.

1

A



2



B

3

C

4

D

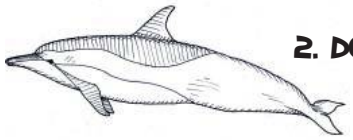
Answers: 1 D, 2 B, 3 A, 4 C

LOCAL NAMES

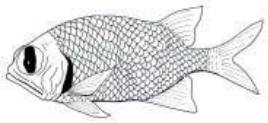
BECAUSE OF HAWAII'S MANY DIFFERENT CULTURES, SOME SEA CREATURES HAVE MANY DIFFERENT NAMES. CAN YOU MATCH UP THE CREATURES ON THE LEFT WITH THEIR LOCAL NAMES ON THE RIGHT?

*HINT: SOME OF THEM MAY HAVE MORE THAN ONE NAME. ANSWERS ARE AT THE BOTTOM OF THIS PAGE.

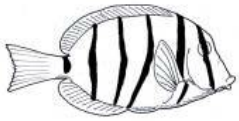
1. OCTOPUS



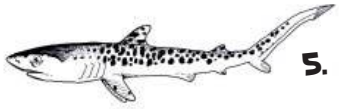
2. DOLPHIN



3. SOLDIERFISH



4. CONVICT TANG



5. TIGER SHARK (JUVENILE)

6. CODIUM EDULE

A.	NAIA (HAWAII)
B.	MANO PUELE (HAWAII)
C.	HEE (HAWAII)
D.	TAKO (JAPAN)
E.	MANINI (HAWAII)
F.	MENPACHI (JAPAN)
G.	MARRACHO TIGRE (PORTUGAL)
H.	WAWAEIOLE (HAWAII)
I.	POPOKLO (PHILIPPINES)
J.	UU (HAWAII)

ILLUSTRATIONS BY BEN LUEDERS

Answers: 1. C&D, 2. A, 3. F&J, 4. E, 5. B&G, 6. H&I

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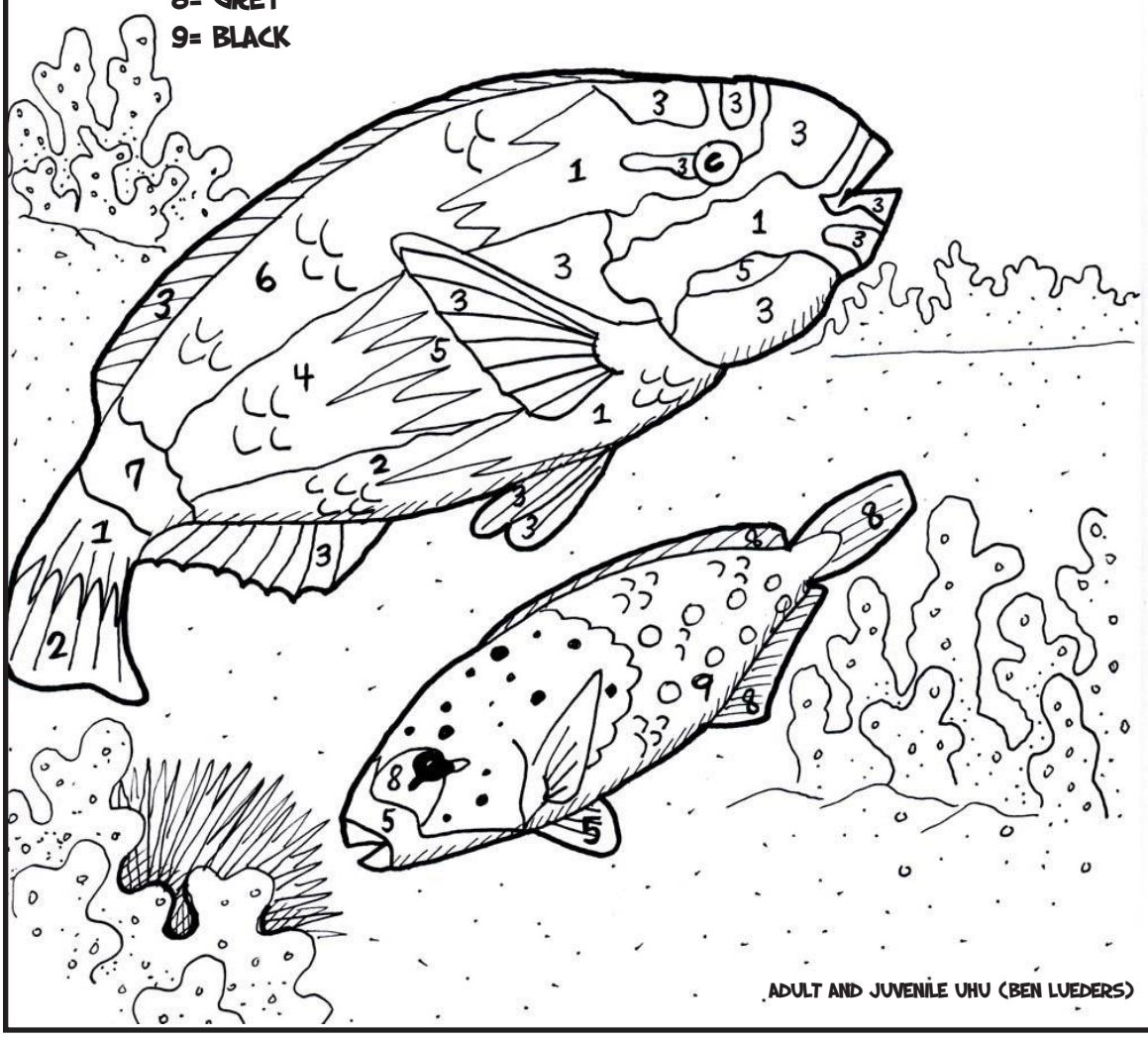
COLOR BY NUMBER

COLOR IN THIS ADULT AND JUVENILE UHU (PARROTFISH) USING THE COLOR KEY AS YOUR GUIDE.

1= CERULEAN (BRIGHT BLUE)
2= BLUE
3= TURQUOISE
4= ORANGE
5= PINK
6= LIME-GREEN
7= YELLOW
8= GREY
9= BLACK

PARROTFISH ARE A MAJOR SOURCE OF SAND. AS THEY GRAZE ON CORAL TO GET AT ALGAE HIDDEN WITHIN, SPECIAL BONES IN THEIR THROAT GRIND UP THE CORAL CHUNKS. EVENTUALLY, THE GROUND CORAL EXITS THE BACK END OF THE FISH AS SAND.



ADULT AND JUVENILE UHU (BEN LUEDERS)

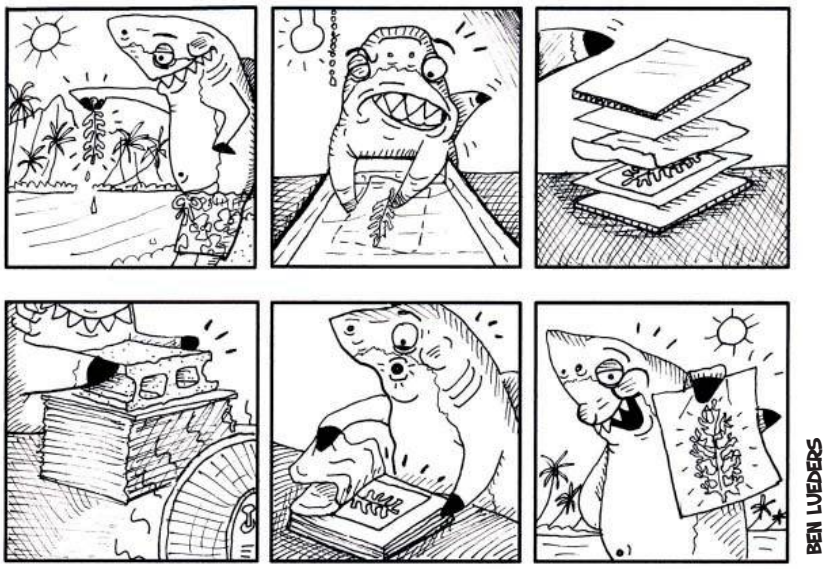
LIMU PRESS HOW TO KEEP YOUR OWN ALGAL SPECIMEN

A LONG TIME AGO, BEFORE FREEZE DRYING AND REFRIGERATION, SCIENTIFIC EXPLORERS NEEDED TO INVENT A WAY TO PRESERVE SAMPLES OF NEWLY DISCOVERED PLANT SPECIES. THIS INSPIRED THE CREATION OF THE PLANT PRESS, A METHOD THAT REMOVES WATER FROM THE PLANT.

THIS ACTIVITY USES THE BASIC PRESSING TECHNIQUES STILL USED TODAY BY SCIENTISTS. INSTEAD OF SELECTING ONLY ONE ALGA PER SHEET, YOU MAY DECIDE TO CREATE A COLLAGE OF SEAWEEDS BY ARRANGING A FEW DIFFERENT TYPES ON ONE SHEET. THIS CAN BECOME A NOTECARD, A PAPERWEIGHT, OR CAN BE FRAMED.

MATERIALS

- **pan with water**
- **paper (index cards, botany paper or heavy cardstock)**
- **waxed paper (cut into pieces to fit the card/paper; need one piece per card)**
- **old newspaper (to absorb the moisture)**
- **pieces of cloth/old sheets (cut into pieces to fit over the cards/paper)**
- **pieces of corrugated cardboard**
- **heavy weights**
- **electric fan**
- **brushes (to work the specimens)**



DIRECTIONS FOR PRESSING YOUR ALGAE ARE ON THE FOLLLOWING PAGE.

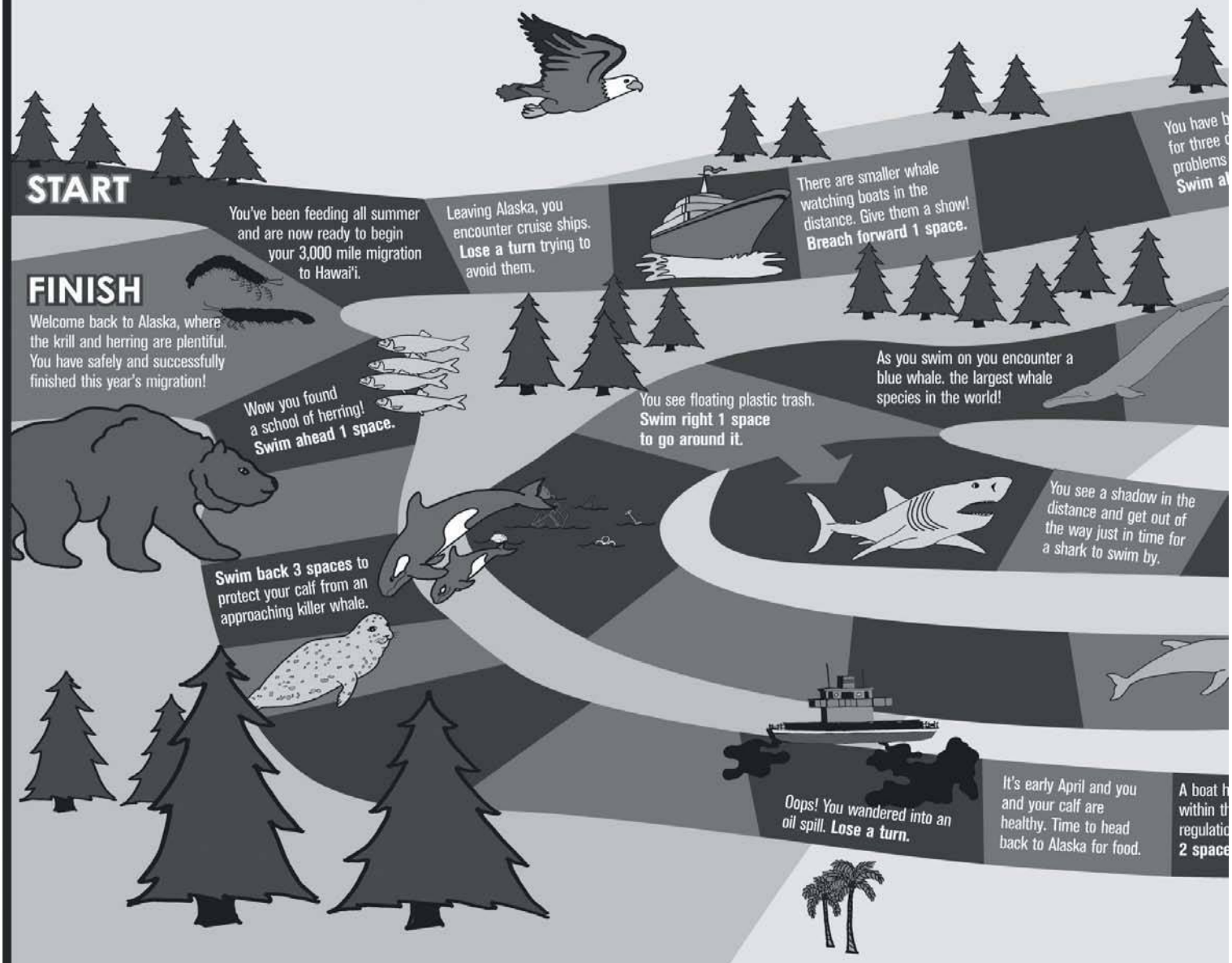
LIMU PRESS CONTINUED

1. Collect your algae. Pinch, do not pull.
2. Bring them home in fresh SEAWATER.
3. Spread newspaper on work area to keep it dry.
4. Fill pan with clean seawater (about ½ inch deep).
5. Select algae to be used.
6. Place selected algae into pan of water.
7. Put heavyweight paper in the water, under the selected algae.
8. Float the alga into place. You can spread, trim, and arrange.
9. Lift gently paper from water with the arranged algae.
10. Drain carefully as much water as possible from the paper without disturbing your arrangement.
11. Place the paper with your arrangement on a folded section of newspaper.
12. Place a piece of waxed paper over the arrangement.
13. Place a cloth over the waxed paper.
14. Place another layer of folded newspaper over the cloth.
15. Place corrugated cardboard squares on top & bottom to help dry your "sandwich".
16. Repeat this process for as many algal sheets as you have.
17. Set gently entire bundle into a plant press. (Plant presses use heavy weight on top to flatten plants.)
18. Dry the stack with air flow to avoid mold and mildew.
19. Check stack after 24 hours. Newspaper, cloth, and cardboard may need to be changed if a lot of water has been absorbed to prevent mold and mildew forming.
20. After 3-4 days, remove arrangements. Glue card onto construction paper cut about 1/4 to 1/2 inches wider and longer than arrangement sheet. (This will frame the arrangement.)

THE MIGRATION GAME

Many of the humpback whales that live in the north Pacif migrate south during the winter from feeding grounds in to warmer waters in Hawai'i to breed, calve and nurse the The Hawaiian Islands Humpback Whale National Marine Sanctuar to protect humpback whales and their habitat in Hawai'i.

Materials Needed: A die and one colored game piece for each



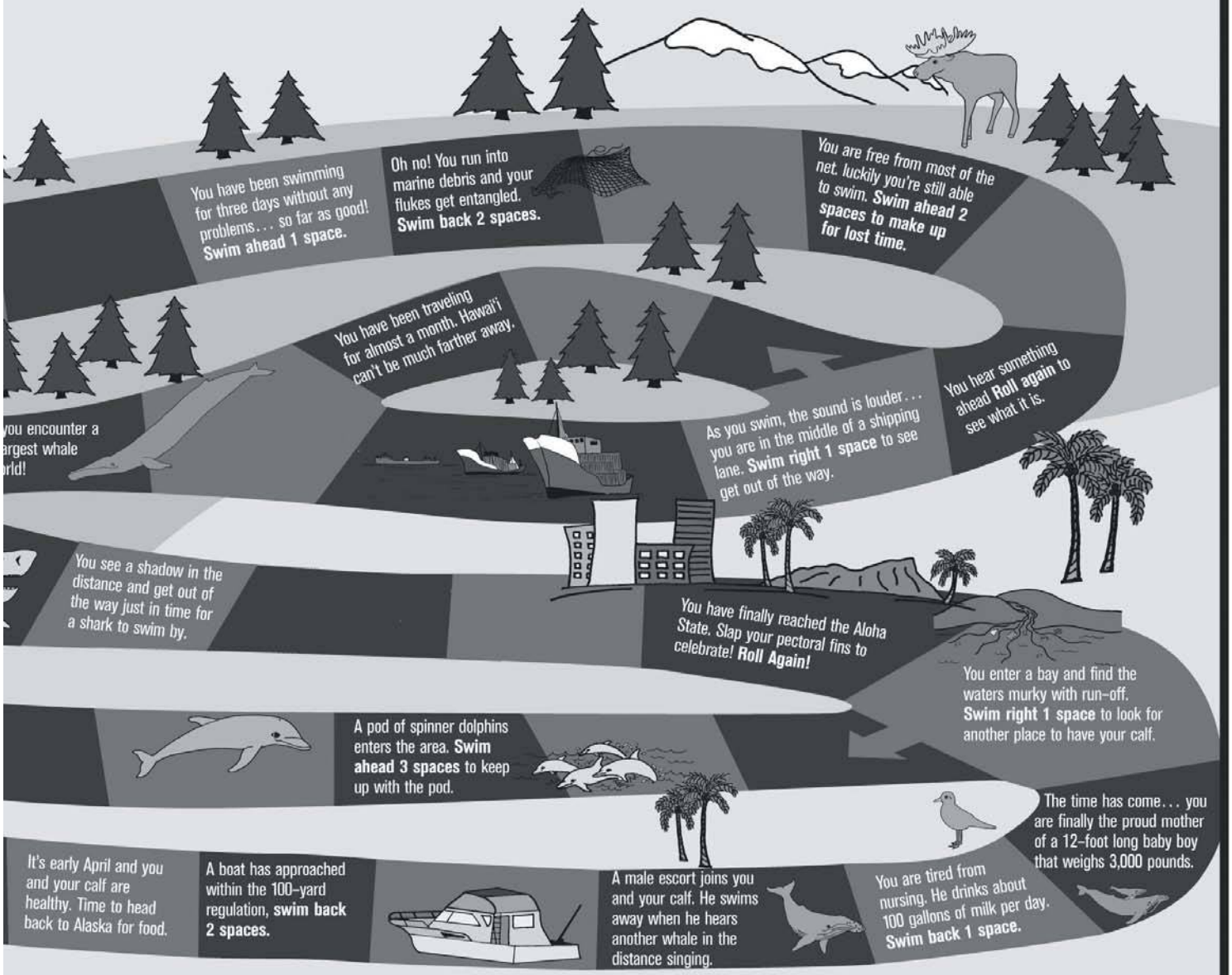
This game is geared toward ages 5–12. Caution: Game pieces you use could be a choking hazard; please keep them away from smal

Text by the Hawaiian Islands Humpback Whale National Marine Sanctuary. Adapted from "The Migra

at live in the north Pacific Ocean
rom feeding grounds in Alaska
eed, calve and nurse their young.
e National Marine Sanctuary was created
habitat in Hawai'i.

olored game piece for each person playing.

Directions: One at a time, roll the die to move your whale ahead. As you land on each space, read the message out loud. Follow the directions given. You must land on the finish space in order to win the game. Keep rolling the die during your turn until you get the right number. The first humpback whale to make it to the finish space in Alaska wins the migration game!



l; please keep them away from small children. Illustrations by **Stephanie McCarthy, Carey Morishige,** and **Christine Brammer.**
Sanctuary. Adapted from "The Migration Game", University of Alaska Sea Grant College Program.

TURTLE TRUE OR FALSE

THREE SPECIES OF SEA TURTLES ARE CONSIDERED NATIVE TO HAWAII: GREEN (HONU), HAWKSBILL (EA), AND LEATHERBACK (LAI). TWO OTHER SPECIES, THE LOGGERHEAD AND OLIVE RIDLEY ARE SOMETIMES OBSERVED IN HAWAIIAN WATERS.

TEST YOUR KNOWLEDGE OF SEA TURTLES. CIRCLE TRUE OR FALSE NEXT TO THE FOLLOWING SENTENCES. CHECK YOUR ANSWERS AT THE BOTTOM OF THE PAGE.

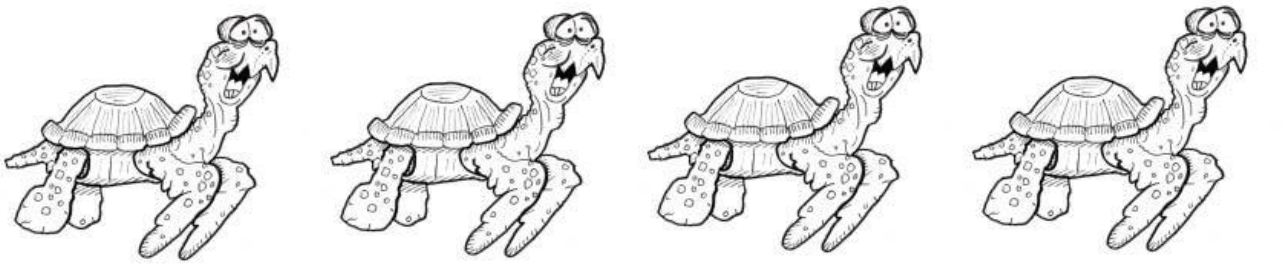


ILLUSTRATION BY BEN LUEDERS

1. Green sea turtles are 20 years old before they become adults. T / F

2. Hawksbill sea turtles use their long, narrow beaks to search for food. T / F

3. The Hawksbill sea turtle eat sponges that are poisonous to humans. T / F

4. It is safe to eat hawksbill sea turtles. T / F

5. The hawksbill sea turtle is native to Hawaii. T / F

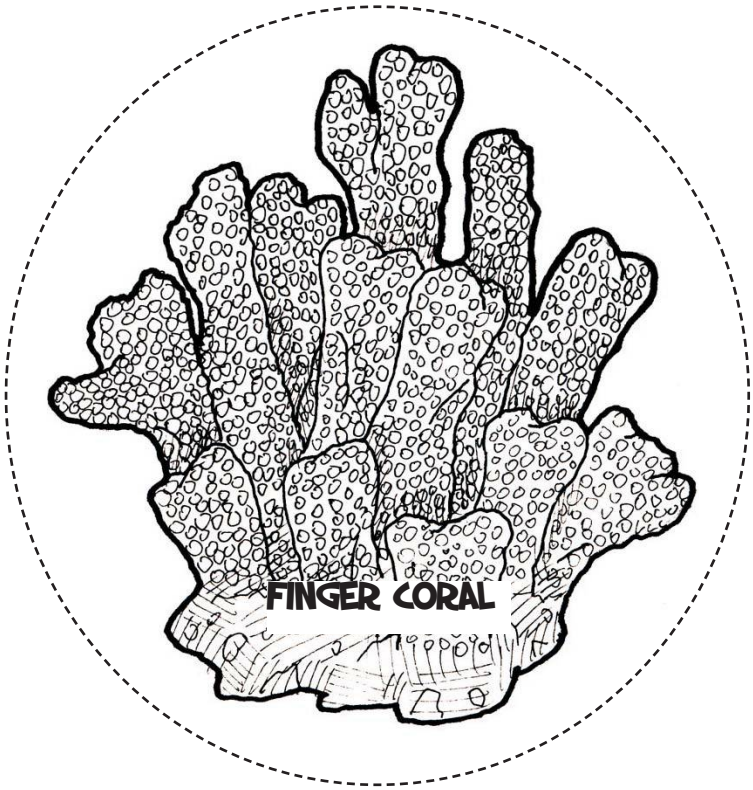
6. Sea turtles can pull their heads or flippers into their shells. T / F

7. The leatherback sea turtle has a hard shell. T / F

8. The leatherback sea turtle is the world's largest turtle. It can grow up to eight feet long and weight up to 2,000 pounds. T / F

Answers: 1. True, 2.True, 3.True, 4.False: Hawksbill Sea Turtle meat can be poisonous to humans, 5.True, 6.False, 7.False: The Leather-back Sea Turtle has a soft shell, 8.True

MOBILE CUTOUT

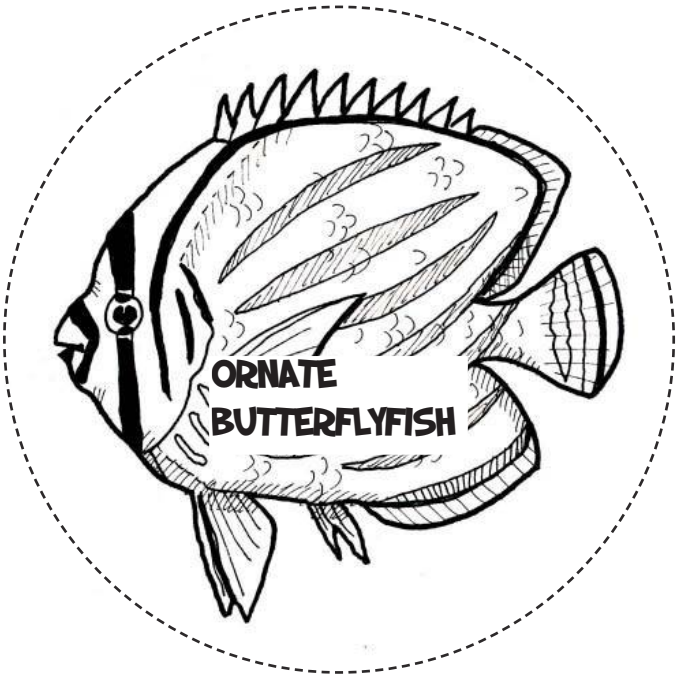


Supplies needed:
Scissors
Paper clips
Hole punch
Plastic drinking straws (3)

DIRECTIONS:

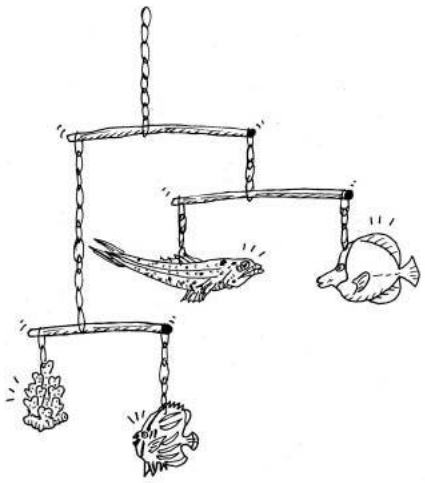
1. Color brown and green turf algae onto part of the finger coral.
2. Cut out the four sea animals.
3. Make 6 paper clip chains (two 6-inches and four 3-inches).
4. Thread and center a straw at the bottom of a 6-inch chain.
5. On the left side of the same straw, thread the other 6-inch chain. On the right side thread a 3-inch chain.

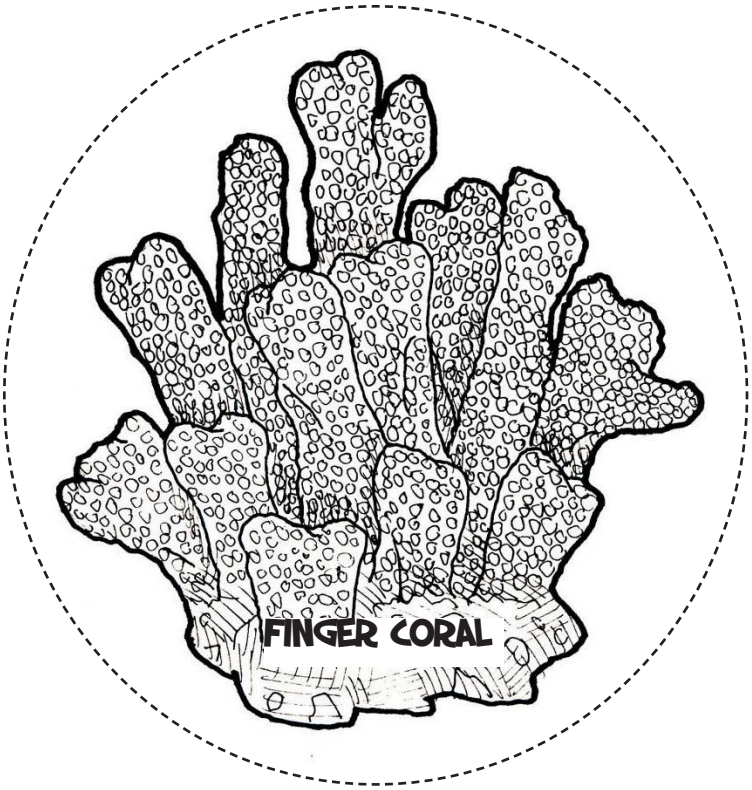
CONTINUED ON PAGE 23

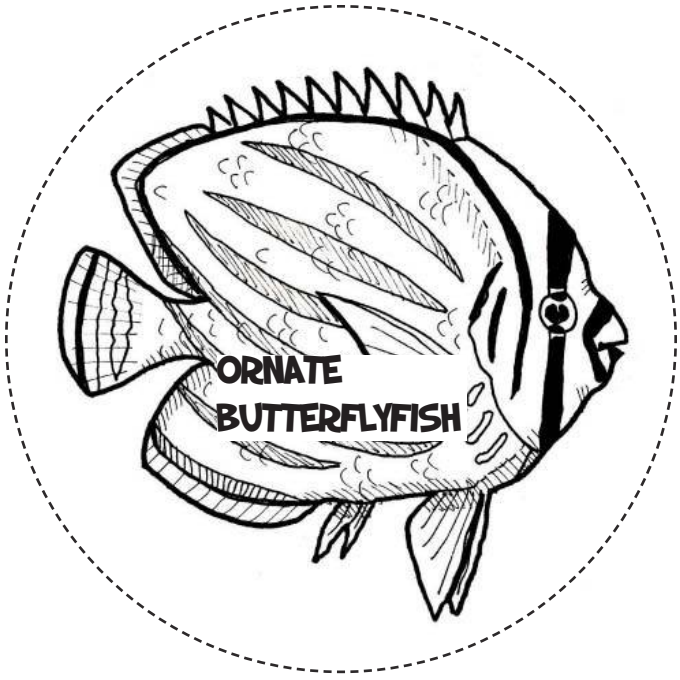


ILLUSTRATIONS BY BEN LUEDERS

MOBILE CUTOUT



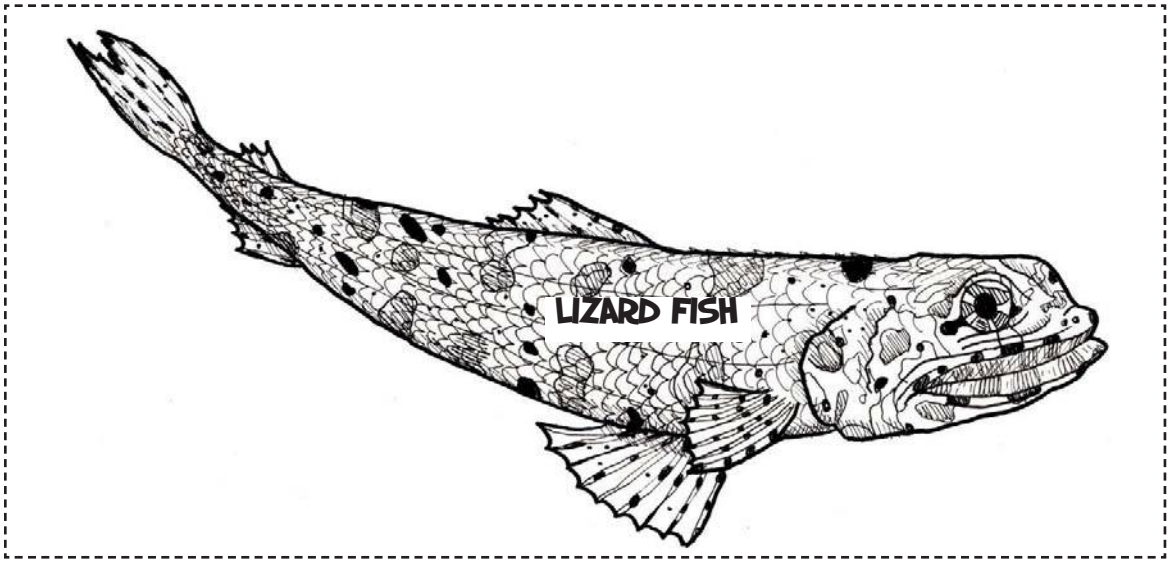


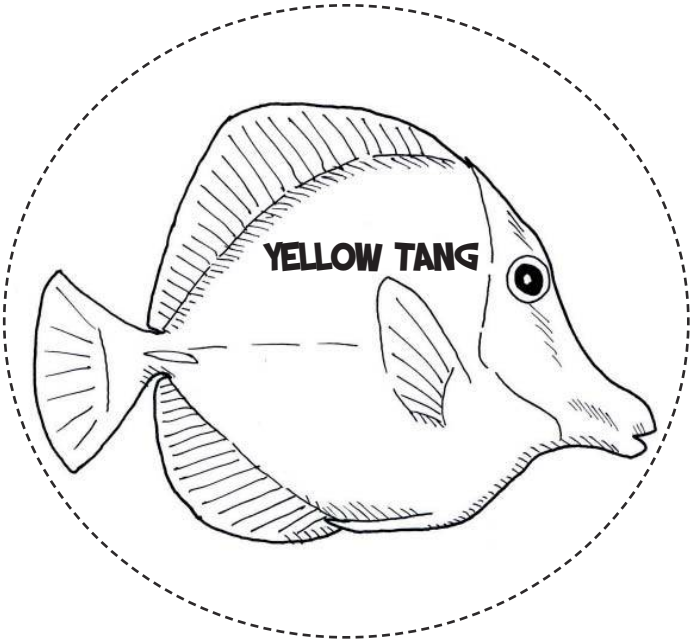


DIRECTIONS CONTINUED FROM PAGE 22:

6. Thread and center a second straw at the bottom of the 6-inch chain.
7. Thread and center a third straw at the bottom of the 3-inch chain.
8. Attach the animals to the remaining 3-inch chains and attach to the ends of the straws.
9. (Optional) Create another chain and attach the food chain explanation to your mobile.

MOBILE CUTOUT





HOW DOES THIS FOOD CHAIN WORK?

A food chain shows how some animals are herbivores (eat plants) and some are carnivores (eat animals).

A finger coral is a planktivore, a carnivore that eats animal larvae in the plankton.

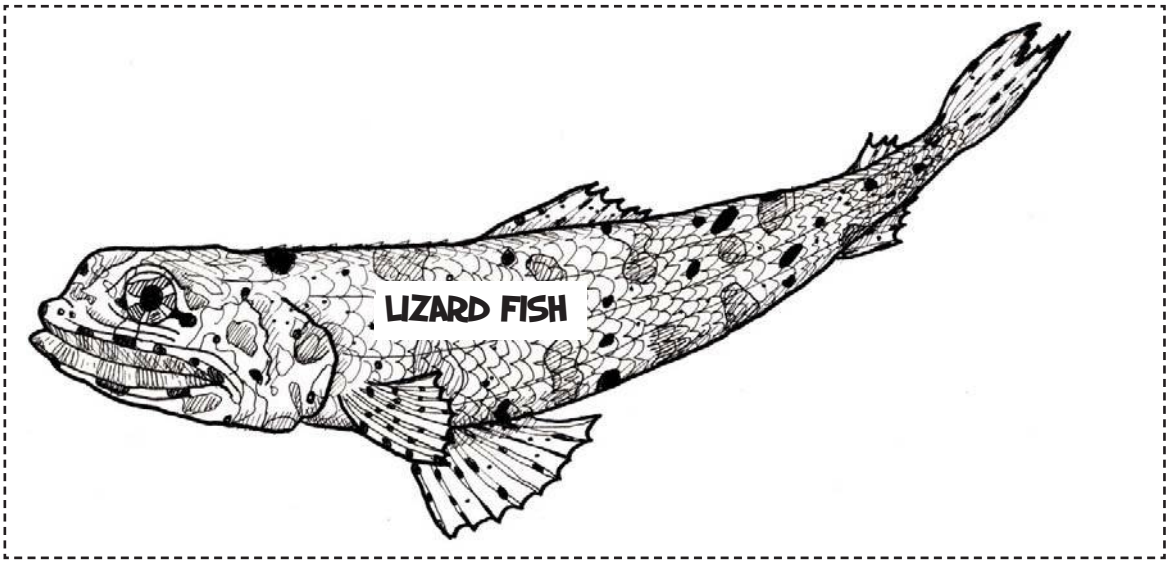
The ornate butterflyfish is a corallinavore, a carnivore that eats coral.

The yellow tang is an herbivore. It eats the turf algae growing on coral.

The lizardfish is a piscavore. It is a carnivore that eats both the yellow tang and ornate butteflyfish.

ILLUSTRATIONS BY BEN LUEDERS

MOBILE CUTOUT



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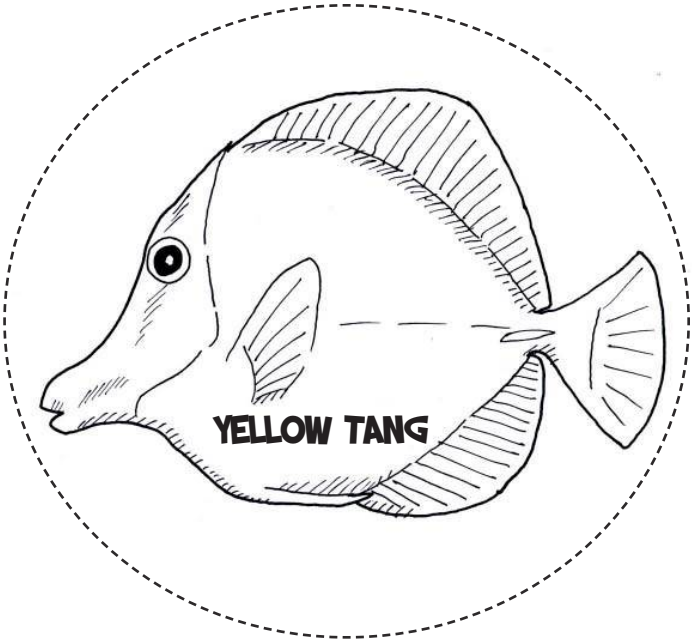

Things you can do to help

1. Stand only in the sandy areas. Rocky areas are covered with a thin layer of living plants and animals, including very young coral.

2. Enjoy watching fish, but do not feed them. Bread, peas, corn, other human foods and human-created fish foods can be harmful to fish. These foods change fish behavior or choke them.

3. Swim smoothly and calmly. That way you will be able to get closer to fish, and you won't stir up sand that can make it harder to see them.

4. Pick up trash in the water or on the beach and place it in the rubbish bin. Plastic bags are often blown into the water by the wind. Sea turtles can mistake these plastic bags for jellyfish, their natural food, and eat them and get very sick or die.

5. Use waterproof sunscreen when going into the ocean. Sunscreen that is not waterproof washes off into the water and pollutes the water.

6. Use the restrooms found throughout the beach park. Going to the bathroom in the water adds unwanted nutrients.

7. Do not take anything that belongs at the beach. Leave the rocks, shells, and sand there. Take only photos and memories away with you.

8. Share this information with a friend. Take the time to teach others how to take care of Hawaii's living reefs and ocean.

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DESIGNED BY LISA HUYNH
JULY 2005