STOP
THE ZEBRA MUSSELS

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STOP THE ZEBRA MUSSELS!

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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
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
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.

LIFE CYCLE OF NATIVE MUSSELS:
- Adult mussels
- Juvenile mussels
- Mussel larvae
- Fish host
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.
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.

CAUTION: SHARP SHELLS
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 INVADED, 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.

PHYTOPLANKTON (TINY FLOATING PLANTS) gets eaten by ZOOPLANKTON (TINY FLOATING ANIMALS) gets eaten by SMALL FISH get eaten by LARGER FISH
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.

Clear water does not always mean healthy water. More light can make invasive aquatic weeds grow and lead to heavy blooms of blue-green bacteria, which can be toxic.
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.