



River Kidz present Marty the Manatee



JULIA KELLY ©



PRESENTED BY MARTY THE MANATEE



A Letter from our Superintendent

THE SCHOOL BOARD OF MARTIN COUNTY, FLORIDA

500 East Ocean Blvd • Stuart, Florida 34994 • Telephone (772) 219-1200 Ext: 30222 • Facsimile: (772) 219-1231



Dear River Kidz,

Many years ago, I came to Stuart, Florida to interview for a teaching position in the Martin County School District.

I will never forget my first view of the aquamarine water of the Indian River Lagoon and the St. Lucie River. I thought how wonderful it would be to live here.

We are blessed to live in a community who cares so deeply about protecting and preserving our greatest resources, whether it is our waterways (or our children).

It is up to us to protect our natural assets. Thank you to all for their efforts to preserve our environment.

Sincerely,

Laurie J. Gaylord
Superintendent of Schools

Laurie J. Gaylord, Superintendent

School Board Members: Michael DiTerlizzi • Tina McSoley • Rebecca Negron • Marsha Powers • Christia Li Roberts

"An Equal Opportunity Agency"

A Welcome from Marty Section 1



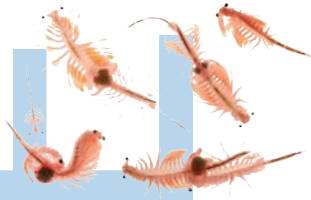
Hello, future River Kidz. I am Marty the Manatee! I live in and protect the St. Lucie River/Indian River Lagoon (SLR/IRL). Right now, my home is very dirty and this makes me so sad. I remember the river when it was crystal clear, full of seagrass and oysters... but they are hard to find these days. I have a great bunch of friends who are fighting for my home, and I hope that you will join us too!

The River Kidz speak out and raise **awareness** about local waterways. They believe that kids should have a voice for their SLR/IRL.

The River Kidz started with a lemonade stand and from there they grew and grew! They gather together to do projects and learn about how to save their lagoon. They have been to Washington D.C. to speak, presented art and read their letters at rallies and meetings full of adults who **appreciate** their voice.

My SLR/IRL home right now is facing some major problems. The water is not nearly as clean and clear as it used to be. When it rains a lot, all the bad water from Lake Okeechobee and the other **canals** comes and brings with it fresh water and **pollutants** that make me and my **aquatic** friends sick. Naturally, my home is **brackish**, which is a mix of fresh water and salt water. When the releases of freshwater happen, it harms many of my river friends. Seagrass, which is a very important food source to a lot of my friends, gets covered in muck when the **discharges** from canals start.

Seagrass needs sunlight to make **energy** so that it can live. Seagrass is a **primary producer**, meaning that it makes its own food and all the other animals depend on it to survive. If this muck blocks the sunlight from getting to the seagrass it dies because it can't **photosynthesize**. All of my friends are relying on you to help them. Will you join me in becoming a River Kid?



Common Name

Scientific Name

Family

Manatee

Trichechus manatus

Trichechidae

Dolphin

Tursiops truncatus

Delphinidae

Rosette Spoonbill

Platalea ajaja

Threskiornithidae

Blue Heron

Ardea herodias

Ardeidae

Striped Mullet

Mugil Cephalus

Mugilidae

Snook

Centropomus undecimalis

Centropomidae

Green Sea Turtle

Chelonia Mydas

Cheloniidae

Sea Grass

There are 7 species!

Hydrocharitaceae

Plankton

There are 1,000s of species!

Oyster

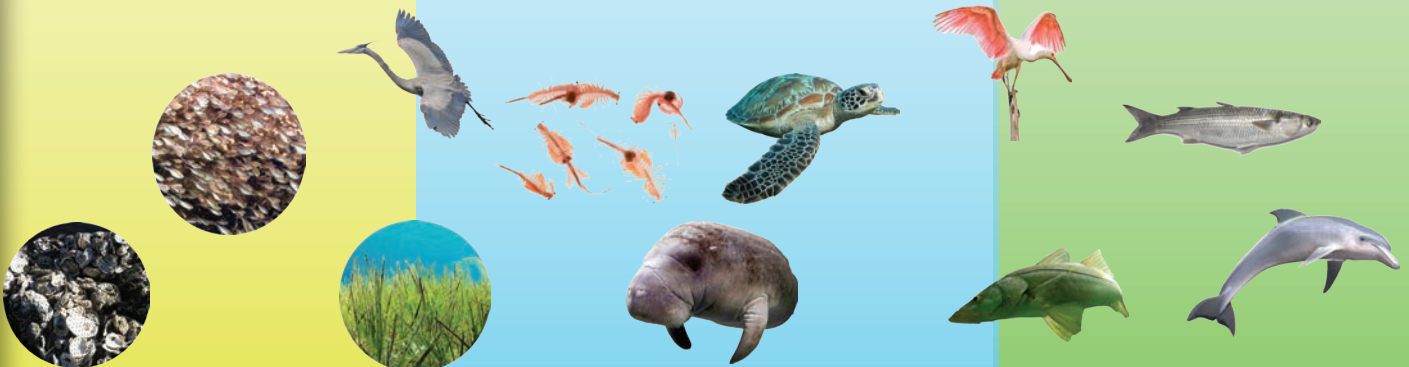
Crassostrea virginica

Ostreidae

Pin Fish

Lagodon rhomboides

Sparidae





Question Difficulty Key



Level 1



Level 2



Level 3



Level 4

QUESTIONS



What type of animal is Marty? Why do you think this?

- (a) Fish
 - (b) Reptile
 - (c) Mammal
-
-



What bodies of water does Marty live in? What type of water is in these waterbodies when the canals are not discharging?



What type of water is coming into the SLR/IRL from the canals and Lake Okeechobee when it rains or the government is releasing water?



What do you think some of the pollutants coming into the SLR/IRL are? How are they getting into our waterways?



Research: Describe the characteristics that classify Marty.



Marty talked about how the incoming freshwater is hurting his friends, why do you think the freshwater is bad for them?



What could you do to help Marty and his friends?



Many manatees are injured by boats. **GO SLOW, boat carefully.**



Almost 100 years ago, Florida looked very different than it does today. Lake Okeechobee did not have a [dike](#) around it and the SLR/IRL was not connected to the lake. The Kissimmee River flowed in a winding path, and the Everglades stretched south from the northern [estuaries](#) to Florida Bay.

New people began to move to Florida and wanted to settle here, build homes and start farming in the year-round sunshine. Lake Okeechobee naturally overflowed when it rained heavily. This overflow posed a problem for people living and farming near the [fertile](#) lake [watershed](#), especially after the 1928 Hurricane. The residents and the state of Florida asked [Congress](#) to help them control this natural situation. A reinforced dike was built around the lake by the Army Corp of Engineers (ACOE) to help keep it from overflowing and flooding the area where people were living and growing crops.



This dike is still there today but is even stronger. It is named after a past president, Herbert Hoover. After the dike was built, citizens and the government began draining the Everglades area for farming and the development of some of the cities people live in today. There are many [canals](#), but during this time two major release canal systems were put into place to assist the drainage of the vast and wet Everglades. These two major canals are the [C-44](#) and the [C-43](#). The [C-43](#) canal runs from Lake Okeechobee westward to the Caloosahatchee River. The second canal, the [C-44](#), runs from Lake Okeechobee eastward to the SLR/IRL.

When flowing, these canal connections disrupt the **salinity** of the Caloosahatchee and the SLR/IRL. The new fresh water flowed directly into these rivers/estuaries as they drained Lake Okeechobee. Another river that was impacted by human **intervention** was the mighty Kissimmee River. Originally, water flowed from the Northern Everglades into this river where it moved southward through natural **oxbows** that slowed the water, cleaning it and removing **sediment**. People wanted to settle, ranch, and grow crops in Central Florida. To do this, Floridians needed to quickly move water off of the land. By straightening the Kissimmee River, they believed that they could achieve this goal. As a result, the river was shortened and straightened to a length of 56 miles. The original length of the river was 134 miles. The straightening of the river caused the flow of the water to speed up. Dirty water **polluted** Lake Okeechobee which caused **disastrous** effects. Some of these effects included **harmful algae blooms**, raised water levels, and increased **nitrogen** and **phosphorus** levels within Lake Okeechobee.

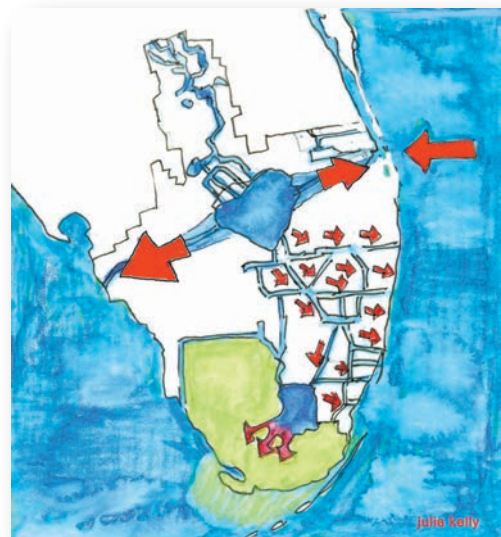
South of Lake Okeechobee, where the beautiful Custard Apple Swamp once was, lies the Everglades Agricultural Area, (EAA). Here, sugar, lettuce, tomatoes and other crops are grown. This area is filled with the richest soil in the country.



Where I am



Historic flow

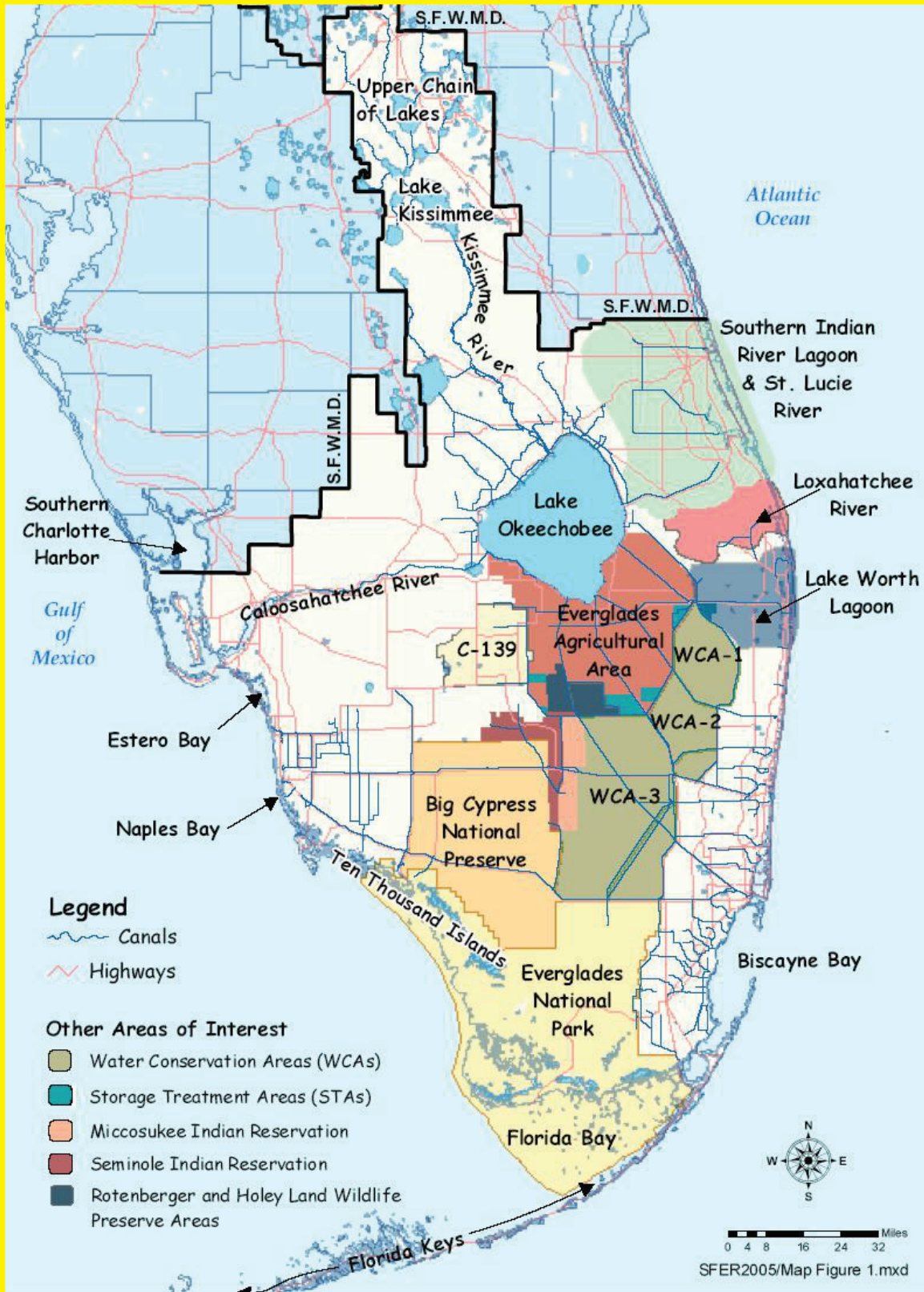


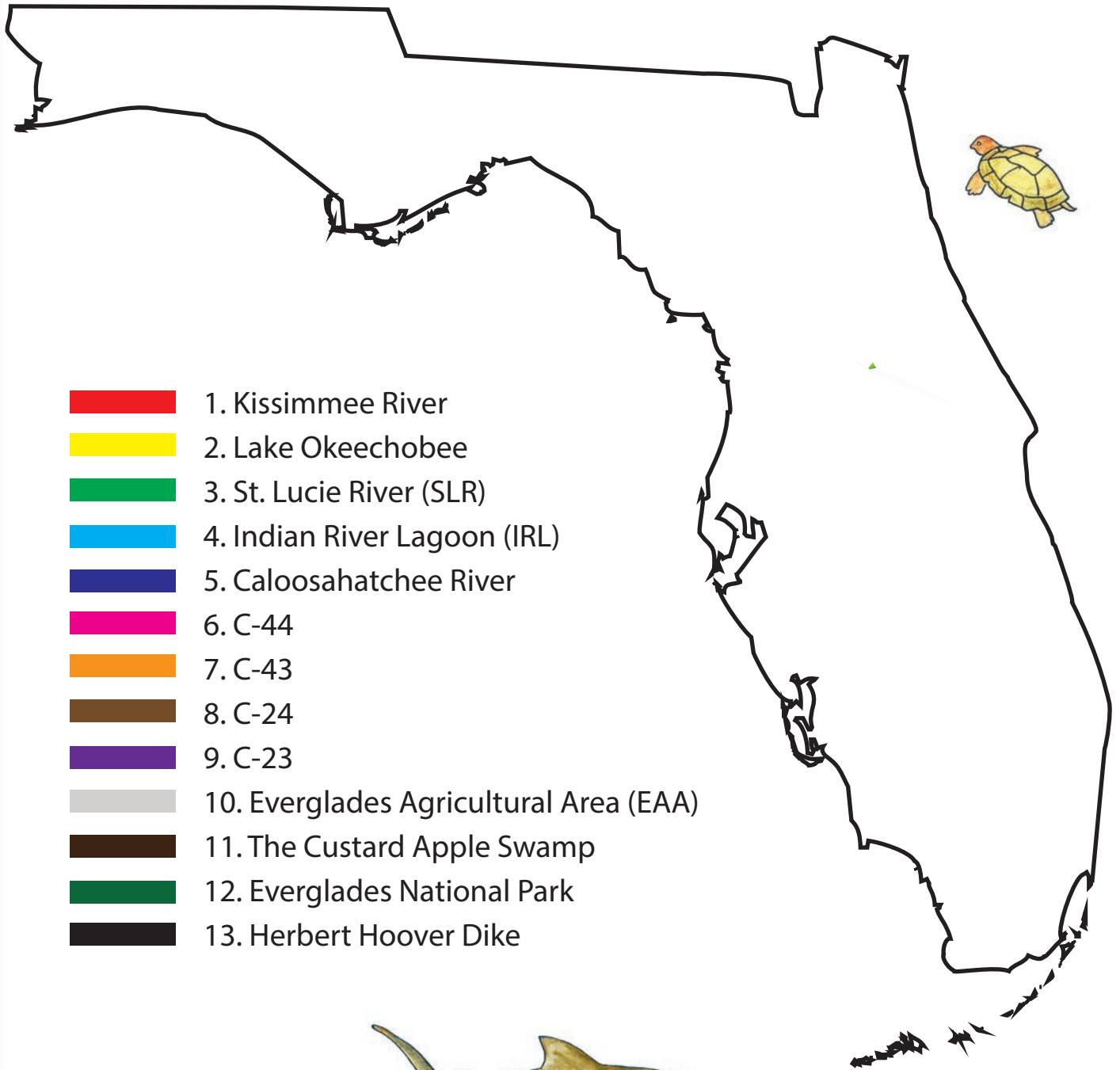
Current flow

The Great Custard Apple Swamp



Just over 100 years ago, south of Lake Okeechobee, the Great Custard Apple swamp grew. This area was a beautiful representation of the Everglades dynamic ecosystem.





-  1. Kissimmee River
-  2. Lake Okeechobee
-  3. St. Lucie River (SLR)
-  4. Indian River Lagoon (IRL)
-  5. Caloosahatchee River
-  6. C-44
-  7. C-43
-  8. C-24
-  9. C-23
-  10. Everglades Agricultural Area (EAA)
-  11. The Custard Apple Swamp
-  12. Everglades National Park
-  13. Herbert Hoover Dike

Locate the item and color the location on the map:



Questions



Why did people move to Florida?



Why would Lake Okeechobee overflow?



How long was the Kissimmee River before it was straightened?



Why did the people move to the Kissimmee area?



Describe how oxbows help the Kissimmee River?
What do they look like?

Questions



List in order what events happened in the history of Florida using the options below:

_____ The State and residents ask Congress to help build a dike.

_____ Flooding becomes a problem for people living in the watershed.

_____ New people move to Florida.

_____ A dike is built around Lake Okeechobee.

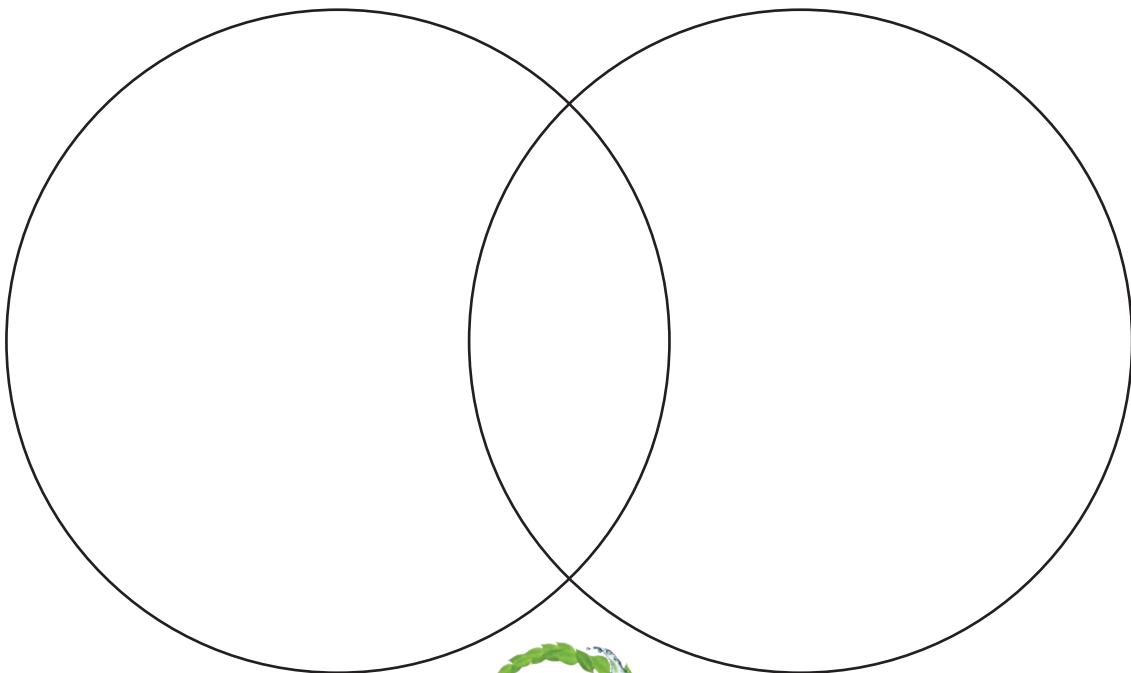
_____ The St. Lucie River/Indian River Lagoon is not connected to Lake Okeechobee.



Use this Venn diagram to compare and contrast the Kissimmee River before and after it was straightened.

Before

After



Questions



Why do you think the Kissimmee River was straightened?
Research on the internet with a partner who did this and why.



Why was the dike built around Lake Okeechobee?



What do you think causes harmful algal blooms?
Why do you think these blooms are harmful to the environment?

Questions



Why would the land near the lake be more fertile than land farther from the lake?



What was the Great Custard Apple Swamp that was found south of Lake Okeechobee?



How are nitrogen and phosphorus negatively affecting Lake Okeechobee?



DISCHARGES FROM LAKE OKEECHOBEE AND WATERSHED

ABOVE THE WATER



BELOW THE WATER



The Lost Summer

Section 3



You might remember the Summer of 2013? There was **excessive** rain that summer and with the rain came a lot of **discharges**. Lake Okeechobee's water level got dangerously high. The Army Corps of Engineers (ACOE) was forced to release the water to help guarantee the safety of the aging Herbert Hoover Dike. The freshwater came into the **C-43** and **C-44**, then flowed into the Caloosahatchee, the SLR and the Indian River Lagoon. This massive amount of freshwater hurt the estuary very badly. The Indian River Lagoon is my home and it was and still is being destroyed by these discharges.

At one time, it was one of the most **bio-diverse** ecosystems in North America with over 4,000 species of plants and animals: 700 species of fish, 300 species of birds and 1,300 species of plants! I was surrounded by all types of friends. Oysters, dolphins, other manatees, stingrays, sea turtles and fish; all sorts of other animals lived around me in the lagoon, and we all got along so well! Times changed and the **canals** and **releases** from Lake Okeechobee brought in too much fresh and **polluted** water, especially during the "Lost Summer" of 2013. The seagrasses could not tolerate the dirty water that was now low in salinity; **algae blooms** formed and blocked out the sunlight; the seagrass could not **photosynthesize**. These blooms were caused by the freshwater and high **nutrients** and made it so that my human friends could not swim in the lagoon. There were signs up all summer that said "No Swimming." That is why we call it the "Lost Summer." All the oysters living in the lagoon died; seagrass died by around 80%. Birds had to find a new place to hunt for fish and weren't soaring above the lagoon like they usually do.

The future is up to you, and that gives me hope that my home can be restored to what it once was.

- Marty



Questions



Who are some of Marty's friends?

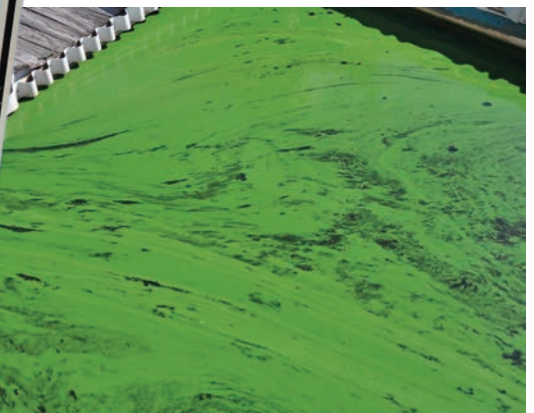


What caused Lake Okeechobee's level to rise?



Which species were impacted by the freshwater?

The Lost Summer



Photos courtesy of Mary Radabaugh



Why was 2013 called the Lost Summer?



What was blocking the sunlight from the seagrass?



Why is freshwater so harmful to the lagoon?



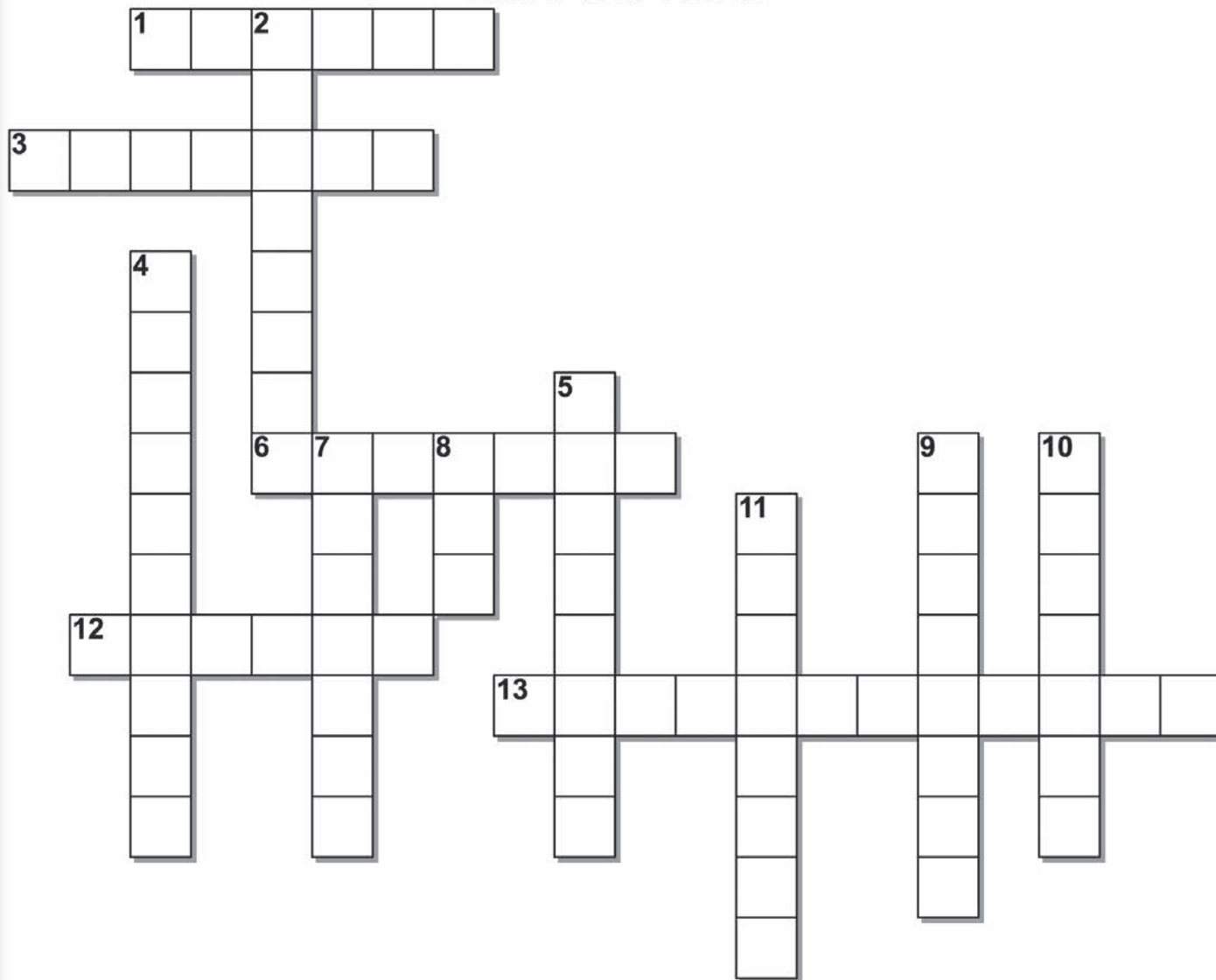
What does the lake level have to reach to prompt discharges in the Indian River Lagoon?



Directions: Refer to the glossary for clues.

Crossword

Save the River



Across:

- 1 A bend in a river shaped like a "U". (plural)
- 3 A brackish body of water that is influenced by tides.
- 6 A place in an ecosystem where an organism normally lives.
- 12 Any various warm-blooded vertebrate animal of the class mammalian including humans, characterized by a covering of hair on the skin, and in the female, milk producing mammary glands for nourishing their young.
- 13 Having many different species in one area.

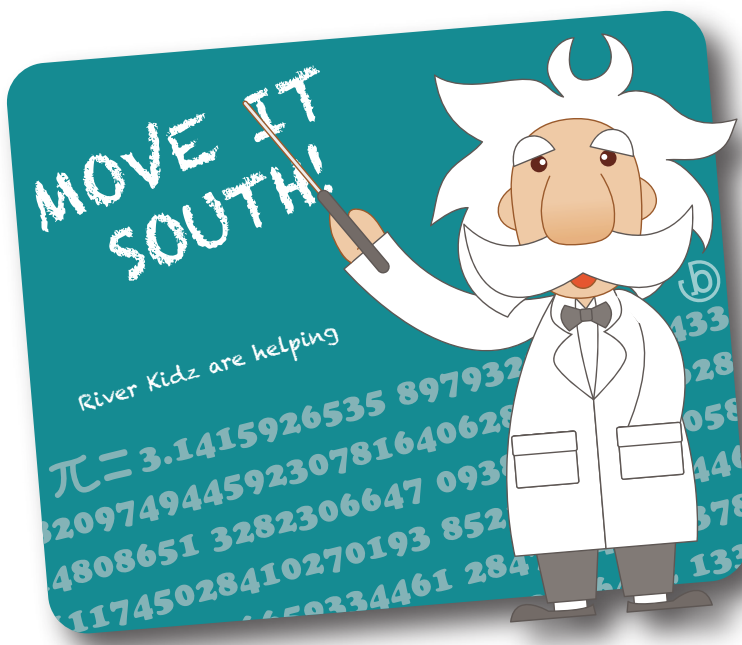
Down:

- 2 A mixture of fresh and saltwater.
- 4 Harmful substance found in an area.
- 5 Measure of the salt in a water sample.
- 7 Living in a water environment.
- 8 156 mile waterbody with brackish water on the east coast of Florida.
- 9 Branch of Government that makes laws.
- 10 Rich in plant nutrients.
- 11 Material from the land that reaches the water.



Scientists and engineers have been working on plans to move the water south into where the Everglades once was. The southern part of the Everglades needs the water that we are sending into the estuaries. If we move that freshwater from Lake Okeechobee south, the estuary would be healthier and the Everglades would benefit too!

Before the water can move south, we have a few major problems to deal with. The first of these problems is that the water is **polluted**. The **nitrogen** and **phosphorus** in the water will harm the Everglades and cannot be moved south until it is cleaner. The **nitrogen** and **phosphorus** comes mostly from agriculture, watershed runoff and people's yards. The second major problem is the location of the Everglades Agricultural Area (EAA). Some of this land is needed to move water from Lake Okeechobee into the Everglades but is currently being farmed. If the same land can be bought from the farmers, then it could help send some of the water down where the amazing Great Custard Apple Swamp once was. Currently, scientists are researching ways to "move the water south."



Get Involved

Being a River Kid is a big part of solving the problems facing the Lagoon and the Everglades. If you learn as much as you can about these topics, then you can help my friends and me. There are lots of ways that you can help; you have a voice that people in charge want to hear. Some of the ways that you can get involved are by going to meetings and speaking out for my friends and the waterways we live in. You can draw pictures and write letters and send them to local, state, and federal politicians, even to the president of the United States! You could come to River Kidz events and help make changes as a group.



You could participate in reef ball and oyster deployments with the Florida Oceanographic Society. You could visit the Environmental Studies Center not just with your class but with your parents. You can tell your friends about the animals that depend on the water being clean and inspire them to join the cause. One thing is for sure, with your help and your voice we can clean up the water and send it south.



Questions



Who has been working on plans to move the water south?



What two elements are heavily polluting the water?



What are some of the ways that you can help the Indian River Lagoon?



Name three ways that you can help the Lagoon that are not listed in the “Move it South” passage.

HOW YOU HELP



Vocabulary

Appreciate- To value something highly.

Aquatic- Living in a water environment.

Awareness- Knowing or learning about something.

Biodiversity- Having many different species in one area.

Brackish- A mixture of freshwater and saltwater.

Canals- Man-made waterways intended to move water from one area to another, usually straight and narrow.

Congress- Branch of Government that makes laws.

Consumer- An organism that feeds on other organisms for food.

C-43- Canal that runs from Lake Okeechobee to the west coast of Florida, specifically the Caloosahatchee River.

C-44- Canal that runs from Lake Okeechobee to the east coast of Florida, specifically the St. Lucie River.

Dike- A man-made barrier that surrounds a body of water. (Lake Okeechobee has the Herbert Hoover dike).

Disastrous- Having serious results.

Discharges- To release water.

Disrupted- To interrupt the way things normally are.

Energy- The capacity to do work.

Environment- The sum of conditions affecting an organism, including all living and nonliving things in an area such as plants, animals, water, soil, weather, landforms and air.

Vocabulary

Estuary- A brackish body of water that is influenced by tides.

Excessive- In large amounts. (More than ideal)

Fertile- Rich in plant nutrients.

Food chain-Transfer of energy through various stages as a result of feeding patterns of organisms.

Habitat- A place in an ecosystem where an organism normally lives.

Harmful Algae Bloom- When algae grows at high rates and causes damage to the surrounding water environment.

Indian River Lagoon (IRL)- 156 mile waterbody with brackish water on the east coast of Florida.

Inference- The act of reasoning from factual knowledge or evidence

Intervention- Action and regrouping that is intended to help improve a current situation.

Life Cycle-The entire sequence of events in an organism's growth, development and reproduction.

Light- Electromagnetic radiation that lies within the visual range.

Mammal- Any various warm-blooded vertebrate animal of the class mammalian including humans, characterized by a covering of hair on the skin, and in the female, milk producing mammary glands for nourishing their young.

Vocabulary

Model- A systematic description of an object or phenomenon that shares important characteristics with the object or phenomenon. Scientific models can be material, visual, mathematical or computational and are often used in the construction of scientific theories.

Nitrogen- Naturally occurring element that improves plant growth and is needed by all living things.

Observation- What one has observed using senses or instruments.

Oxbows- A bend in a river shaped like a “U.”

Organism- An individual form of life of one or more cells that maintains various vital processes necessary for life.

Phosphorus- Naturally occurring element that improves plant growth and is needed by all living things.

Photosynthesis- A process performed by plants and algae using light to produce energy.

Pollutants- Harmful substance found in an area.

Primary producer- The first link in a food chain; algae and plants are examples of these.

Salinity – Measure of the salt in a water sample.

Sediment- Material from the land that reaches the water.

Sun- Star closest to the Earth and the center of our solar system.

Watershed- Land or area that drains into a waterway, river or stream.

Waterways- A navigable channel of water.



River Kidz is a division of The River Coalition



Evie Flaugh and Naia Mader of the Town of Sewall's Point
(River Kidz Founders)



"Our mission is to speak out, get involved, and raise awareness because we believe kids should have a voice in the future of our rivers."

Hello River Kidz!

We are Mrs. Lucas' Marine Science II class. Our class wrote the book that you are now holding in your hands! We all worked extremely hard during our senior year learning and writing so that you could read about the St. Lucie River/Indian River Lagoon that we all love so much. For as long as we can remember, the Indian River Lagoon has played a huge part in our lives. It never occurred to us that anything bad could happen to such a beautiful place. During the summer of 2013, there were days when a sea of greenish-blue algae covered the surface of the water as far as we could see. Not only the sight of the river devastated us, but also knowing the harm this devastation was causing to all the living things. We feel that it is important for you to learn about Florida's waterways, and what you can do to help make them healthy and clean again. You have a voice that people want to hear; now that we are all off at college, it is your turn to speak up for our environment just like we did! We hope that you will help bag oyster shells, pick up trash at the beach, and speak up at rallies and government meetings. Most of all, we hope that you become and will always be a River Kid! It is important that we all learn and care about our environment and it is really important to make your voice heard!

Thank you for all you will do to help protect the place we love while we are away at college!

Sincerely,

Mrs. Lucas' Marine Science II class, 2013-2014

Jensen Beach High School Marine II Honors



Samantha Anderson



Stephen Baron



Travis Bellas



Ryanne Bentley



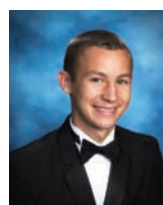
Canaan Campo



William Carell



Michael Dickens



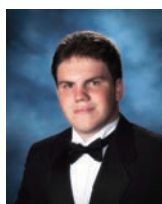
Hunter DuBois



Emma Harland



Christopher Justice



Alexander Kennedy



Jordan Kushner



Timothy Loveland



Annie Majette



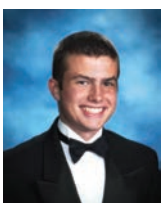
Hayley Mazur



Bailea McNeil



Ryan Gallaher



Austin Gasiorek



Alexandria Hall



Angeli O'Connor



Derek Provencher



Emily Rainey



Larkyn Ridgway



Marty Manatee

Thank you

The River Kidz and Marty the Manatee would like to thank all of the people and businesses, especially students from local schools, that dedicated their time and efforts into creating the River Kidz.

We would also like to thank those who specifically gave towards our second edition River Kidz workbook campaign.

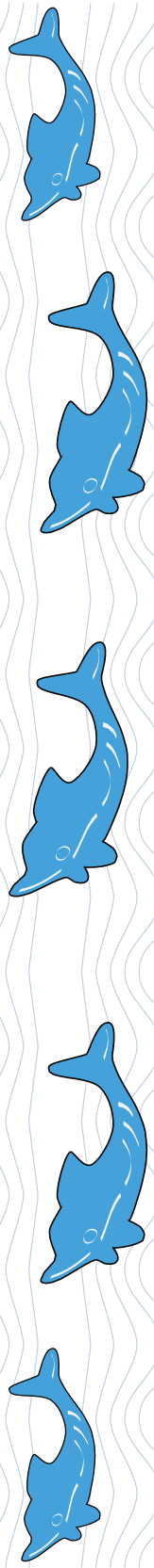
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Indian Riverkeeper, Marty Baum
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JBHS Marine Science II
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Conrad Family
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Weissing Family
Lucas Family
Thurlow Family
Livingston Family
Marsha Coates
Stacey Heatherington
James Campo
Gayle Ryan
Trena Merendino

All others who donated after our printing date.

River Momz: Nic Mader, Crystal Lucas, Valerie Gaynor,
Jacqui Thurlow-Lippisch, and River Dad, creative consultant [Jason Leonard](#)



Certification of Completion

is hereby granted to

For Successfully Completing the



Educational Workbook

Date

Signature



*The River Kidz are here
Our mission's quite clear
We love our river and ALL its critters
Let's hold it all dear*

*Please keep our river clean
So we don't have to scream
"Go shut the locks" and walk the talk
and quit (pause) being so mean*

*To all the little fish
It's our biggest wish
To keep them healthy and swimming around
And sometimes on our dish*

*North Fork, South Fork, Manatee Pocket!
We gotta keep it pristine...
Sand Bar, Pecks Lake, Indian River
The color's blue not green!*

*What about the seagrass?
It's disappearing so fast
What will happen? No shrimp-a-snappin'?
It's just not gonna last*

*The dolphins and the turtles
We know they have some hurdles
Nets and boats and hooks in throats
Our blood begins to curdle*

*North Fork, South Fork, Manatee Pocket!
We gotta keep it pristine...
Sand Bar, Pecks Lake, Indian River
The color's blue not green!*

*Florida's big mistake
Is discharge from the Lake
The runoff and the fer-ti-lizer
Ruins us, FOR PETE'S SAKE!*

*The River Kidz are here
Let's not live with fear
We'd lose our river and ALL it's life
We better keep it clear!*



RIVERSCOALITION.ORG



Sample Letter

January 30, 2015

Dear Honorable Commissioner _____,

I am writing in support of all projects that help the St. Lucie River/ Indian River Lagoon as well as Marty the Manatee and his friends. Please help us secure the future.

Sincerely,

You can address your letter to many diferent people, just choose the politician you want to write.

You can draw pictures of favorite river animals on your letter. Your teacher will help you find the address and where to mail the letter.

This workbook is dedicated to Jensen Beach High School graduate,

Kyle Conrad 1989-2010.

*Soccer star; gifted athlete; lover of our ocean, rivers and reefs;
outstanding person; beloved friend...*



*The creators of the workbook wish to thank
Jensen Beach Elementary School teacher, Mary Ann Conrad
for her work in creating the first River Kidz
workbook that laid the foundation for the second edition.*





You are our Rivers' Future!

