OCEAN FUN PACK - CORAL REEFS

This lesson plan developed by:

Overview:

Often referred to as “rainforests of the ocean”, coral reefs are one of the most diverse ecosystems in the world. Coral reefs provide a home to at least 25% of all marine species, and only occupy less than 1% of the world’s surface. Corals are most commonly found at shallow depths in warm tropical and subtropical waters, but deep, cold-water corals also exist.

Are they rocks, plants or animals?

Corals are animals! They belong to the phylum Cnidaria, which also contains sea anemones and jellyfish. Cnidarians are radially symmetrical with an opening at one end that is surrounded by tentacles. The tentacles have stinging cells called nematocysts that are used for protection and to capture prey that swim too close. The coral animal, also known as a polyp, is made up of a tube-shaped body, tentacles and a mouth.

There are two main types of corals: hard corals and soft corals. Hard corals extract calcium and carbonate from the ocean water and deposit a hard calcium carbonate skeleton that surrounds the lower portion of the body. Polyps fuse their skeletons together and form large colonies, which become the basis for coral reefs. Each polyp extends their tentacles from their skeleton to feed and withdraw into the skeleton for protection. Therefore, a coral colony can look very different depending on whether the polyps are extended or not. When hard coral polyps die, the calcium carbonate skeleton remains intact.

Soft corals do not produce a hard external calcium carbonate skeleton and therefore do not significantly contribute to the building of coral reefs. Instead they have small, hard internal structures called spicules, which are uniquely shaped for each species and are used to help

Coral Reefs (cont.)

identify soft corals.

Hard corals and some soft corals contain microscopic, marine algae, known as zooxanthellae, living within their tissue. These zooxanthellae have a mutually beneficial symbiotic relationship with their coral host. The zooxanthellae photosynthesize from within the coral tissue and produce sugars that provide nutrition to both the zooxanthellae and the coral. In return, the coral provides protection and assists the growth of zooxanthellae by passing on some of its waste, which the zooxanthellae use as a nutrient source.

The zooxanthellae give coral their different colors and because zooxanthellae need sunlight to perform photosynthesis, they are the reason why these corals are found in shallow water to receive the sunshine they need to survive. Some environmental stressors such as increased water temperature or sedimentation may cause zooxanthellae to leave its host, turning the coral white. This phenomenon is known as coral bleaching. Corals that normally contain zooxanthellae rely on their symbiotic algae as a food source and cannot survive long without them living in their tissue.

What are some of the threats facing coral reefs?

Unfortunately, humans pose the greatest threat to coral reefs. Climate change impacts including warming water temperatures and increasing ocean acidity can cause coral bleaching and slow the growth of coral skeletons. Local dangers including destructive fishing practices, overfishing, pollution from sewage and agriculture, invasive species and careless tourism can also heavily impact these beautiful ecosystems.

What are some things can you do to help?

1. Wear UV protectant clothing and reef-friendly sunscreen
2. Reduce ocean plastic pollution by limiting single-use plastics by using reusable items
3. Reduce your carbon footprint by walking, riding the bus and biking
4. Conserve water
5. Practice responsible boating, diving and snorkeling techniques to prevent damage to coral reef habitats
6. Volunteer for beach and coral reef cleanups
7. Spread the word!

Word Search

Find the following coral reef-related words in the word search on the next page. The words will be hidden horizontally, vertically, or diagonally.

Word List:

Algae
Barracuda
Bleaching
Boat
Brain Coral
Conch
Coral
Crab
Current
Jellyfish
Loggerhead Turtle
Manta Ray
Marine Debris
Mesophotic Zone
Mooring Buoy
Moray Eel
Nematocyst
Octopus
Parrotfish
Polyp
Reef
ROV
Salt Dome
Scuba
Shark
Shrimp
Spiny Lobster
Sponge
Star Coral
Urchin
Waves
Zooxanthellae

Word Search (cont.)

O E O T U Z Q B K X E L E E Y A R O M K M E O

W L K V C O R A L F J A V E G N O P S X A R N

V T N M R H M O O R I N G B U O Y Z L M N E R

F R K C O Q R T H S L M B L J J B Q H K T O Y

N U L U V W W A V E S A Z N A Q N H Z V A C B

R T D K P W M X F A R Z G E W C T U Y J R G Z

O D B M M C N B A R C O T E J V N Z A L A K F

Q A S F I J E D A W X V C E F Z O A M M Y E S

H E I F R I R C E N O Z C I T O H P O S E M T

X H R R H N U B A Q I P A R R O T F I S H G A

Y R B Q S D R E T S B O L Y N I P S P E X X R

P E E Y A S A L T D O M E Z S S H Y K A I U C

Y G D V B O H N T W K V X X E P W V J L L R O

L G E N L J A B U C S W E B G V M Z D L G C R

O O N E E V Q Z C J E L L Y F I S H C E H H A

P L I M A C D Z T D O V O C T O P U S H Y I L

H C R A C U B R A I N C O R A L Q R K T P N Z

K S A T H R O K J Q U W K C J G B M K N G Q P

V L M O I R Y R R L R T J W O W H V Z A X D O

F F H C N E U F V A V B O M C N X Z U X S L Y

J M A Y G N H E G G H O U B F B C I A O T C H

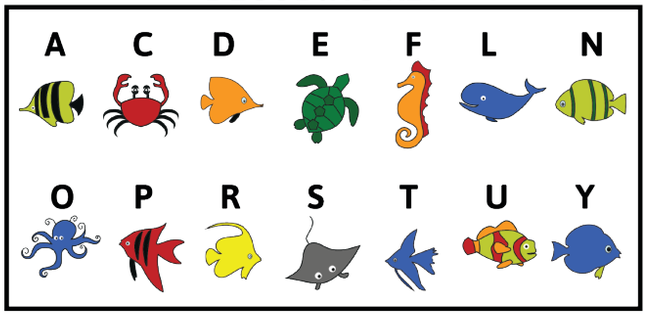
T I G S T T Y E Y K V S U M R M J H A O O B H

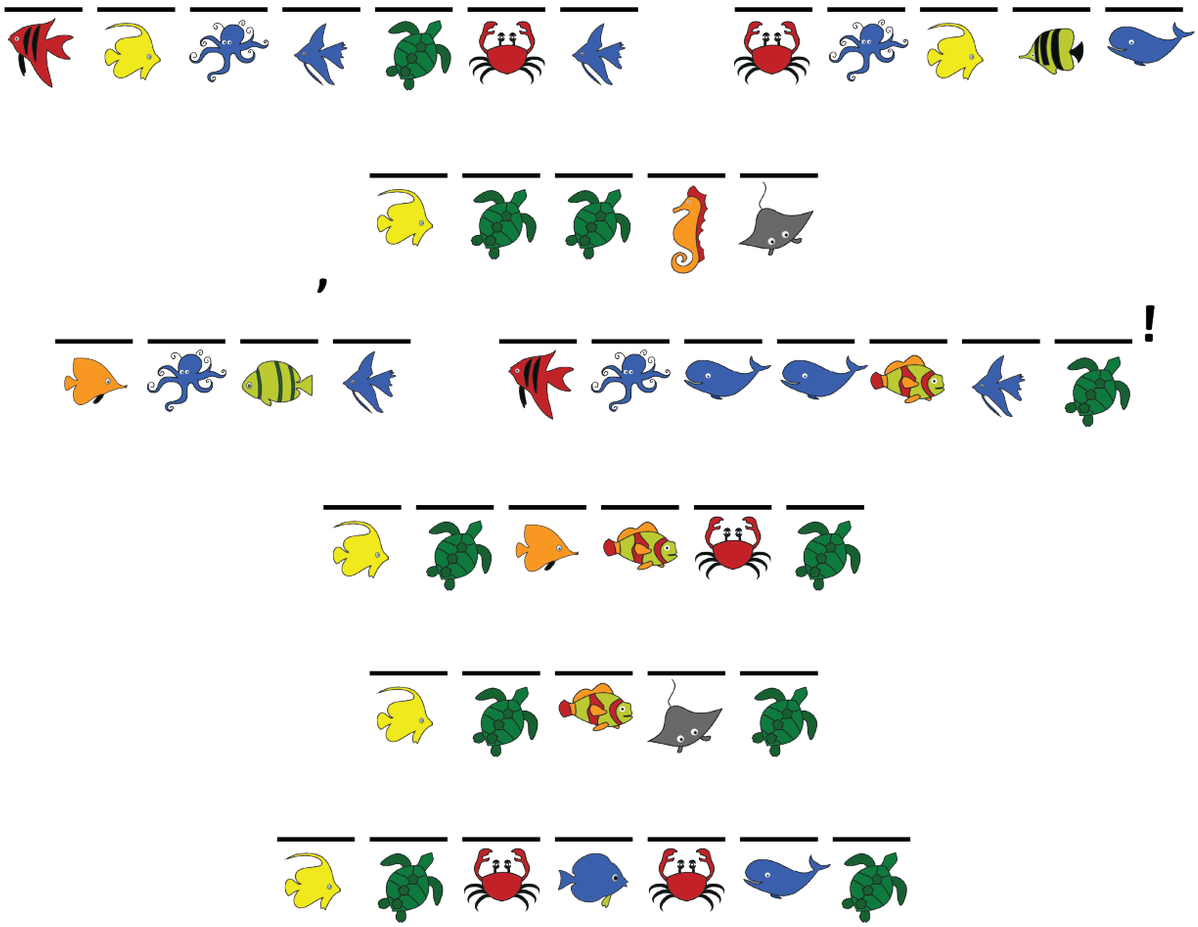
C U U T G R P R B I B O A T V X Q W K Z C U O

Decoding Game

Find out how you can help save coral reefs by decoding the secret message.

DECODING KEY





Crossword Puzzle

Coral reefs support more species per unit area than any other marine ecosystem. This includes about 4,000 species of fish, 800 species of hard corals and hundreds of other species. In fact, scientists estmate that there may be millions of undiscovered specis of organisms living in and around coral reefs.

Complete the crossword puzzle on the next page with the clues listed below to learn more about coral reef habitats.

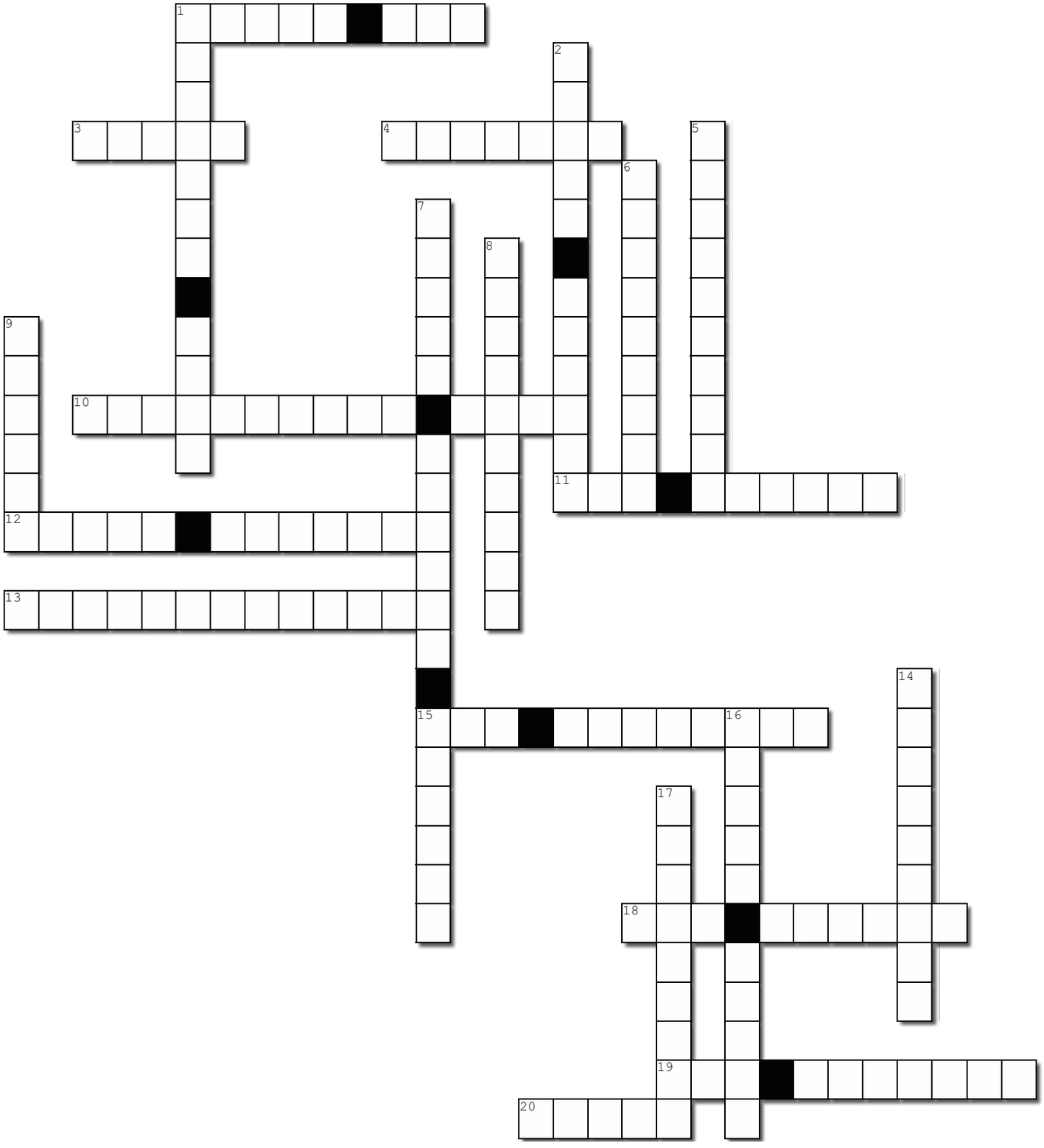
Across

1. An elongated fish that secretes a protective mucus over their skin and lives in crevices on the reef
3. A cartilaginous fish with many rows of razor-sharp teeth
4. A mollusk that has eight tentacles with suction cups that can camouflage with surrounding
10. A deeper part of the ocean where some light still penetrates
11. A marine reptile that comes to shore to dig a nest in the sand and lay its eggs
12. A crustacean that lacks large claws
13. Single-celled algae that live inside coral polyps and help the coral obtain nutrition
15. An echinoderm with an elongated body shape that feeds on bottom sediments
18. A slow-moving, spherical echinoderm that is covered in spines
19. A sedentary marine invertebrate that has a ring of stinging tentacles around the mouth
20. A sea snail that is protected from harvest, grows in a pink shell, and lives in the open sand flats

Down

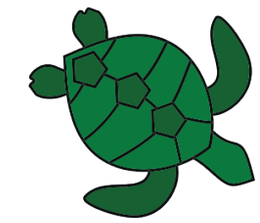
1. A floating ball anchored to the seafloor by a long lie that boats can tie up to
2. People who use Self Contained Underwater Breathing Apparatus
5. A stinging cell found in the tentacles of coral polyps, anemones, and jellies
6. A large, predatory, ray-finned fish known for its fearsome appearance and ferocious behavior
7. A filter feeder that is the largest of its species
8. A brightly colored fish that has bird-like beak that eats algae, which grows inside coral polyps
9. An entire colony of coral is actually many individual of these all living together
14. The absence of color in coral polyps due to the loss of their symbiotic algae (zooxanthellae)
16. This kind of reef builder grows in a pattern that resembles human gray matter
17. Members of this family of brightly colored fish are often seen feeding on sponges. (Hing: Queen, Blue, French)

Crossword Puzzle (cont.)



Sea Turtle Maze

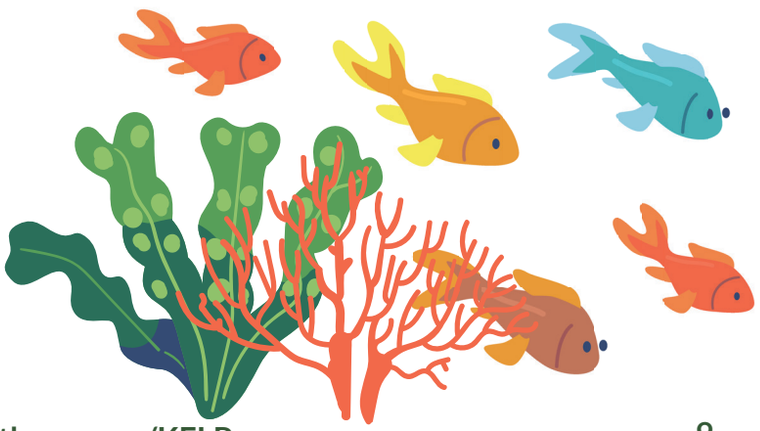
Help the sea turtle find its coral reef friends!



Did you know? Coral reefs are home to more than 25% of all known marine fish species.

Word in a Word

What words can you find in the word ZOOXANTHELLAE?



Coral Reef Fish Memory

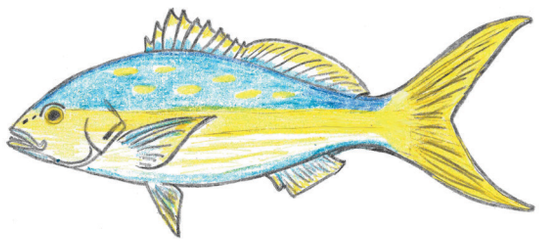
Coral reefs are an important habitat for many marine species. Learn the names of some fish that rely on these ecosystems by playing Fish Memory. Either practice by yourself or play with a friend!

Before you can play:

Cut out all of the fish cards (pictures and names) with the Sailors for the Sea card attached. Fold in half and glue together so that you can't see the fish through the back of the paper.

Rules for playing Fish Memory:

1. Mix up the cards and lay them face down in rows.
2. Turn over any two cards. If the two cards match (picture and name of the fish), keep them. If they don't match, turn them back over.
3. Try to remember what is on each card and where it is.
4. The game is over when all the cards have been matched. The player with the most matches wins!



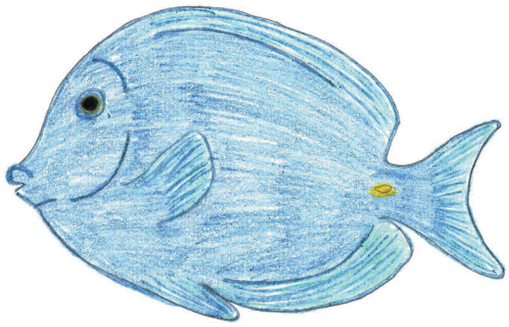
SAILORS FOR THE SEA
POWERED BY OCEANA

Yellowtail Snapper

Ocyurus chrysurus

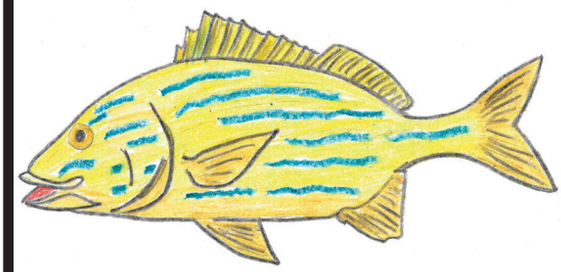
SAILORS FOR THE SEA
POWERED BY OCEANA

Coral Reef Fish Memory (cont.)



Blue Tang

Acanthurus coeruleus



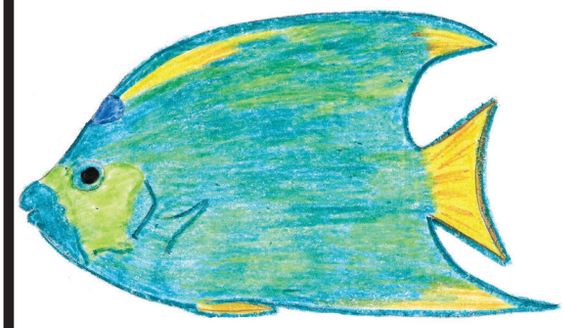
Blue-striped Grunt

Haemulon sciurus

Coral Reef Fish Memory (cont.)

Banded Butterflyfish

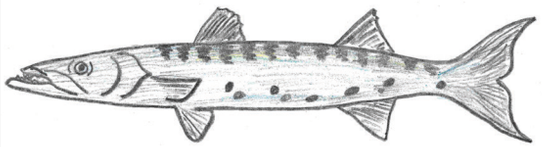
Chaetodon striatus

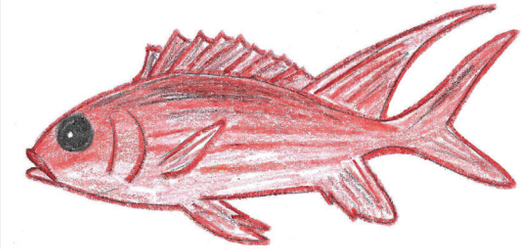


Queen Angelfish

Holacanthus ciliaris

Coral Reef Fish Memory (cont.)





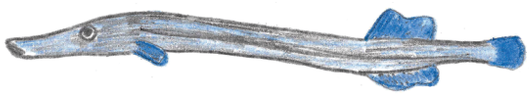
Great Barracuda

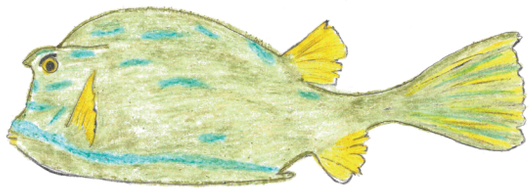
Sphyraena barracuda

Longspine Squirrelfish

Holocentrus rufus

Coral Reef Fish Memory (cont.)





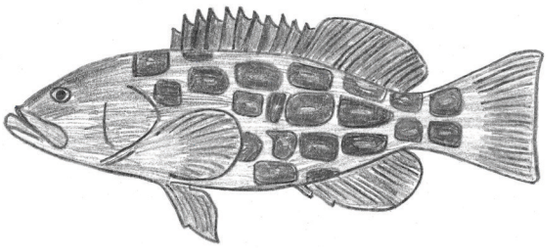
Trumpetfish

Aulostomus maculatus

Scrawled Cowfish

Acanthostracion quadricornis

Coral Reef Fish Memory (cont.)



Black Grouper

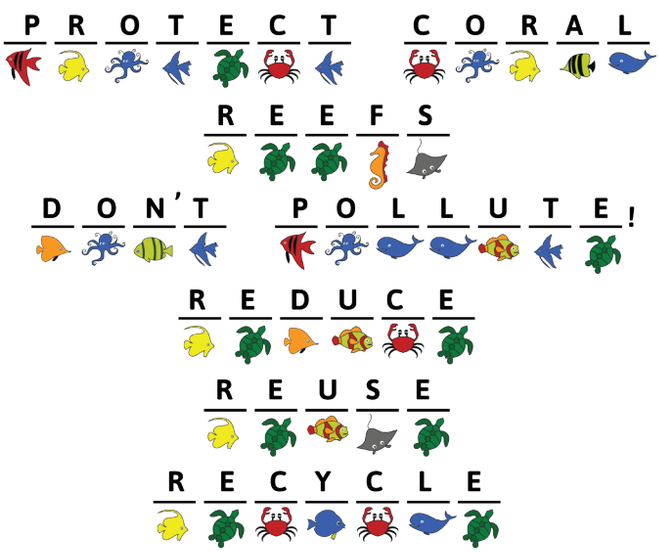
Mycteroperca bonaci

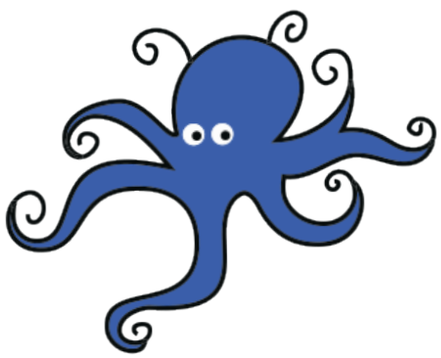
Answer Key

Word Search

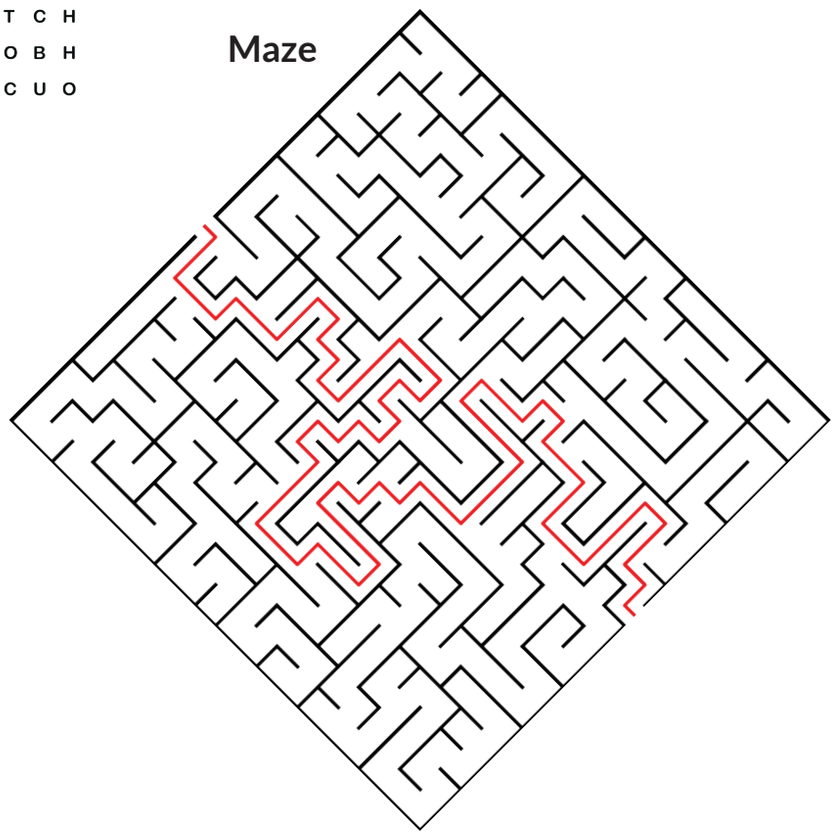
O	E	O	T	U	Z	Q	B	K	X	E	L	E	E	Y	A	R	O	M	K	M	E	O
W	L	K	V	C	O	R	A	L	F	J	A	V	E	G	N	O	P	S	X	A	R	N
V	T	N	M	R	H	M	O	O	R	I	N	G	B	U	O	Y	Z	L	M	N	E	R
F	R	K	C	O	Q	R	T	H	S	L	M	B	L	J	J	B	Q	H	K	T	O	Y
N	U	L	U	V	W	W	A	V	E	S	A	Z	N	A	Q	N	H	Z	V	A	C	B
R	T	D	K	P	W	M	X	F	A	R	Z	G	E	W	C	T	U	Y	J	R	G	Z
O	D	B	M	M	C	N	B	A	R	C	O	T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

Decoding Game



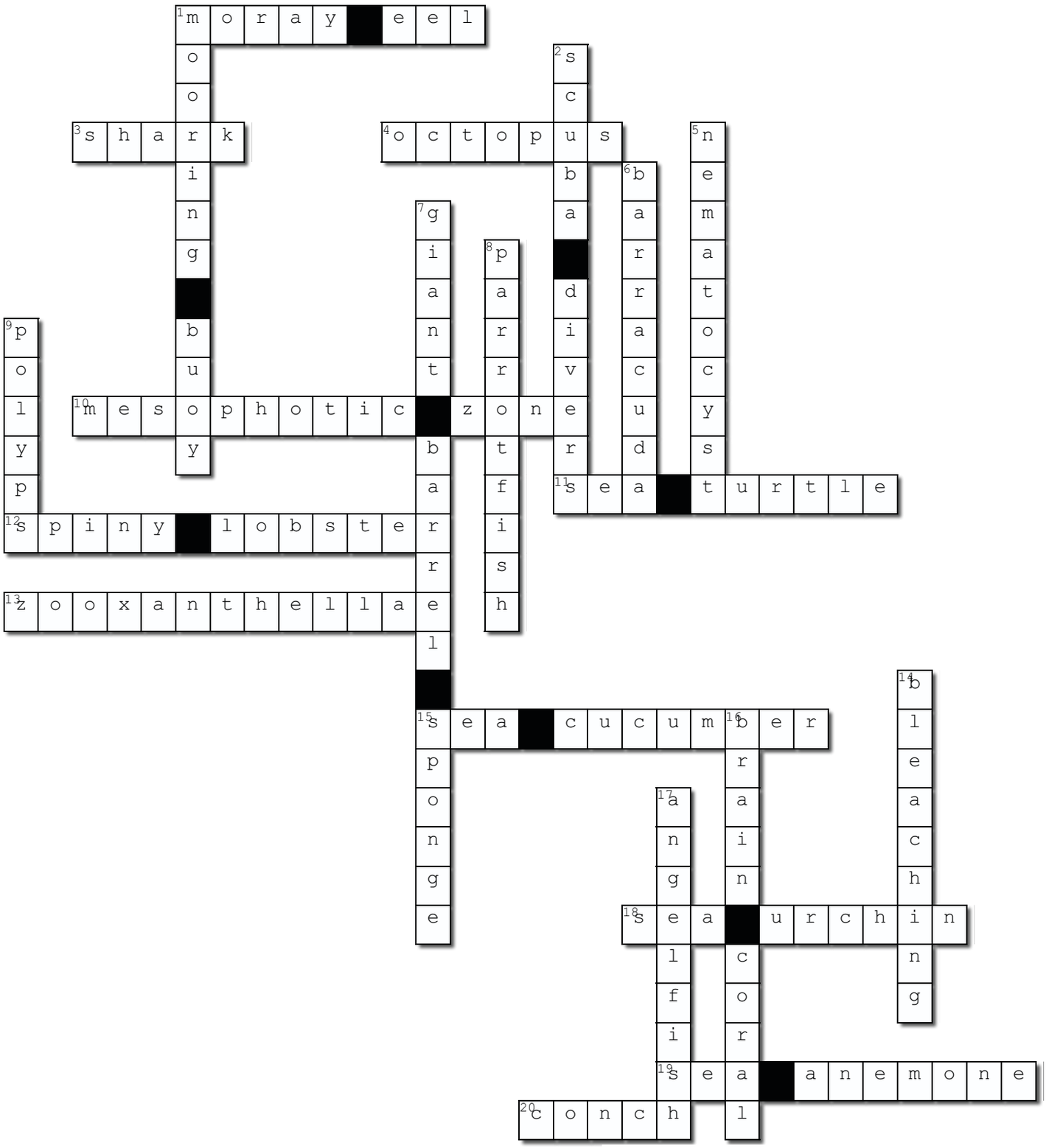


Maze



Answer Key (cont.)

Crossword Puzzle



Answer Key (cont.)

Word in a Word Game

zoo
ant
the
an
ox
on
late
tell
eat
he
let
than
hot
heat
hoax
heal
lent
leant
axe
tan
teen
ten
laze
haze
then

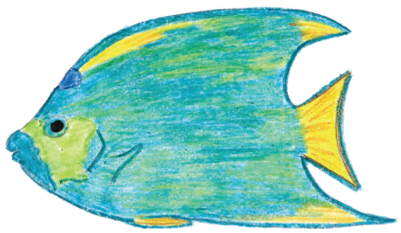
ooze
oxen
eel
axle
ate
hole
hone
tone
lone
alone
tale
oat
oath
ozone
zen
eon
lane
lathe
zeal
lot
loot
halt
lethal
zone
neat

net
teal
all
tall
hall
not
lothe
hello
aloha
halo
hat
that
hate
heel
hen
hex
hoe
hotel
hoot
tool
toll
to
too
thee

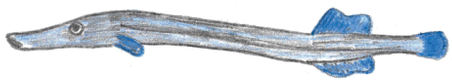
Proper nouns:
Allen
Alex
Alexa
Ella
Ethan
Ethel
Hazel
Leon
Leona
Leah
Lee
Len
Lena
Nate
Noel
Noelle
Zeno
Zena
Helen
Ellen
Hellen

Answer Key (cont.)

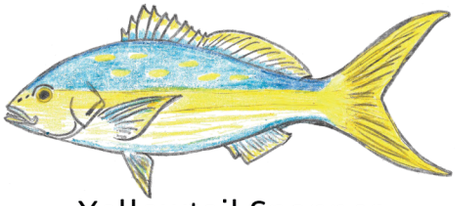
Fish Memory



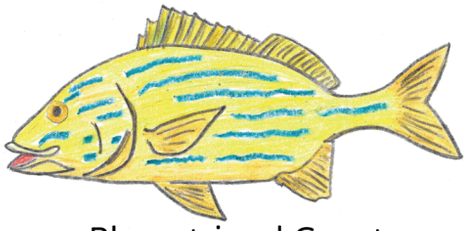
Queen Angelfish



Trumpetfish

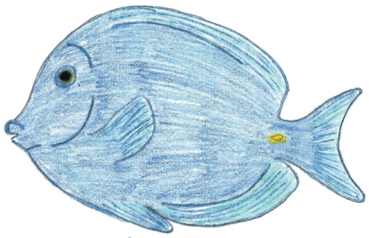


Yellowtail Snapper



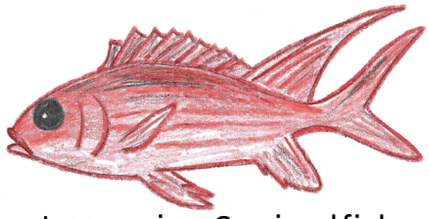
Blue-striped Grunt

Great Barracuda

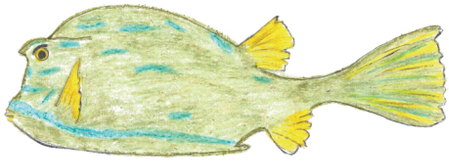


Blue Tang

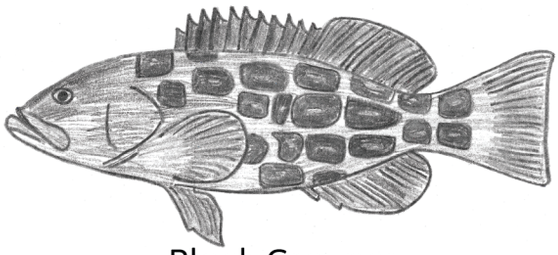
Banded Butterflyfish



Longspine Squirrelfish



Scrawled Cowfish



Black Grouper

About Us

Sailors for the Sea Powered by Oceana is a global conservation organization that engages, educates, inspires and activates the sailing and boating community toward protecting our oceans and waterways. We are a movement and a pragmatic voice for action that offers boaters tangible opportunities to create a legacy and make a difference.

Sailors for the Sea wants our youth to flourish, to truly become empowered as the next generation of ocean stewards. Through our KELP (Kids Environmental Lesson Plans) program and our Ocean Fun Packs we hope to inspire children to know and love the ocean.

Do you want to learn more about coral reefs?

Check out these KELP activities:

Build an Edible Coral Polyp

With different food items, students can create a coral polyp and learn about the anatomy of coral and the unique symbiotic relationship they have with zooxanthellae.

Coral Reef Spawning Snow Globe

Mimic a mass coral spawning event by building a snow globe with eco-friendly materials. You can even add Christmas tree worms to your coral reef.