

KINGS BAY RESTORATION PROJECT

Crystal River, Florida

Pilot Project Produces Immediate Results
for Outstanding Florida Waters



www.kingsbayrestorationproject.com



OUR GOAL

THIS



Not This



Clean Water Means Business

Pilot Project **SNAPSHOT**



In 2015, the Florida Legislature appropriated \$1.6 million for a pilot project to begin the process of cleaning up Kings Bay. Kings Bay and the Crystal River are designated “Outstanding Florida Waters and part of a National Wildlife Refuge. Kings Bay is also home to Florida’s largest west coast winter refuge for manatees.

The eight week Pilot Project removed more than 8,000 cubic feet of toxic algae from three canals (3.41 acres), that feed Kings Bay. The algae, called *Lyngbya* (Lingbeeah), is choking the springs, depleting oxygen, crowding out native plants and threatening manatees, wildlife ecosystems and the natural habitat that ultimately effects the economy and the environment.

After the *Lyngbya* removal, native grasses were planted and protected with specially designed exclusion cages that allow the plants to take root and grow. The growth of these plants has already surpassed the experts expectations.



So far ... so great!

The Pilot Project's immediate success is outstanding.

- More than **70 spring** vents have been **unclogged** and reopened. Fresh spring water is now flowing freely from these vents, which were previously unidentified on survey maps because they were covered in dead *Lyngbya*.
- **Bonus:** Initial results revealed more than 99% of the phosphorus and 40-70% of the nitrogen polluting the water was removed as part of the process.

PILOT PROJECT DETAILS

THE LOCATION

Kings Bay is part of the **Crystal River (Citrus County)**, with multiple first and second magnitude spring systems that begins inland and flows for seven miles into the Gulf of Mexico. The Crystal River is among a number of “Outstanding Florida Waters” and portions of Kings Bay are designated as a National Wildlife Refuge.

Kings Bay and the Crystal River are even more important because *hundreds of manatees spend their winters here - more than anywhere else on the Gulf Coast.

*January 2016 USFWS aerial manatee survey sited 758 manatees



Map Data ©2016 Google

Kings Bay Facts

- Fed by multiple 1st and 2nd magnitude springs
- Designated “Outstanding Florida Waters”
- National Wildlife Refuge
- Largest Gulf Coast winter refuge for manatees



PILOT PROJECT DETAILS

THE PROBLEM

Kings Bay was once a pristine, crystal-clear oasis. But over the past two decades, the Bay has been overrun by an invasive algae called *Lyngbya*. *Lyngbya* forms long, slimy hair-like strands that can grow as much as five feet long in thick, tangled mats. The mats block sunlight and prevent native grasses from growing.

Lyngbya is harming the ecosystem in Kings Bay and other Florida waterways as it:

- **clogs** the springs and **reduces** water flow
- **crowds out native plants** that provide food and shelter to manatees, turtles and other wildlife
- **reduces oxygen and habitat** for fish, shellfish and crabs, impacting recreational and commercial fishing and crabbing
- **toxic** if ingested by manatees or pets
- produces a “rotten egg” **smell**



PILOT PROJECT DETAILS

THE CHALLENGE

Across Florida, there have been numerous attempts over several decades to clean up algae and other invasive plants. Even now there are several projects underway in the Crystal River: *One Rake at a Time/Rotary Project* and the *Hunter Cove Restoration Project/Southwest Florida Water Management District (SWFWMD)*. Unfortunately, *Lyngbya* is invasive and aggressive, and grows quickly in low light conditions.

Some local clean up efforts also involve planting native species, like tape grass or eel grass, in place of *Lyngbya*. **But until now**, no one has achieved sustainable success because the new grass gets eaten by manatees, turtles and other herbivores before it can take root and grow.



PILOT PROJECT DETAILS

THE PILOT PROJECT

In 2015, Florida Legislators approved an appropriation of \$1.6 million to fund an innovative pilot project to remove *Lyngbya* and restore the natural habitat. Managed by a not for profit community group of volunteers called Save Crystal River, Inc., the project kicked off these restoration efforts September of 2015 in a 3.4 acre test site within canals that feed Kings Bay.

The project involved three steps:



REMOVE

Lyngbya and many feet of decayed organic material



RESTORE

Native Grass using protective cages



MAINTAIN

Native Grass Protection



Pilot Project **DETAILS**

The Pilot Project:

Step 1: *Lyngbya* Removal

The algae was removed through specially designed vacuum equipment. The suctioned material was transported through vacuum tubes into a mechanical separator located on shore. The water was filtered out and returned to the canal, and the algae was dried and transported to an offsite non profit agricultural facility to be used as a soil additive.



Manatee-friendly modified “suction barges” with mechanical and hand-held hoses were used to remove *Lyngbya* but not the natural sediment.



The Triflo Mechanical Dewatering System separates the sediments, while fine mesh filters remove and clean the water, which is returned to the canal.



Mechanical separator

Fact

Over 8,000 cubic yards of *Lyngbya*, 90% of phosphorous and 40-70% of nitrogen, **key nutrient sources for algae growth** polluting our waters was removed.

Pilot Project **DETAILS**

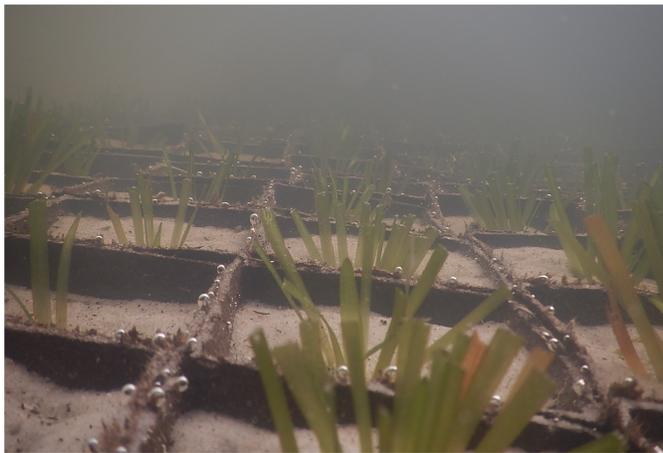
The Pilot Project

Step 2: Restoring the Natural habitat

Once the *Lyngbya* was removed, aquaculture specialists planted tape grass — a natural, native habitat for fish and crabs. Tape grass is also a good source of nutrition for manatees, turtles, waterfowl, crayfish and snails. The tape grass (*Vallisneria americana*) was grown in aquaculture facilities until its root structures were developed, then transplanted in peat pots and placed in the water on the canal floor.



Tape grass growth in only two (2) months



Tape grass planted underwater shows oxygen bubbles produced by grasses

Fact

The tape grass selected for the project was created by the University of Florida and nicknamed “Rock Star” because of its impressive performance in the battle against *Lyngbya*. This grass outcompetes *Lyngbya* for available nutrient resources.

Pilot Project **DETAILS**

The Pilot Project

Step 3: Maintain restored habitat

Tape Grass Protection. What makes this project so unique is that all the newly planted tape grass is surrounded by **manatee friendly specially designed patented** “exclusion cages”, which prevents herbivores from eating it before it has a chance to take root.

Once plantings are thriving, the cages will be easily removed **and used for future Kings Bay Restoration Project(s)**.



Specially designed, patented exclusion cages designed to protect newly planted tape grass

Fact

Over 360 patented exclusion cages protecting 1,800 “Rock Star” grasses

Pilot Project **DETAILS**

KINGS BAY **RESTORATION** PROJECT

REMOVE

Invasive algae that has overtaken native grasses and habitats

3.41 acres of canals cleared

8,000+ cubic yards of Lyngbya removed

99%+ amount of phosphorus pollution removed from treated water

50%+ amount of nitrogen pollution removed from treated water

8 number of weeks for mobilization, vacuum dredging, and planting

RESTORE

Healthy ecosystems will be replanted into clean canals

74 new, previously unidentified spring vents opened and flowing

1,800 native "Rock Star" grasses planted

MAINTAIN

Newly planted grasses to prevent recurrence of algae overgrowth

Improve water quality

Provide food & shelter for native species

360 manatee friendly patented exclusion cages protecting the grasses

WHAT'S NEXT?

About 80

acres still to be cleaned and restored

July 2, 2023

target completion date – Crystal River's 100th Year Anniversary



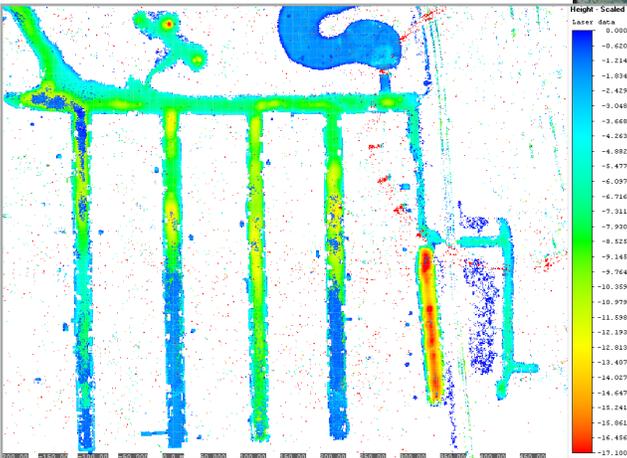
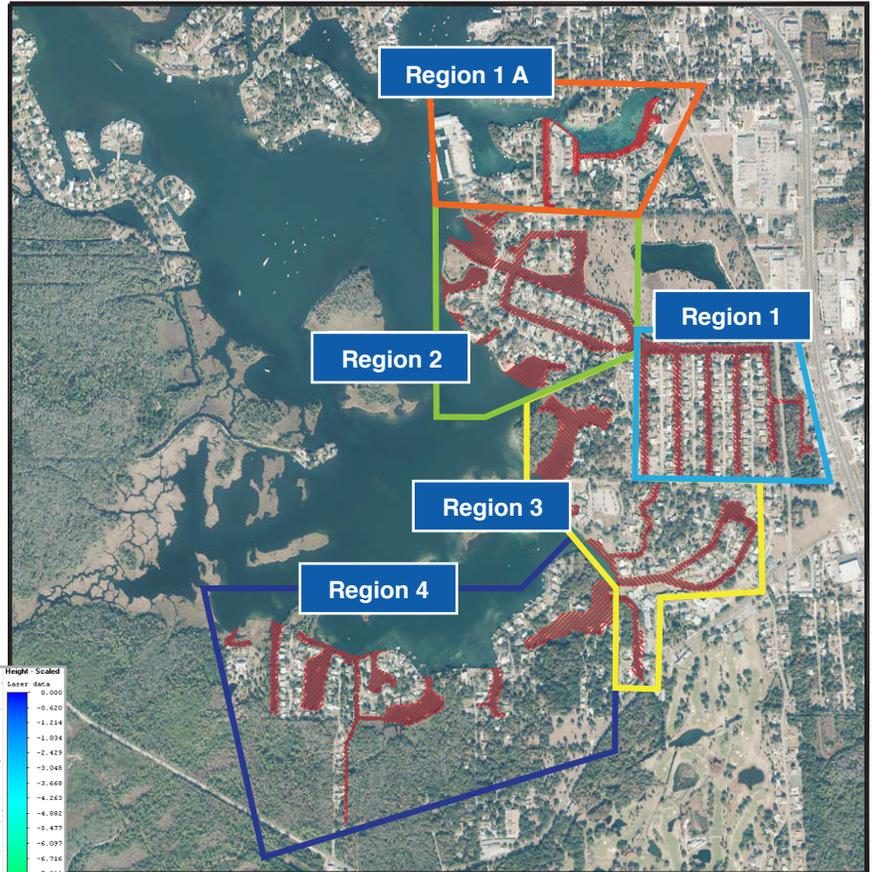
Clean Water Means Business

www.kingsbayrestorationproject.com



WHAT'S NEXT

We still have more work to do to continue to preserve and restore the natural habitat in our community for future generations. The estimated cost to complete this project is \$40 million over the next eight years. Given the overwhelming success of the pilot project we are committed to cleaning and restoring the entire Kings Bay by the City of Crystal River's Centennial Celebration, July 2, 2023. Clean Water means Business.



Projected regions to be restored by Save Crystal River, Inc.

RIEGL USA donated Aquatic Aerial Demonstration LiDAR baseline scans and reports to help SCR identify future water restoration needs.

GOOD FOR CITRUS COUNTY

1. Kings Bay is important **ECONOMICALLY**

- Kings Bay and Crystal River play a critical role in the regional economy.
- In fact, **tourism infused \$182.3 million into the economy** in 2015 (*Citrus County Visitors and Convention Bureau)
- Hotels, attractions and tour operators depend on tourists visiting the area to swim, dive, kayak, paddle board, hike, take photographs and see manatees.
- Commercial fishermen and recreational charters depend on the waterways for fishing, scalloping and crabbing.

2. Kings Bay is important **ENVIRONMENTALLY**

- Kings Bay comprises more than **600 acres** and is fed by multiple 1st and 2nd magnitude springs creating the second largest group of springs system in the State of Florida.
- The springs are the headwaters of Crystal River, which helps supply critical fresh water to St. Martins Reef, one of the principal sea grass beds and estuaries in the state of Florida.
- Kings Bay and Crystal River are classified as a National Wildlife Refuge and together, are the largest winter refuge for manatees on Florida's Gulf Coast.



GOOD FOR FLORIDA



The Kings Bay Restoration Project is good for Florida because:

- 1. IT WORKS.** This project is the only one of its kind and the **first to see** this type of **success**.
- 2. It can be replicated across the state.** Hundreds of Florida springs and waterways have been invaded by *Lyngbya* and other types of algae. This innovative process will become a model for the state, helping other Outstanding Florida Waters return to their natural best.
- 3.** Clean water has a **direct impact on Florida's economy**. Water is our state's lifeblood and we must act to preserve and protect it for future generations to enjoy.
- 4. A healthy ecosystem benefits all species**, the local community, the great state of Florida and its visitors from around the world.

COMMUNITY SUPPORT



Educating Future Generations

- Save Crystal River, Inc. and Sea & Shoreline are currently working with Citrus County schools to educate students and teachers about the pilot project. Students are participating in growing native grasses and teachers are teaching on the importance of habitat restoration. The lessons support Florida innovative movement that embraces STEM skills. (Science, Technology, Engineering and Math)
- Teachers and students wrote over 6,800 letters of support for clean water in Citrus County. These letters taken to Tallahassee as part of the Citrus County Legislation Days in March of 2015.
- SCR, Inc. is seeking and pursuing additional educational grants.
- SCR, Inc. received a generous donation by a local private citizen of a highly visible building located on Highway 19. Plans are underway to use this building to develop a high profile public education program. This education program is intended to help raise awareness of the Kings Bay Restoration Project as well as appreciation, value and stewardship of clean water.

COMMUNITY SUPPORT

In 2015, Save Crystal River, Inc.

1. Awarded the Mayors Award
2. Received a special Proclamation from the City of Crystal River acknowledging SCR's dedication and hard work in the community and proclaiming to clean the entire Kings Bay by July 2, 2023 , to celebrate the City's Centennial Anniversary.
3. Received unanimous support from the Board of County Commissioners to make Kings Bay Restoration the #1 priority project for BP RestoreAct Settlement dollars.
4. Citrus County Board of County Commissioners remains a strong funding partner in support of the Kings Bay Restoration Project.
5. Received continued funding and in-kind volunteer support from private citizens.
6. Ongoing active community support received thru local fundraising events.



Proclamation



Murder Mystery Fundraiser



Mayors Award

COMMUNITY SUPPORT



City of Crystal River

123 Northwest Highway 19
Crystal River, Florida 34429
Telephone: (352) 795-4346
Facsimile: (352) 795-4351

January 17, 2016

Re: Kings Bay Restoration Project

To Whom It May Concern:

The City of Crystal River is incredibly fortunate to have an abundance of natural water resources and an array of ecosystems sustained by such resources present within the community. A high quality of life and economic stability are sustained through the utilization of these resources, however with that comes the responsibility to maintain and preserve these resources for future generations. One of the related challenges centers upon the long-term accumulation of non-native aquatic vegetation that has left the water bottoms with significant amounts of decayed organic material (muck).

Last year, the Florida Legislature recognized this challenge by funding a one million six hundred thousand dollar (\$1.6 million) pilot project to use a specialized vacuum system to remove the muck and solve invasive algae from three point four (3.4) acres of canal bottom in the area of Crystal River and Kings Bay. The project also involved the replanting of eelgrass within the canal and shielding them with protective cages allowing development of a root structure to handle future manatee grazing.

Upon successful completion of the project seventy four (74) spring vents or seeps were opened, eight thousand cubic yards (8,000 cu. yd.) of decayed organic material was removed, and eighteen hundred (1,800) Rock Star Ingress plants were planted and protected. The ecosystem enhanced by this project has shown dramatically positive outcomes related to plant growth, as well as repopulation of fish and small fish species through this habitat restoration. Successful outcomes of the pilot project demonstrate that continued funding of subsequent project phases of this restoration effort are not warranted, but a wise investment in the future of our fair state.

The City of Crystal River is supportive of Save Crystal River's proposal and request for continued funding of a cleaning and re-vegetation project that would cover eighty (80) acres of canal in the vicinity of Crystal River and Kings Bay. The long-term plan is to secure funding of a five to seven (5-7) year comprehensive project with a total cost of forty (40) million dollars. Restoration of Kings Bay to its once pristine state will allow people the opportunity to an experience enjoyed by previous generations, an experience that has attracted many visitors and residents to Crystal River. It has never been truer than today that future economic success of the local community is inherently linked to this invaluable community asset. Please support the Kings Bay Restoration Project by allocating available funding sources to restore the bay to its natural state not only for the sake of the local community, Florida residents and visitors from all regions of the world, but for future generations to come.

Sincerely,

David Burnell
City Manager

cc: Jim Paffen, Mayor
Mike Gudi, Vice Mayor
Andy Heaton, Council Member
Robert Holmes, Council Member
Ken Brown, Council Member

Crystal River
Main Street, Inc.

January 19, 2016

To Whom It May Concern,

Crystal River, Florida is a charming, historic waterfront city that is on the move. The recession hit our community very hard, and when Duke Energy closed it's Nuclear plant in 2012 our economy was devastated. Fortunately a new economic engine has appeared before us – tourism. Thanks in part to a article that appeared in National Geographic a couple of years ago Crystal River has emerged as the place to swim with wild manatees and hundreds of thousands of people come from all over the world to do just that.

Eco-tourism has come to Crystal River, putting the issue of our water quality front and center. The river has been designated an Outstanding Waterway, but it is impaired due to the presence of a noxious algae called Lyngbia. Initially an organization began handraking the Lyngbia to remove it, this is an incredibly slow an impractical process. Save Crystal River, Inc. has developed a process to mechanically remove the Lyngbia from the waterway. The initial phase of the project has been successfully completed.

As a recently designated Main Street Community we are working very hard to revitalize our historic downtown. This movement goes hand in hand with Save Crystal River's effort to clean the bay. Few communities have the combination of a charming historic downtown and a pristine, natural waterfront. Revitalizing our downtown and restoring our waterway will have a lasting impact on the economy of not only Crystal River, but the entire county and beyond.

Crystal River Main Street, Inc. fully supports the efforts of Save Crystal River, Inc.

Sincerely,

Karen Pieters
Executive Director
Crystal River Main Street, Inc.



City of Crystal River

123 Northwest Highway 19
Crystal River, Florida
34429
Telephone: (352) 795-4346
Facsimile: (352) 795-4351

1/16/2016

To Whom It May Concern,

The Kings Bay Restoration Project uses specialized vacuum equipment to remove muck and invasive algae from the once sandy bottom and restores fresh water flow from springs into Kings Bay and adjacent canals in Crystal River, Florida. Native aquatic vegetation is then replanted to restore natural habitat, increase oxygen levels, and provide food and shelter for many species. The project also provides for maintaining the newly planted grasses to prevent recurrence of algal over growth. This restoration project will serve as a Florida model for restoration of the State's natural resources, conservation of habitat, and enhancement of recreational opportunities.

I urge you to provide sufficient financial resources, including RESTORE Act funds, to allow Save Crystal River to continue its proven successful restoration efforts in Kings Bay.

Sincerely,

Mayor
City of Crystal River

January 19, 2016

Lisa Moore
President
Save Crystal River
Crystal River, Florida

Re: Endorsement of SCR

Dear Lisa,

The Save Crystal River organization has made a profound impact on the quality of the waters in Crystal River and in how non-profit organizations achieve results in the state of Florida.

Save Crystal River has long advocated that government needed to work through its bureaucratic tendencies to meet and discuss the condition of our Outstanding Florida Waterway yet not take any action to resolve the problems.

SCR decided to take a lead role as a partner with state and local government to try and resolve the problems. The non-profit group and its leadership have coordinate dozens of meetings with public officials and government agencies to create some synergy toward dealing with the muck problems in King's Bay and Crystal River.

After several years of work a state grant was received so SCR could complete a demonstration project at several canals off of Hunter's Springs on the Crystal River. A company was hired and a muck removal project was completed. As part of the project, natural grasses were replanted in protective cages (keeping the manatee from eating the grass) so that pollutants could be cleaned from the waters.

The results have been stunning. The water is clearer, the muck is gone and this part of Hunter's Springs is coming back to life.

SCR is now seeking additional funding on the project can be extended to other parts of King's Bay and Crystal River. This would be a wise investment of funds from both an environmental and economic standpoint. The health of Crystal River hangs in the balance. And as the success of this project is demonstrated, state and agency leaders will have a new tested tool in the toolbox to deal with similar environmental problems around the Florida.

Gerald Mulligan
Publisher
Citrus County Chronicle
352-363-3122 gmmulligan@chronicleonline.com



January 18, 2016

To Whom It May Concern:

The Citrus County Chamber of Commerce through its Governmental Affairs Committee supports the efforts of Save Crystal River to continue and expand the Pilot Restoration Project that they undertook last year in the canals adjoining Kings Bay.

Forty years ago, Kings Bay was known for its crystal clear waters and was put on the map when Jacques Cousteau brought its attention to the world in the early 1970's. We became the Nature Coast and a destination spot for tourists that came to enjoy water sports and nature viewing in pristine waters with white sandy bottoms and healthy marine grasses that provided sustenance for marine and wildlife.

Over many years, the pristine Kings Bay lost its clarity due to muck and invasive algae. Through the efforts of Save Crystal River and the \$1.6 million Pilot Restoration Project that they undertook last year, Save Crystal River demonstrated that through proper dredging and replanting of native grasses, the canals can be cleaned and restored to its natural beauty. Their efforts opened more than 74 spring vents, removed more than 8,000 cubic yards of decayed material, and resulted in fish beginning to repopulate the restored habitat.

As Save Crystal River now seeks continued funding to expand the Restoration Project to complete its project of more than 80 acres of canals adjoining Kings Bay, the Chamber stands in support. Save Crystal River has demonstrated the success of the project and their commitment to complete it. A clean bay will provide substantial environmental and economic benefits to our community and to Florida as a whole and we urge the Legislature to support continued funding.

Sincerely,

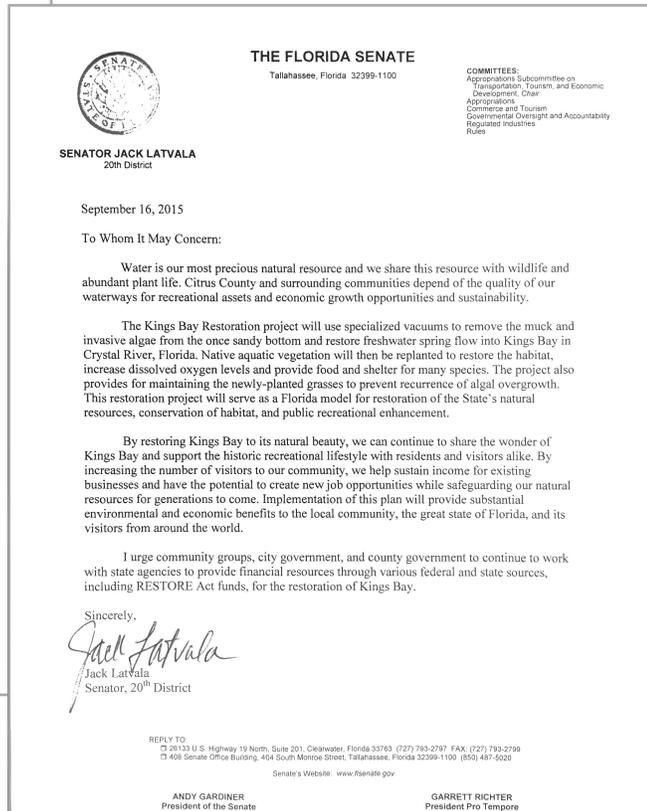
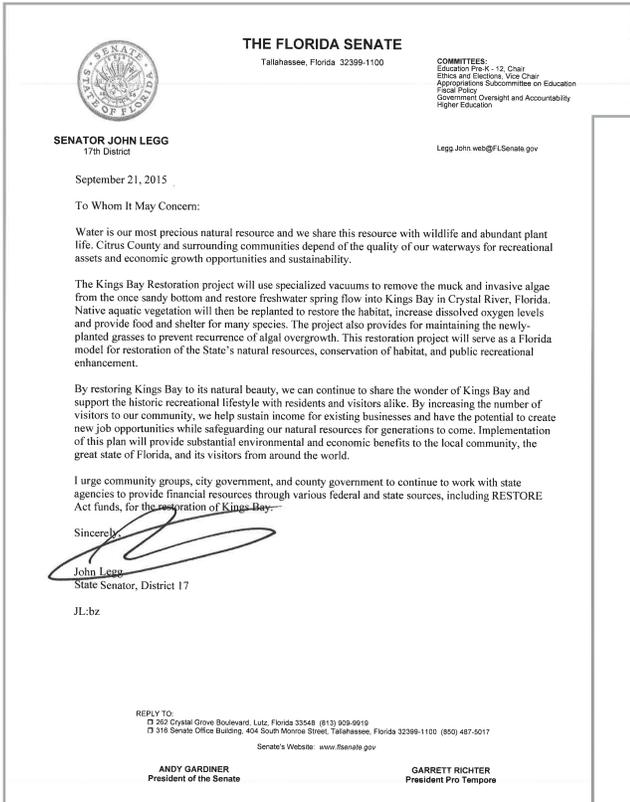
Josh Wooten, President / CEO

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CitrusCountyChamber.com

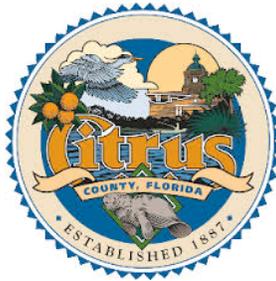
LEGISLATIVE SUPPORT

Florida Senator Charles S. Dean

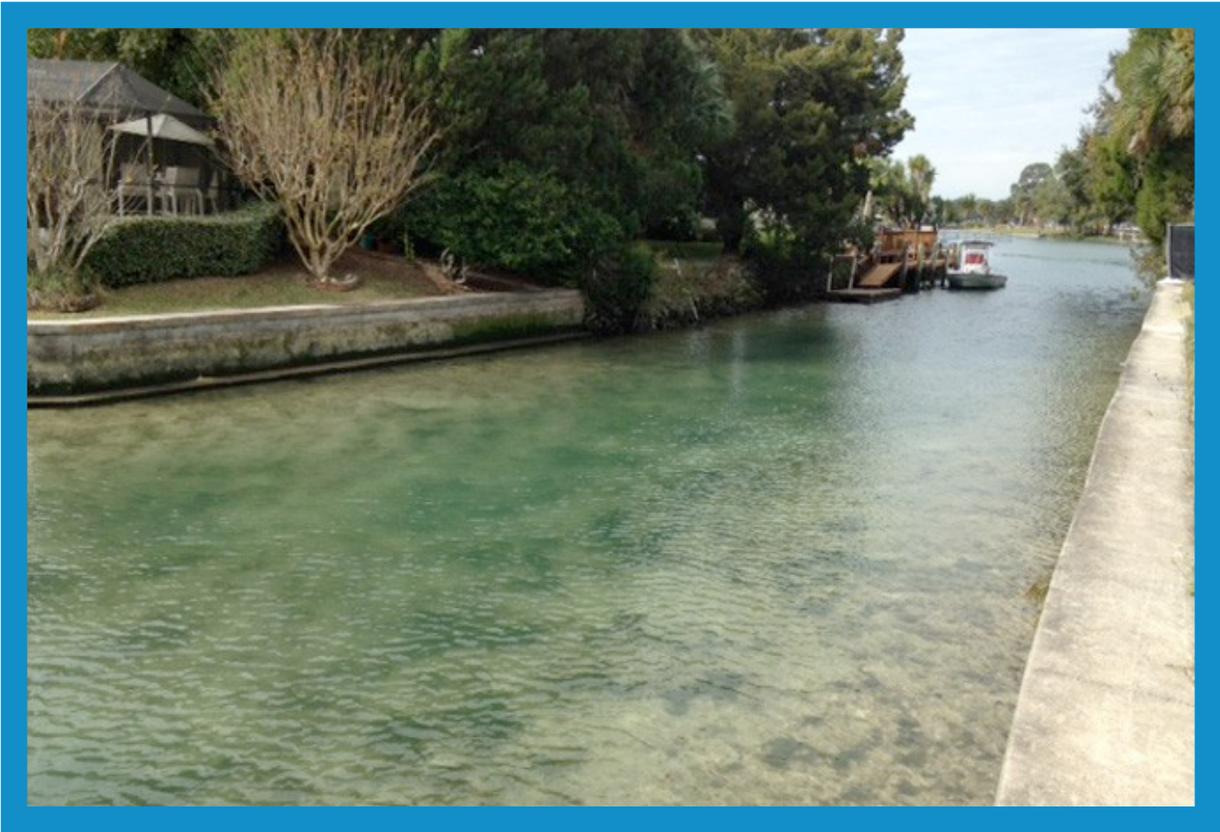
“It’s amazing! This project is the realization we have all dreamed of and one of my proudest moments. Thanks to the city, county and the many volunteers that have stepped up to help out. This is our future for generations to come.”



PARTNERS & EXPERTS



Clean Water Means Business



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SaveCrystalRiver@gmail.com

Lisa Moore, President
Steve Lamb, Vice President