

ASTRID SCHWALB / NICOLE HARWELL



STOP THE ZEBRA MUSSELS!

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ILLUSTRATED BY: NICOLE HARWELL

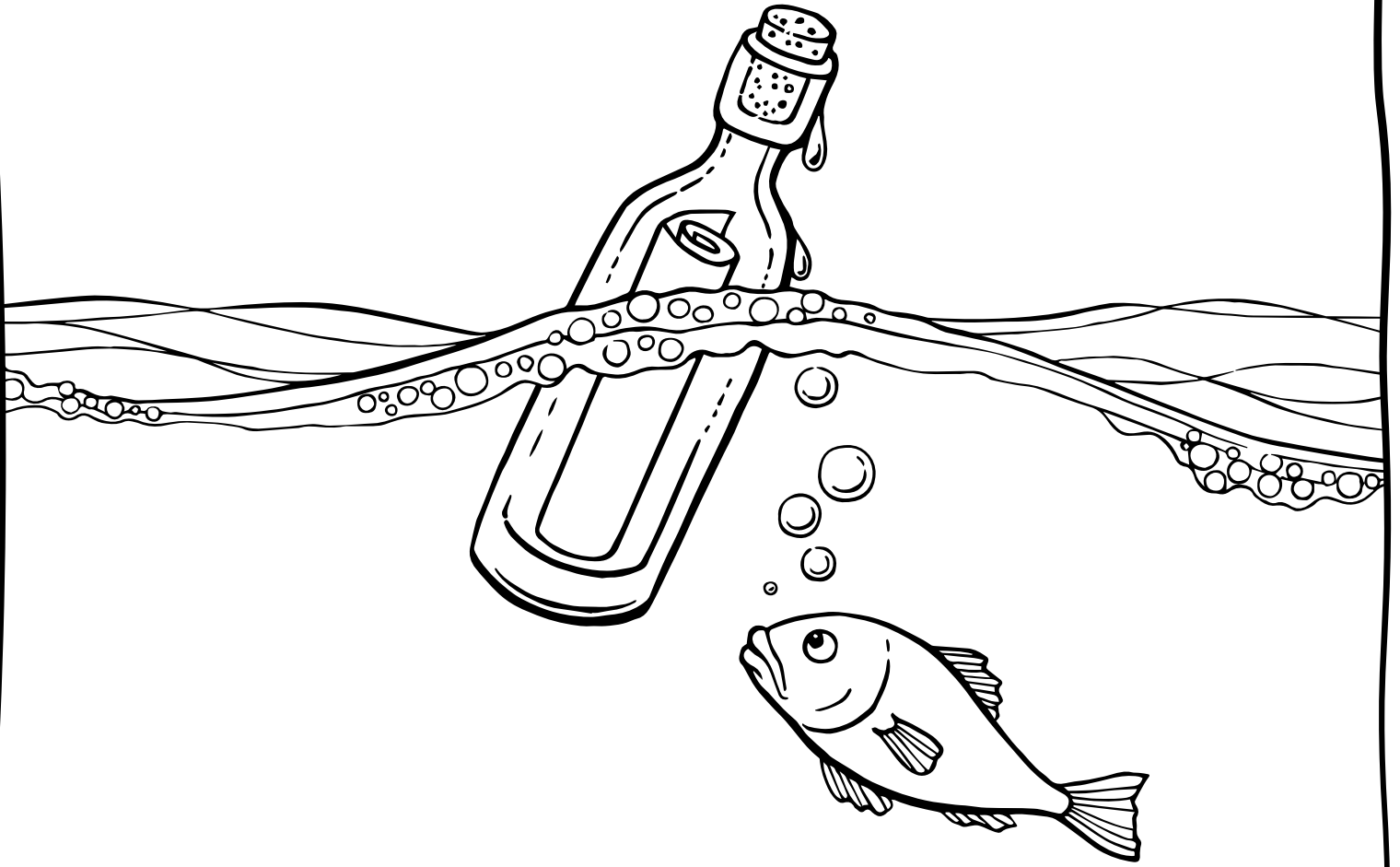
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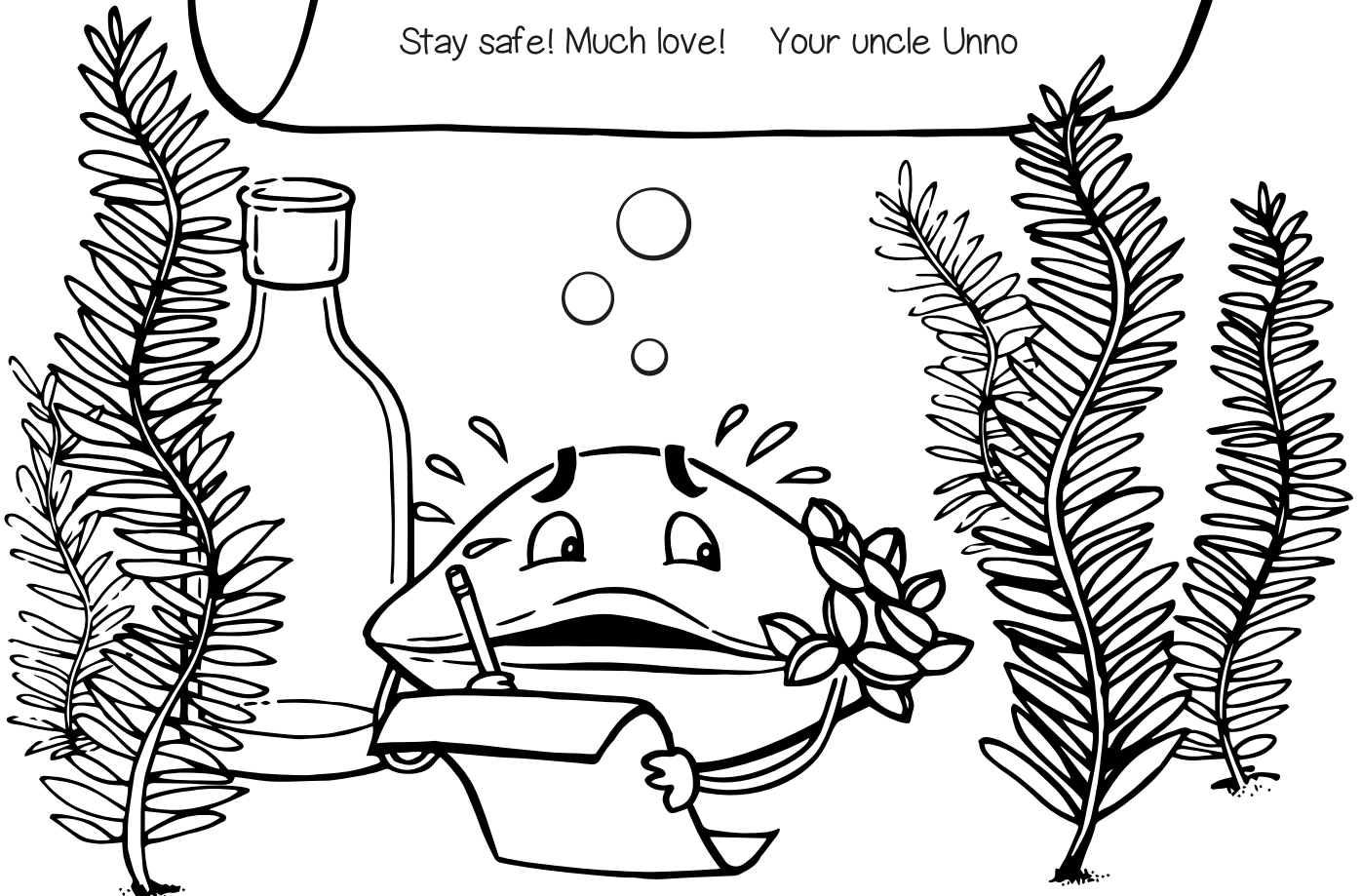




My dear Niece,

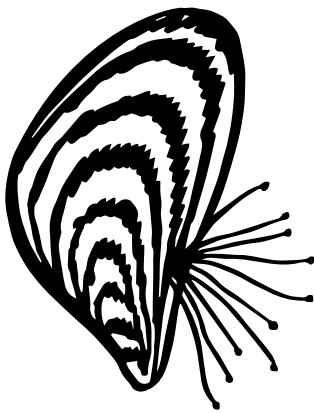
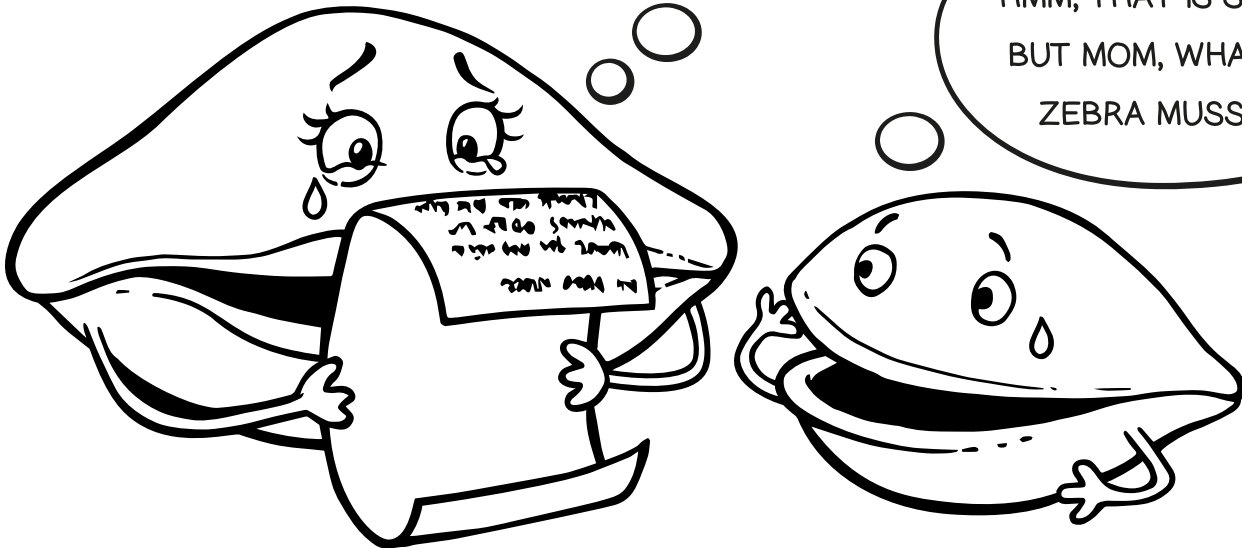
I hope you and little Uni are doing well. Things here in our lake are looking rather bad for us native mussels. Zebra mussels have invaded our waters. First there were only a few of them, but now they have taken over the whole lake. They are eating all of our food leaving hardly anything for us to survive. Some of them have even...even...settled on my shells! I can hardly move or eat. I'm afraid if it does not get better soon we won't be able survive here for much longer. Hopefully you will never have to deal with this in your lifetime.

Stay safe! Much love! Your uncle Unno



SIGH! OH NO... -
NOT ZEBRA MUSSELS

HMM, THAT IS SO SAD...
BUT MOM, WHAT ARE
ZEBRA MUSSELS?

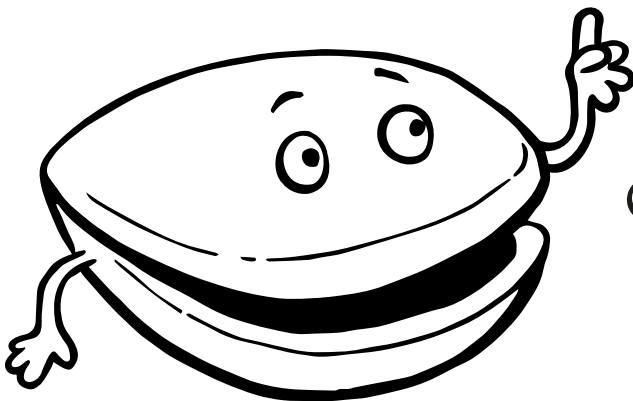


1/4 - 1/2 inches

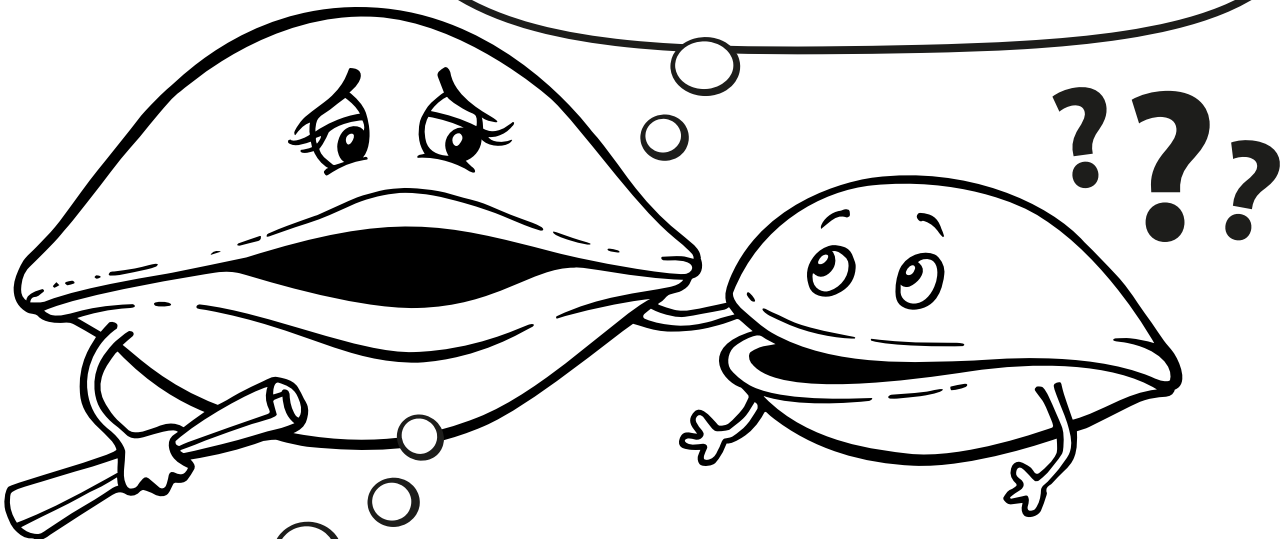


Zebra mussels are small
freshwater mussels with
triangular shaped shells.
They have a striped yellow
and brown pattern that
reminds one of...

I KNOW IT -
ZEBRASI



YES, MY DEAR. AND JUST AS ZEBRAS ARE NOT NATIVE TO OUR AREA, ZEBRA MUSSELS DON'T ACTUALLY BELONG HERE EITHER. THEY EVEN ARE INVASIVE.

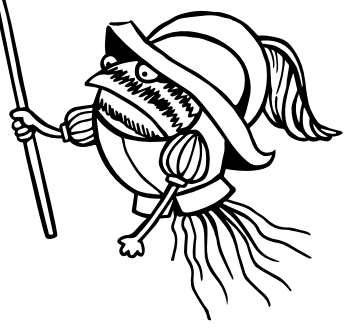


NATIVE SPECIES

are plants or animals which are originally from the area they live in. For example: Raccoons are native to North America. So are we Unionid mussels.

NON - NATIVE SPECIES

are plants or animals which are actually from somewhere else, but don't cause any harm. For example: the common Dandelion is originally from Eurasia.



INVASIVE SPECIES

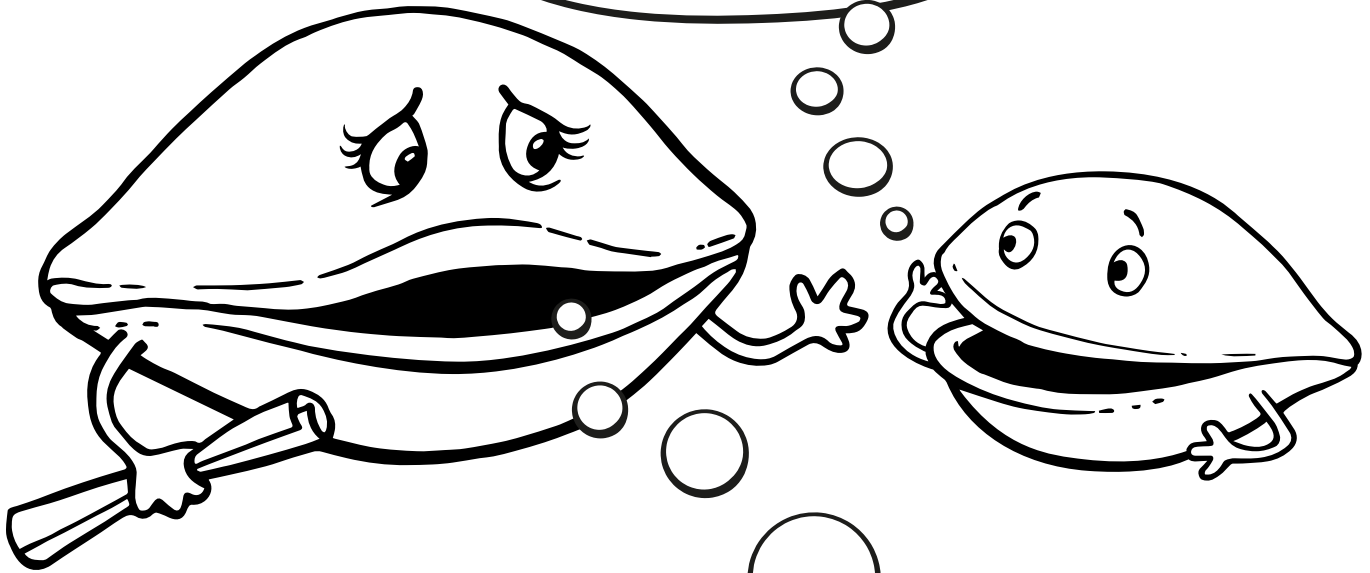
are plants or animals which are non-native and have negative effects on local ecosystems. For example: Zebra Mussels are invasive to North America. They cause economic and ecological problems.



Zebra mussels were carried from their home waters in Eastern Europe and Western Asia into other parts of the world. They came to the Great Lakes of North America in the ballast water of big ships during the late 1980s. Since then they have spread throughout the continent.



BUT HOW DID THE ZEBRA
MUSSELS GET INTO UNCLE
UNNO'S LAKE?

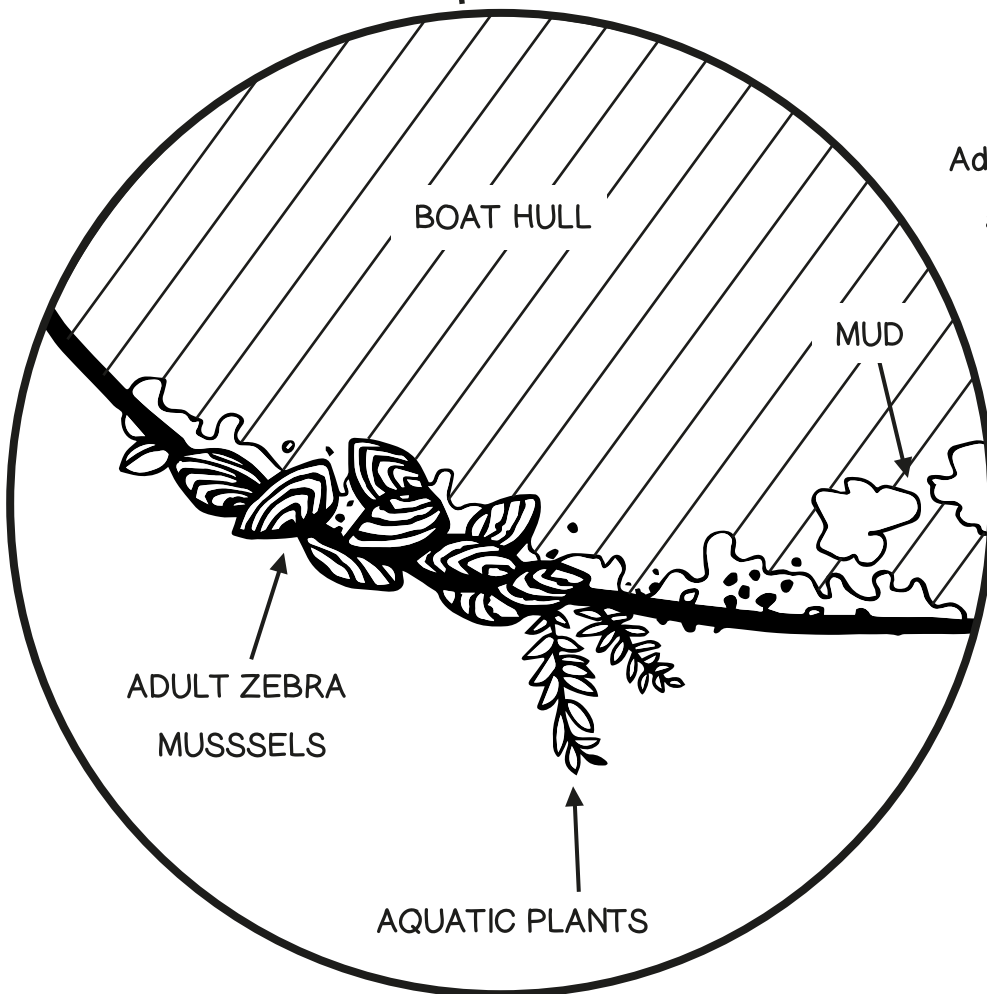
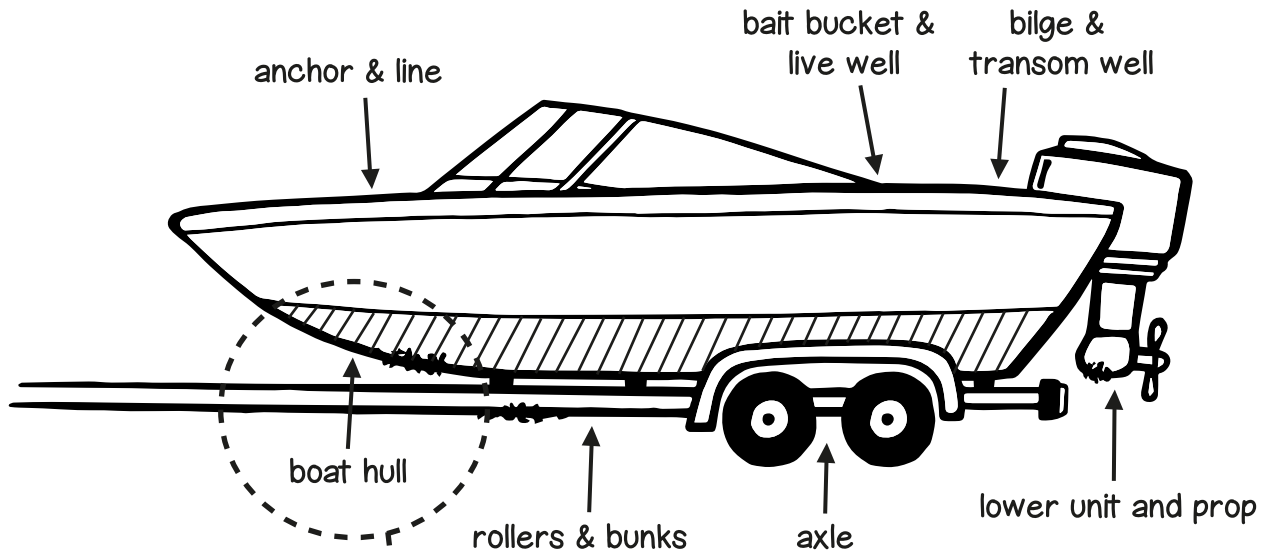


ZEBRA MUSSELS CAN
ATTACH TO BOATS WITH
THEIR SPECIAL STICKY THREADS*.
IF PEOPLE DON'T REMOVE AND
KILL ALL THE MUSSELS BEFORE
THEY MOVE THEIR BOAT TO
ANOTHER LAKE, THE ZEBRA
MUSSELS CAN SPREAD TO THAT
LAKE. AND THEY SPREAD FAST.



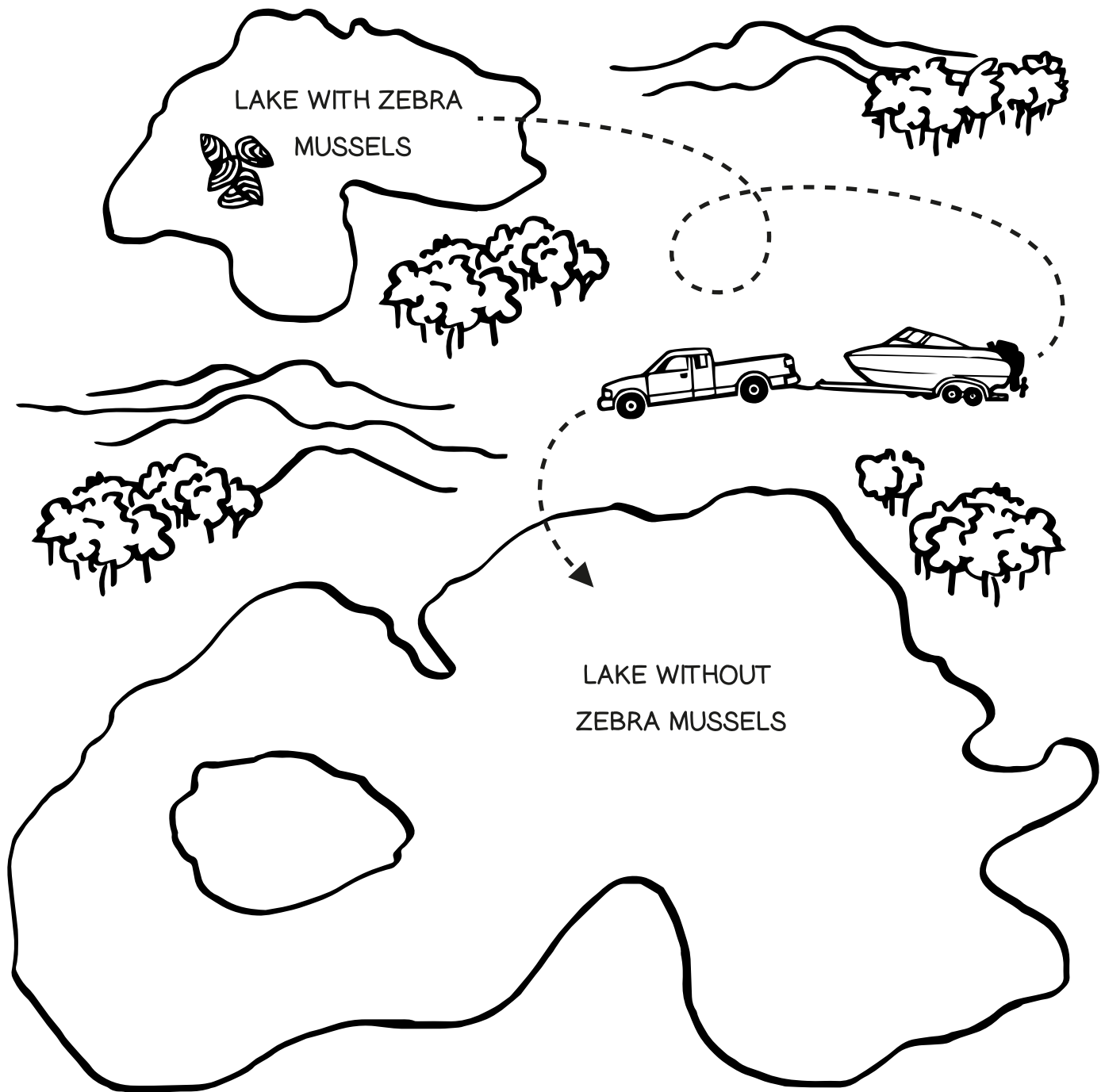
*STICKY THREADS

THERE ARE MANY PLACES ON A BOAT AND BOAT TRAILER
WHERE ZEBRA MUSSELS CAN HIDE:



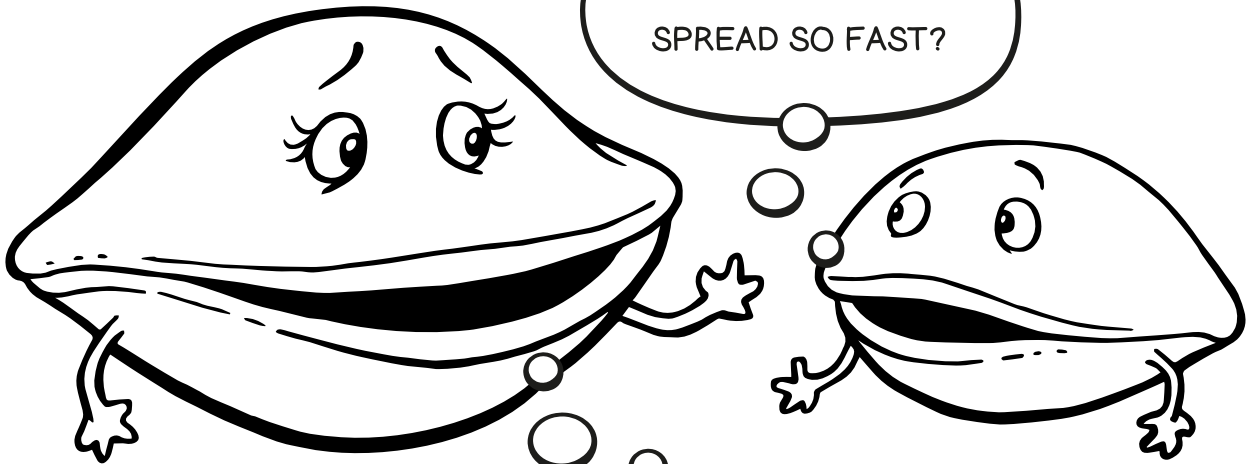
Adult Zebra mussels can be attached to the boat, trailer & anchor or even in mud. Veligers (Zebra mussel larvae) can be found in any part of the boat or equipment that holds water (like live wells, bilges, bait buckets, engine cooling systems)

It only takes one boat with a couple of zebra mussels on it or larvae in the water inside to bring this invasive species to another lake.



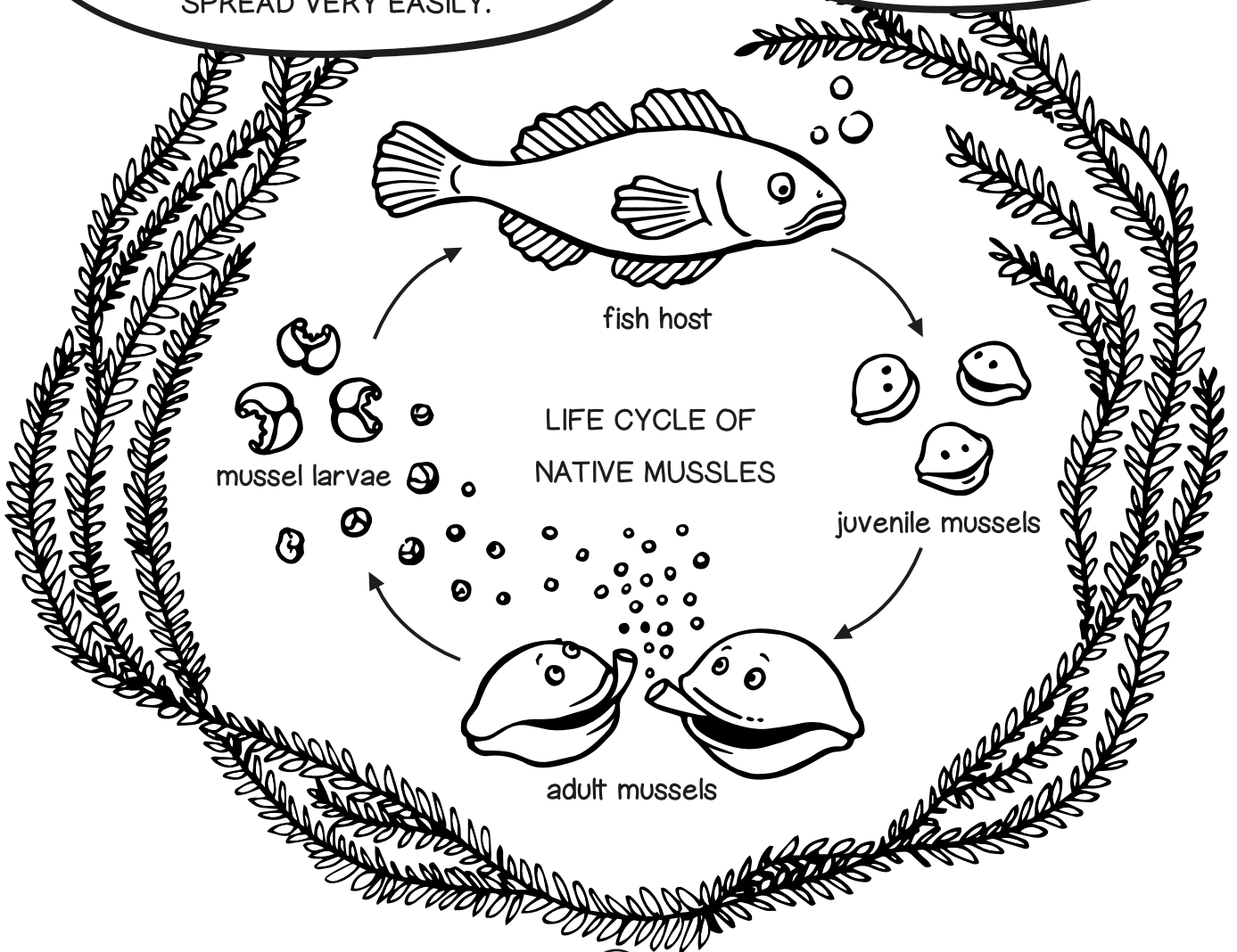
Once the Zebra Mussels have arrived and settled in the new lake, they start spreading fast - causing many problems for the other animals that are living in that lake.

HOW DO THEY
SPREAD SO FAST?



THEY DON'T NEED THE
HELP OF FISH HOSTS TO REPRODUCE
LIKE WE DO. THEIR LARVAE FLOAT
FREELY IN THE WATER AND CAN
SPREAD VERY EASILY.

THE LARVAE OF US NATIVE
MUSSELS HAVE TO ATTACH
THEMSELVES TO FISH GILLS
OR FINS TO GROW.

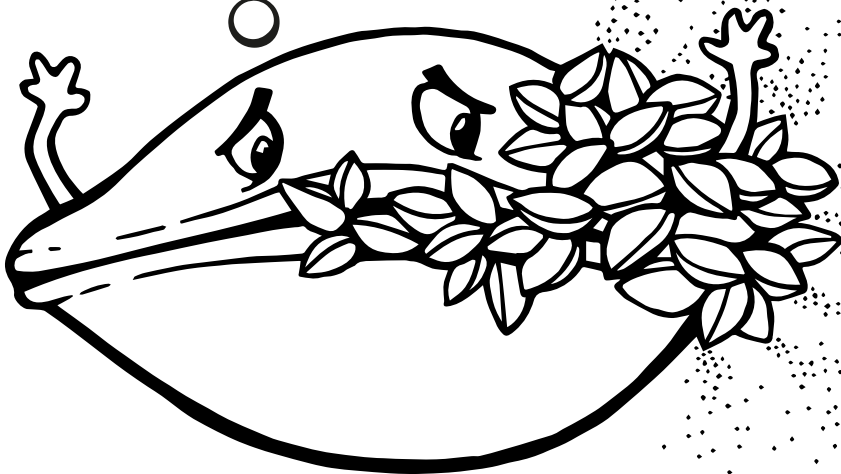


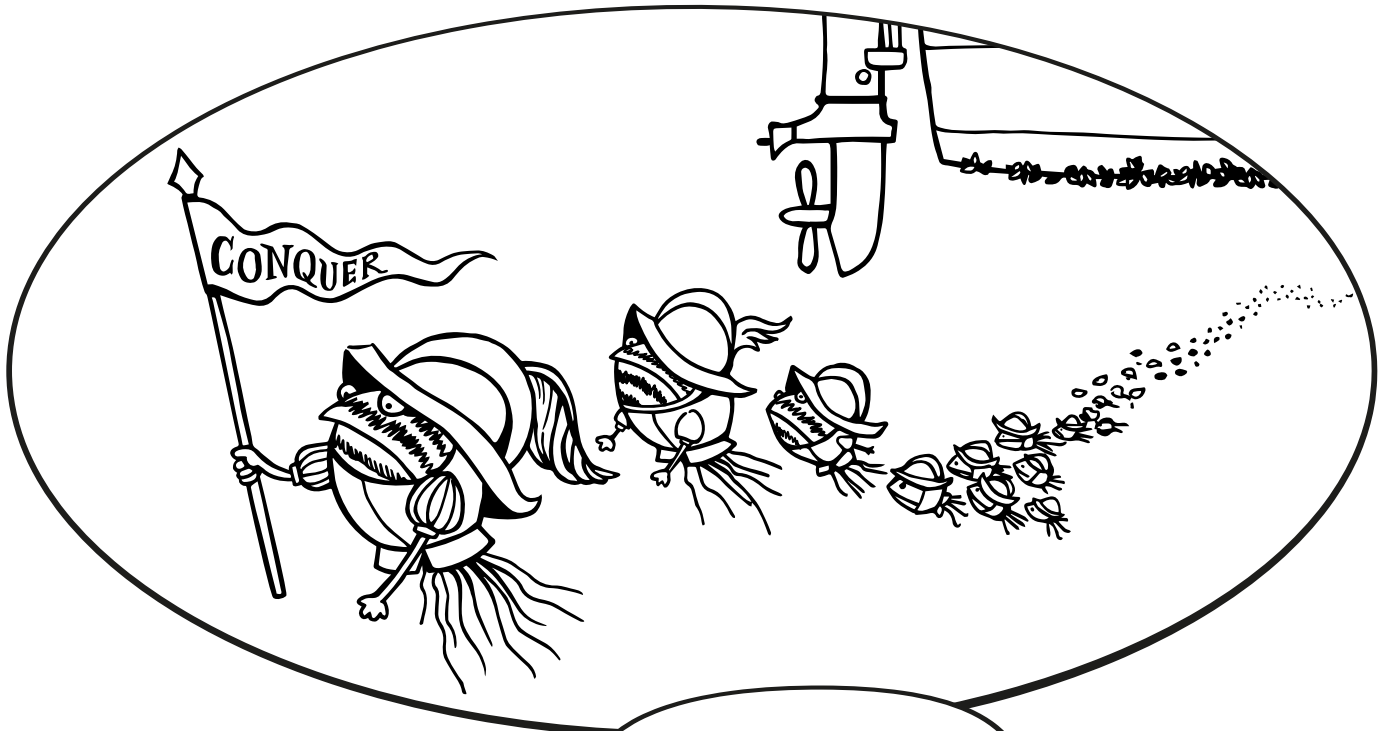
ZEBRA MUSSELS EATING PHYTOPLANKTON (= TINY PLANTS / ALGAE FLOATING IN THE WATER)



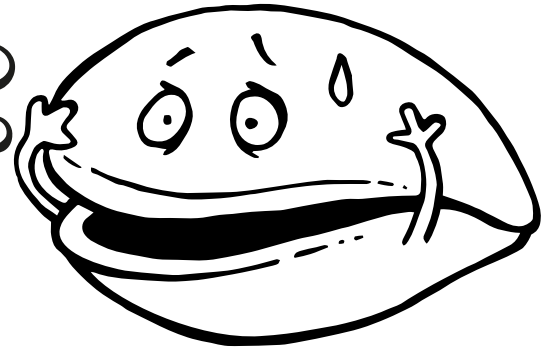
SO IN A SHORT AMOUNT OF TIME A FEW ZEBRA MUSSELS CAN TURN INTO A MILLION. THEY ALSO EAT MORE AND FASTER THAN WE DO, WHICH LEAVES LESS FOOD FOR US AND OTHER SPECIES LIKE SOME FISH. AND IF THIS WASN'T ALREADY BAD ENOUGH, THE ZEBRA MUSSELS ALSO ATTACH TO OUR SHELLS WHICH MAKES OUR LIVES DIFFICULT - ESPECIALLY FEEDING.

HELP!
SO HUNGRY...

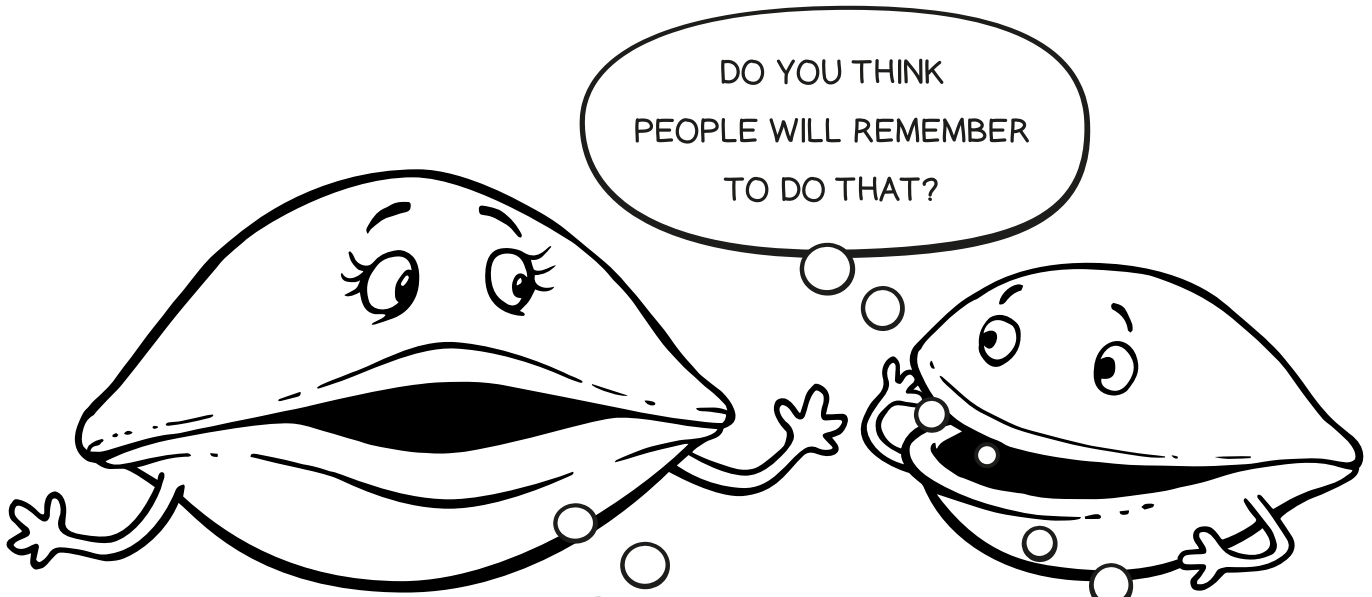




WILL THEY ALSO
COME TO OUR LAKE?



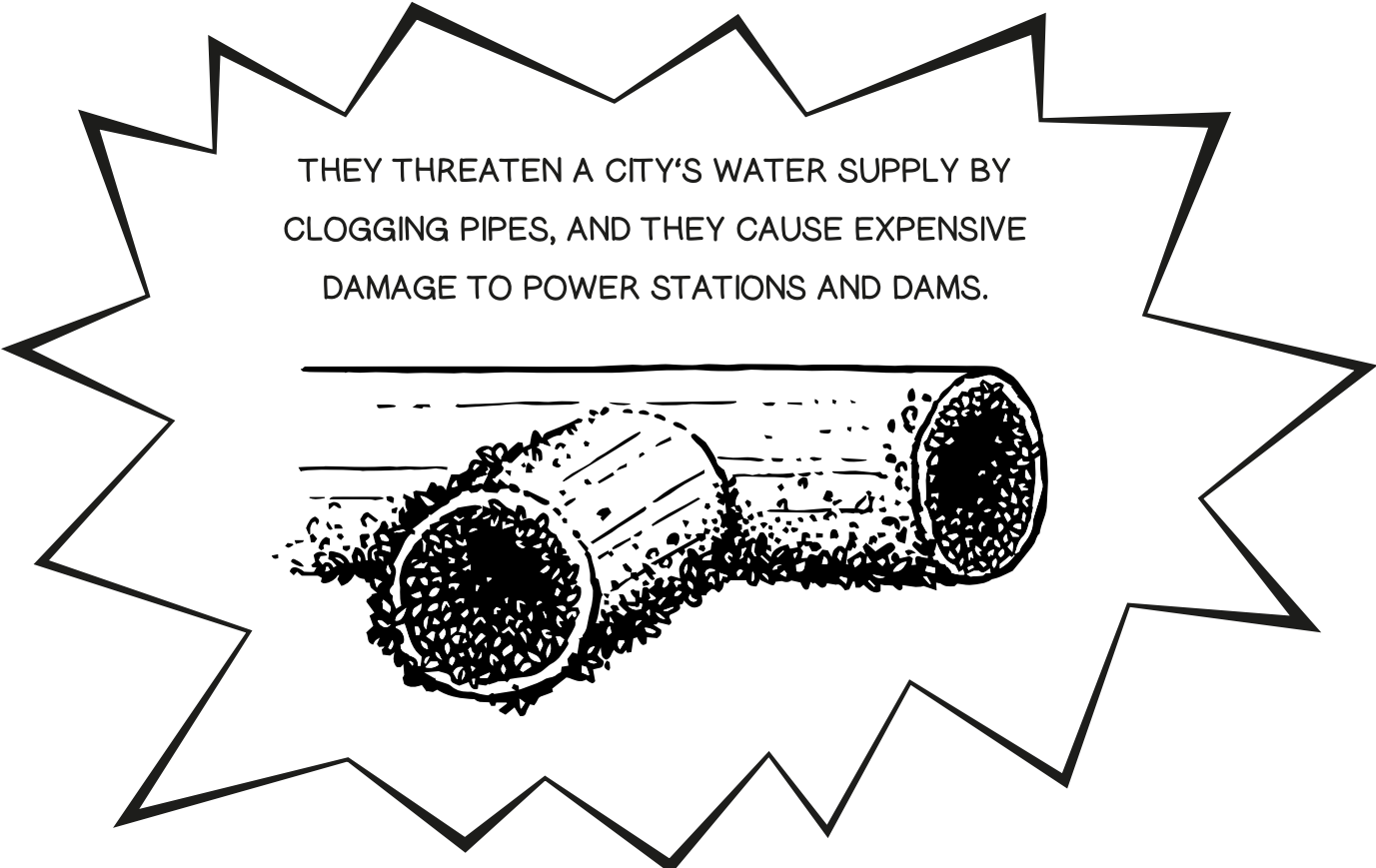
NOT IF PEOPLE ARE CAREFUL
AND PAY GOOD ATTENTION TO CLEANING,
DRAINING AND DRYING THEIR BOATS AND
WATER EQUIPMENT BEFORE TAKING THEM
FROM AN INFESTED LAKE TO
OUR LAKE.



DO YOU THINK
PEOPLE WILL REMEMBER
TO DO THAT?

I REALLY HOPE SO, UNI.
AFTER ALL, THE ZEBRA
MUSSELS AFFECT THEIR
LIVES, TOO.

HOW?



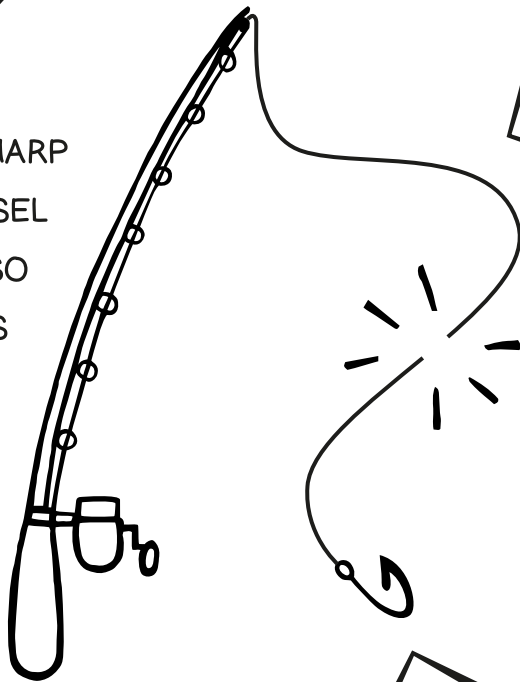
THEY THREATEN A CITY'S WATER SUPPLY BY
CLOGGING PIPES, AND THEY CAUSE EXPENSIVE
DAMAGE TO POWER STATIONS AND DAMS.



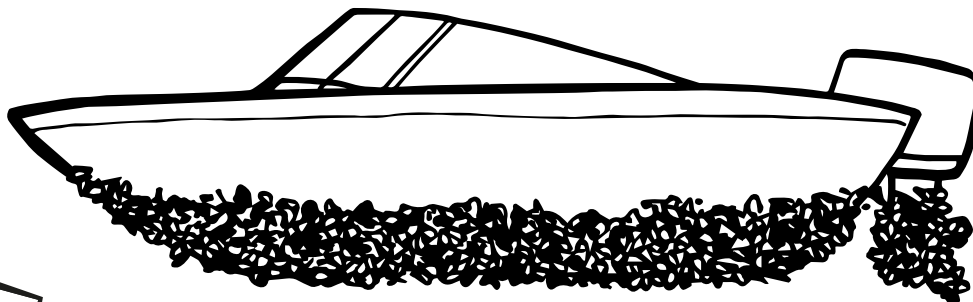
ZEBRA MUSSELS' SHARP SHELLS ALONG LAKE SHORES CAN CAUSE PAINFUL CUTS FOR CHILDREN AND ADULTS PLAYING OR WALKING ON THE BEACH.



THE SHARP
ZEBRA MUSSEL
SHELLS CAN ALSO
CUT ANGLER'S
FISHING LINES

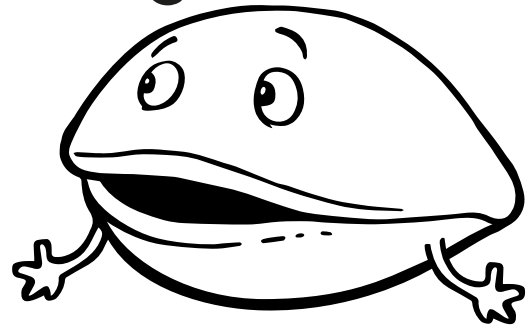
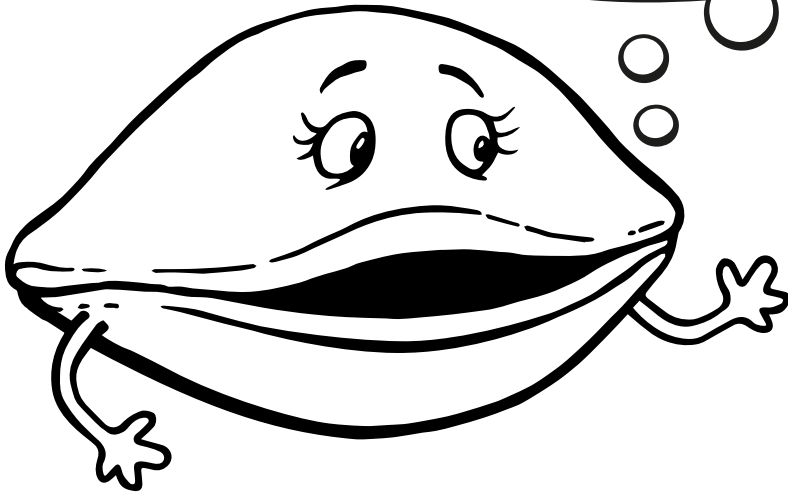


ZEBRA MUSSELS DAMAGE BOAT HULLS,
MOTORS AND OTHER WATER EQUIPMENT



BUT THERE IS MORE, MY CHILD.
ONCE THE ZEBRA MUSSELS
HAVE INVADDED, THE WHOLE
LAKE CHANGES

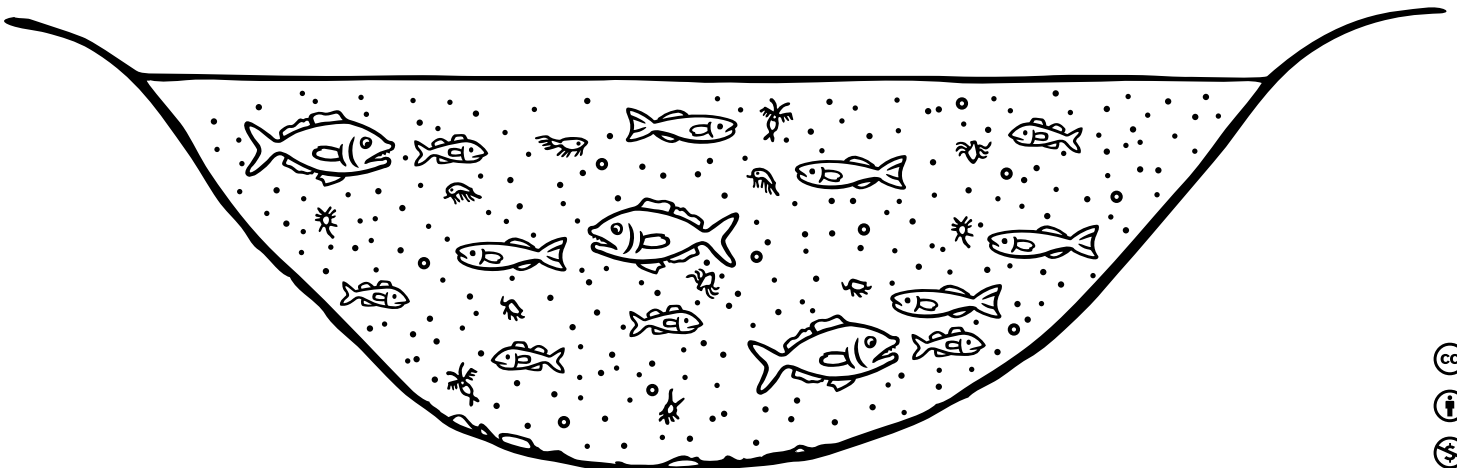
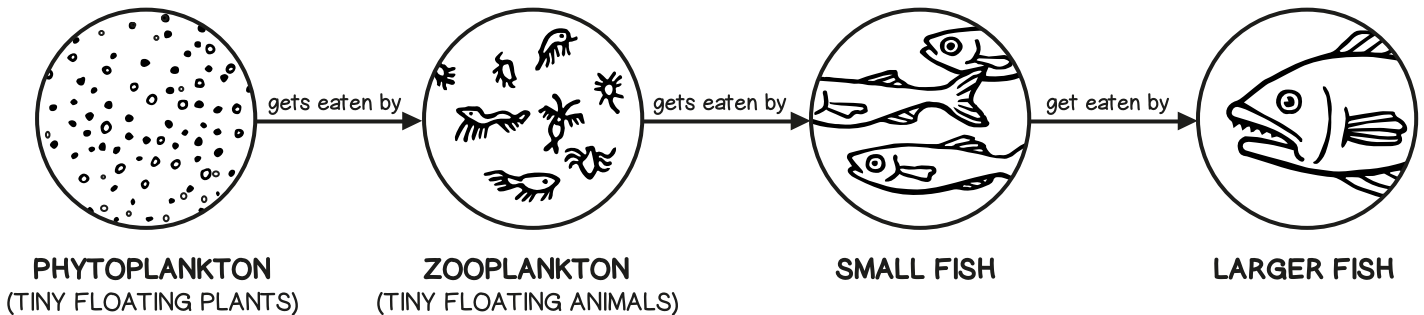
OH, IN WHAT
WAY ???



LAKE BEFORE ZEBRA MUSSELS

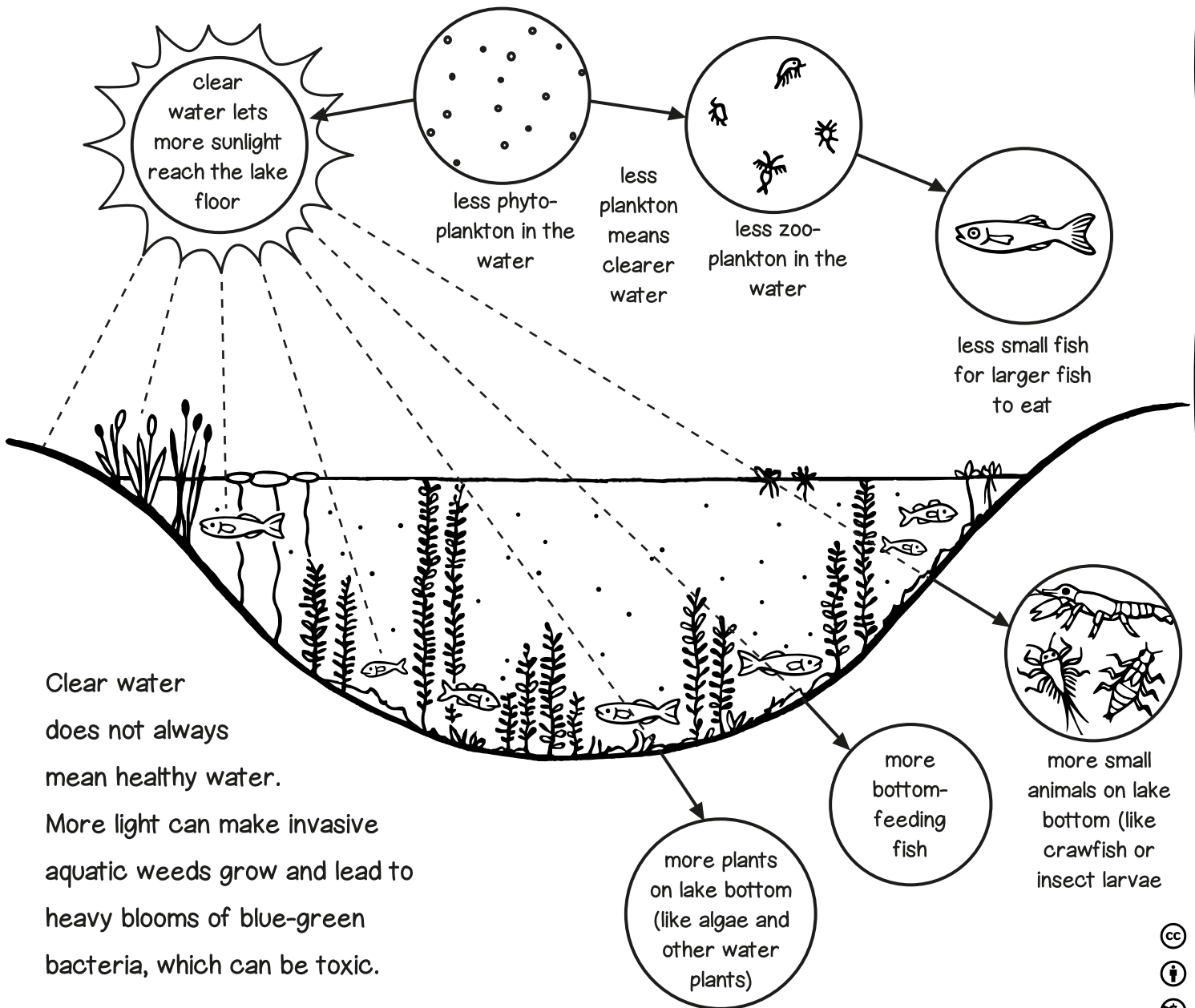
Tiny plants and animals called plankton are the base of the food web.

Small fish feed on the plankton throughout the lake.

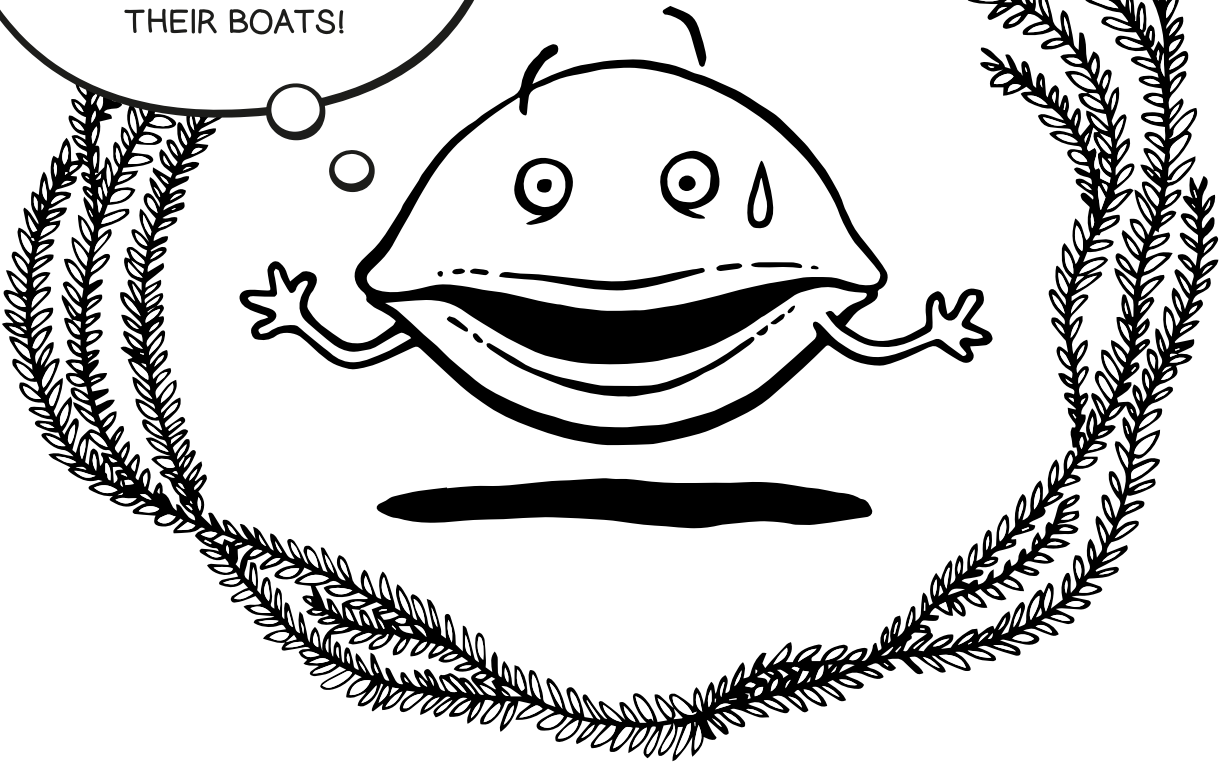


LAKE WITH ZEBRA MUSSELS

Because Zebra mussels eat a lot, they take away a big part of the plankton, which means there is less food for plankton-eating fish, native mussels and other organisms in the lake. Less plankton leads to clearer water, which also lets more sunlight reach the lake bottom. Sunlight together with Zebra mussel droppings (which act like a fertilizer) then help plants and animals at the bottom eat and grow. The lake will have more organisms on the lake bottom, but less throughout the lake.



WOW, ZEBRA MUSSELS
ARE A BIG PROBLEM!
I HOPE PEOPLE PROTECT
OUR LAKES BY CLEANING,
DRAINING AND DRYING
THEIR BOATS!



REMEMBER

BEFORE MOVING YOUR BOAT FROM ONE WATER BODY TO ANOTHER:

CLEAN

REMOVE PLANTS, MUD AND DEBRIS FROM BOAT AND EQUIPMENT.

DRAIN

DRAIN ALL WATER FROM THE BOAT, MOTOR, BILGES, LIVE WELLS, ETC.

DRY

DRY ALL EQUIPMENT COMPLETELY (APPROX. 1 WEEK) BEFORE
ENTERING NEW WATERS.



About the author

Astrid Schwalb is an Associate Professor at Texas State University and started working on freshwater mussels in 2004, when she first saw zebra mussels attached to native freshwater mussels in the River Spree in Germany. Most of her research is focused on native and invasive freshwater mussels in rivers and lakes of Texas. She has three kids and loves hiking and spending time with them at the river.



About the illustrator

Nicole Harwell was born and raised in Germany, where she started drawing as soon as she could hold a pencil. Since graduating from communication design school in 2004 she has been working as a graphic designer/artist first in Germany and then in Texas, where she lives today with her husband, daughter and two cats. Stop The Zebra Mussels is her first picture book for children but she is certain that there are many more to come.