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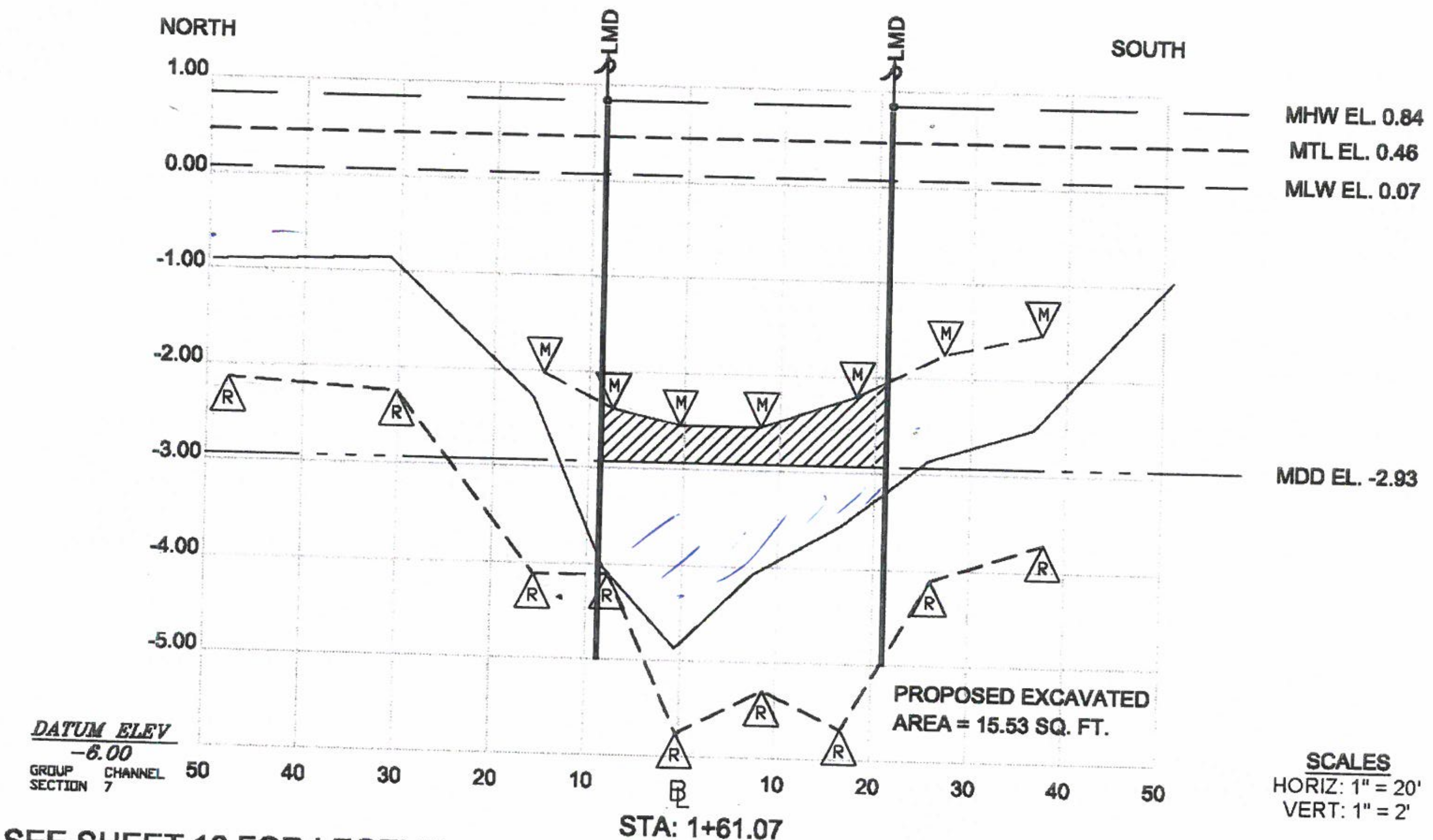
February 13, 2018

TYPICAL CROSS-SECTION OF MUCK REMOVAL IN EXISTING CHANNEL



SEE SHEET 16 FOR LEGEND

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OSLO BOAT RAMP FACILITY
VERO BEACH , FLORIDA
INDIAN RIVER COUNTY
INDIAN RIVER COUNTY PROJ. NO. 0381 (9518)
SECTIONS

SHEET
19

Dwg. #: 17006 C2

IJ. Sept 3, 2014

Grass effects

FILE PHOTO

A hermit crab crawls through sea grass on a flat in the Indian River Lagoon. Officials with the Florida Inland Navigation District plan to deepen a 3.5-mile section of the Intracoastal Waterway stretching from the Sebastian Inlet south to the Wabasso Causeway. They say the dredging will promote more life in the lagoon, but opponents say the dredging will harm the sea grass beds.

Will dredging help, harm lagoon sea grass?

By Cynthia Washam
Special to Treasure Coast Newspapers

SEBASTIAN – Dredging the navigation channel in a section of the Indian River Lagoon devastated by the loss of sea grass will promote river life, experts say, although Sebastian residents opposed to the project have their doubts.

Officials with the Florida Inland Navigation District plan to deepen a 3.5-mile section of the Intracoastal Waterway, stretching from the Sebastian Inlet south to the Wabasso Causeway. The Army Corps of Engineers, working with FIND, is expected to choose a contractor in mid-September and complete the project late this year or early 2015.

Opponents claim the vacuuming action of giant dredges will stir up enough muck to choke off grass beds near the channel. Muck is a black, soupy mix of silt, clay and organic matter, including grass clippings and leaves. It settles in deep areas, including navigation channels, choking off

DREDGING

Where: Sebastian Inlet south to the Wabasso Causeway
When: Late 2014 to early 2015
Duration: About one month of dredging
Depth after dredging: 12 feet
Current depth: 8 feet at shallowest parts
Estimated cost: $3 million to $4 million, to be split evenly between Florida Inland Navigation District and Army Corps of Engineers.
Who pays: FIND's share comes from a special taxing district covering the 12 coastal counties FIND serves, from Nassau to Miami-Dade.

Indian River County anti-dredging group.

Since 2010, up to 45 percent of the lagoon sea grass around Sebastian has disappeared.

DOMINO EFFECT

When sea grass disappears, so do small fish that feed on it, as do

OUR INDIAN RIVER LAGOON

hand, many feel removing muck from the channel might help sea grass rebound.

"Where you find muck, there's no sea grass," said John Trefrey, a professor at Florida Institute of Technology in Melbourne who's led extensive studies on the environmental impact of river muck. "When you remove the muck, sea grass can take root."

St. Johns River Water Management District spokesman Hank Largin also sees a benefit in FIND's project.

"We think it will benefit the sea grass," he said, "and because it benefits the sea grass, that will benefit the fish."

If the dredging did damage grass beds, FIND would be required by law to replant as much grass as it destroyed. But FIND officials doubt they would have to because no grass grows on the

See Altman $20 m muck removal

Mark Perry FOS muck removal

Removing tons of 'black mayonnaise' from lagoon

Posted: Thursday, September 18, 2014 5:00 am

There was a flurry of environmental excitement in May when the legislature appropriated more than $200 million for cleaning up the Indian River Lagoon and Lake Okeechobee. That amount included $20 million to remove ecologically harmful muck from the central lagoon and the Eau Gallie River to reduce the nutrient load in the estuary.

Moving quickly by government standards, the Florida Department of Environmental Protection last month handed over $10 million to Brevard County to remove up to 350,000 cubic yards of muck from the lagoon.

"The last time I spoke with Brevard officials, they were in the engineering and permitting phase," said Sen. Thad Altman, who was instrumental in securing money for muck removal. "A million of the $10 million will go to research and development conducted by FIT. We want to make sure we are dredging in the most beneficial locations for the greatest immediate benefit."

Florida Institute of Technology scientists will help select the best sites to dredge and do pre- and post-dredge testing and analysis to determine how muck removal helps the lagoon.

Professor of Marine and Environmental Systems John Trefry, whose testimony at a senate committee in December put the appropriation process in motion, said he and his colleagues will begin work this month.

"We are close. We have written up our proposals and we should be announcing the study sites in the next week or two, which will be very exciting.

"My part is I will go out and determine how much muck is there and the exact composition of it. Others will look at seagrass and biology and other elements."

Trefry and his colleagues will establish an ecological baseline, documenting the amount of seagrass and biological diversity in areas selected for dredging. After dredging is complete, they will reexamine the dredged areas to chart the degree of biological recovery.

"We have to show this works if we want the legislature to fund an ongoing effort," Trefry says. "I think everything is on track and I am very optimistic this will be very helpful to the lagoon."

Dubbed 'black mayonnaise' because of its consistency, the smelly muck is made up mainly of water, fine particles of soil or clay and rotting organic material. It damages lagoon ecology by releasing nutrients that feed destructive algae bloom and by clouding the water when stirred up by storms, cutting off light seagrass needs for photosynthesis and survival.

A world-renowned expert on sedimentation, Trefry told the Senate Committee on Environmental Preservation and Conservation there has been an "incredible expansion of muck" since he came to the area in the 1980s, due to fertilizer runoff and other causes.

"It is like a cancer that has been spreading," he said in December. "There are now between five and seven million cubic yards of muck along the Brevard and Indian River County stretch of the lagoon. That is enough to cover 1,000 football fields a yard high."

Trefry said besides clouding the water column and continually releasing nutrients that feed algae blooms, muck accumulates toxins and contains bacteria that deplete oxygen levels in the lagoon. It smothers all life forms other than bacteria. "Wherever the muck is, all habitable life is gone," he said.

"The lagoon could recover almost overnight if you get a clean sand bottom again, with shrimp and crabs and oysters coming back along with seagrass and game fish," Indian River County FIND Commissioner Paul Dritenbas said earlier this year.

"We realize $20 million is not going to fix the problem," Altman said. "It will take at least $100 million over a five-year period to clean up most of the muck. But we need to get started and I think we can make significant inroads with the $20 million."

The project is "expected to remove up to 672 tons of total nitrogen and 144 tons of total phosphorous contained in the muck deposits," according to DEP. Those are the chemicals responsible for feeding algae bloom and degrading lagoon ecology.

Brevard County staff aims to have dredges in the water by January 2015, after FIT scientists complete their preliminary surveys.

The other $10 million of the current appropriation will be used to remove muck from the Eau Gallie River, which empties into the lagoon.

"It is critical we remove these sediments from our waterways and get the Indian River Lagoon on a pathway to health," Altman said.

Fish, wildlife return to St. Sebastian River after 3 years of dredging

BY: Tyler Treadway
POSTED: 4:34 PM, Nov 12, 2014
TAG: health (/topic/health) | indian river county (/topic/indian+river+county) | indian river lagoon (/topic/indian+river+lagoon)

SEBASTIAN — Tarpon, manatees and dolphins in the water; ospreys, cormorants and bald eagles in the sky above.

As the River King tour boat's first mate, Scott Smart sees them practically every day as he cruises the St. Sebastian River.

"Once the sea grass came back, that brought in the manatees and bait fish; and the bait fish brought back the bigger fish and the dolphins," Smart said. "And the big fish brought the ospreys and eagles."

Smart attributed the wide array of wildlife to a dredging project that removed about 2 million cubic yards of muck from the river bed from June 2006 to August 2009. That amount would cover the 625-acre Sebastian Municipal Airport in nearly 2 feet of muck.

"It's all because the water quality is better," said Smart, who remembered dodging all the pipes, barges and other equipment during the dredging. "All that sediment on the bottom was keeping the sea grass from growing. Once that was lifted off, there was a vast improvement. ... I noticed a big change, and it didn't take long after they stopped dredging."

Sea grass beds increased from 2.24 acres in 2011 to 8.56 acres in 2013 in the area where the St. Sebastian River enters the Indian River Lagoon, according to mapping by the St. Johns River Water Management District. The survey didn't go farther south.

NO BETTER NO WORSE

During the dredging and for a year after it was completed, the Florida Fish and Wildlife Research Institute at Melbourne collected more than 1.2 million fish from 154 species and determined the project had little significant impact, positive or negative, on the river's fish population.

The size of commercial species such as snook and drum remained the same as well, Richard Paperno, a marine biologist with the institute, said at a Friends of St. Sebastian River meeting in November 2011.

Since then, monthly monitoring of fish populations have shown "good numbers" of commercial and recreational fish such as snook and snapper, "plenty of mullet" and "low but consistent numbers" of exotic species such as opossum pipefish and several types of gobies, Paperno said in October.

With all that's happened to the lagoon in the past few years, including algal blooms and prolonged cold snaps, "you can't really pinpoint whether dredging has had a good or bad effect," said Derek Tremain, another researcher at the institute.

THE BIG FREEZE

Fishing guides who ply the St. Sebastian say prolonged cold weather in early 2010 took a serious toll on the river's fish population. The first two weeks of January 2010 was one of the coldest 12-day periods on record in South Florida, according to the National Weather Service. Water temperatures in the lagoon and its tributaries, including the St. Sebastian, were well below 50 degrees.

The resulting dead fish statewide were too numerous to count, but estimates in the lagoon's Treasure Coast section were in the hundreds of thousands, the Florida Fish and Wildlife Conservation Commission reported.

"Considering only four years ago we lost a lot of fish to a big freeze, the number of snook, jacks and tarpon we're seeing in the river now is pretty impressive," said Capt. Gus Brugger, a Sebastian fishing guide. "The water isn't mucky at all; it's just kind of brown from all the tannins in the water, but that's natural."

The dredging also made navigating the river easier, Brugger said.

Capt. Mike Peppe, a Sebastian fishing guide on the river for about 25 years, said the fishing "is as good as I've seen it in the last 15 to 20 years." Peppe said he has caught 15 to 20 different species of fish in the river over the last year.

"I can catch six or seven types of fish without really thinking about it," he said. "The water clarity is good if there hasn't been a lot of rain draining stuff into the river. If there's no rain, I can see to the bottom. I can see bass on their beds. It's just a wonderful place to go look around."

The manatee population is "super strong" and "plenty of dolphin are coming in," Peppe said. "They wouldn't be there if there was a water quality problem."

It's difficult to impossible to get a good manatee count in the river, according to Katie Tripp, science and conservation director at the Save the Manatee Club. Manatees tend to congregate in the river in summer, but aerial counts are done in winter when manatees congregate around warm springs and power plant discharges.

STOP IT, DON'T SCRAPE IT

Despite the dredging's seeming success, the goal should be ending the source of muck rather than periodically scraping it off the river bottom, said Grant Gilmore, lead scientist at Estuarine, Coastal and Ocean Science in Vero Beach.

"Let's cure the problem before we put another bandage on it," Gilmore said.

The exact source, or sources, of the muck have yet to be determined, Gilmore said, "but generally it's coming off agriculture fields. Muck is basically organic material that washes off the land. It's the finest particles that settle into lowest area of the river bed."

If it's not stopped at its source, Gilmore said, muck will simply return to the dredged-out channel.

"That deep trench (the dredging) left needs to be filled in with sand or it will refill with muck that will just have to be dredged out again," he said."It's a perpetual problem."

District Executive Director Dr. Ann Shortelle and partners gathered Nov. 30 to celebrate the Cocoa Beach dredging project.

This week we enjoyed a great celebration with local government partners and the public as we marked another step in ongoing work to restore and protect the Indian River Lagoon.

Projects like the Cocoa Beach dredging project celebrated Thursday are moving us closer to a healthier lagoon. Through the District's cost-share program, the District provided the city of Cocoa Beach with approximately one third of the funding needed for the latest phase of its $1.8 million muck dredging project. This funding is helping to remove more than 44,000 cubic yards of muck from 13 canals in the southern part of the city. When the project is completed in 2019, Cocoa Beach will have removed a total of 206,657 cubic yards of muck from the waterway. Nearby, the District is also dredging lagoon tributaries (the Eau Gallie River and Elbow Creek), where approximately 632,000 cubic yards of muck will have been removed when that project is completed in 2018. It has taken decades for muck to accumulate in the lagoon and it will take time and a united front to reverse negative impacts. These types of projects continue to help restore our important resources.

Such projects are an important part of overall water quality improvement projects because of the excess nutrients and sediments that are removed from waterways. Muck contains high amounts of nutrients, blocks sunlight, clouds the water and contributes to the creation of algal blooms.

Thanks to State Rep. Tom Goodson, Cocoa Beach Mayor Ben Malik, the Florida Department of Environmental Protection and the other stakeholders and members of the

Mucked up.

That's the crass, yet accurate summation given to the Indian River Lagoon by one of its most fierce protectors, the Florida Institute of Technology.

The more-than-150-mile coastal estuary is host to more than 3,000 species of plants and animals, though industrial and recreational impacts have led to what scientists have deemed a half-century of neglect.

Marine life is at risk, impacted by fertilizer run-off and planned emergency wastewater discharges required when the system becomes inundated with groundwater.

Hurricane Irma and the Oct. 1 floods resulted in nearly 20 million gallons of raw sewage being discharged into an Indian Harbour Beach canal, and into the lagoon, rather than having raw sewage back up into homes and neighborhood streets.

Over time, notes Florida Tech's website, "there's been a huge buildup of what FIT scientists simply describe as 'muck,' a blend of nitrogen and phosphorus that resembles tar." As the muck builds, it kills seagrass beds, fuels algae blooms, suffocating seagrass beds and marine life.

There's plenty of blame to go around, up and down the estuary system. A power outage at a sewage treatment center in Fort Pierce was responsible for a 1.25 million-gallon spill last October. And a broken wastewater pipe in Vero Beach is the culprit for a November spill of 3.1 million gallons of sewage. Those are the most recent episodes. In 2016 an algae bloom led to a massive fish kill in Brevard County.

The recent spills have prompted a fresh examination of how to clean up the Indian River Lagoon, but citizens aren't waiting for the bureaucrats to act. Grassroots efforts have popped up, some by individuals and small groups, and even schoolchildren.

Marti Veatch is among those working to help improve the health of the lagoon. She's a Melbourne Beach resident who is also a member of the town's Environmental Advisory Board.

Veatch said she and a few friends have launched a grassroots effort, one that so far includes plantings near the town's pier, installing bat houses to help control the mosquito population, and placing oyster mats to encourage new marine life in the lagoon.

The group is modeling its efforts after Satellite Beach, which in May 2017 adopted a nearly 50-page Sustainability Action Plan that focuses on five areas: Built Environment; Land and Water Systems; Energy and Transportation; Community Outreach; and Quality of Life.

For each category the plan identifies stressors that have a negative impact, and recommendations to remedy the problem.

"The simplest way to help is for people to pick up after themselves," Veatch said. "Leaves. Debris. Garbage. It all leads to standing water. We're trying to keep our community free of debris."

In addition to awareness spreading about lagoon-friendly practices, there are at least 42 separate projects meant to help clean up the lagoon.

To do the work, the Brevard Board of County Commissioners approved $25.87 million from a special half-cent increase in the sales tax. Completing all 42 projects will cost $68.77 million.

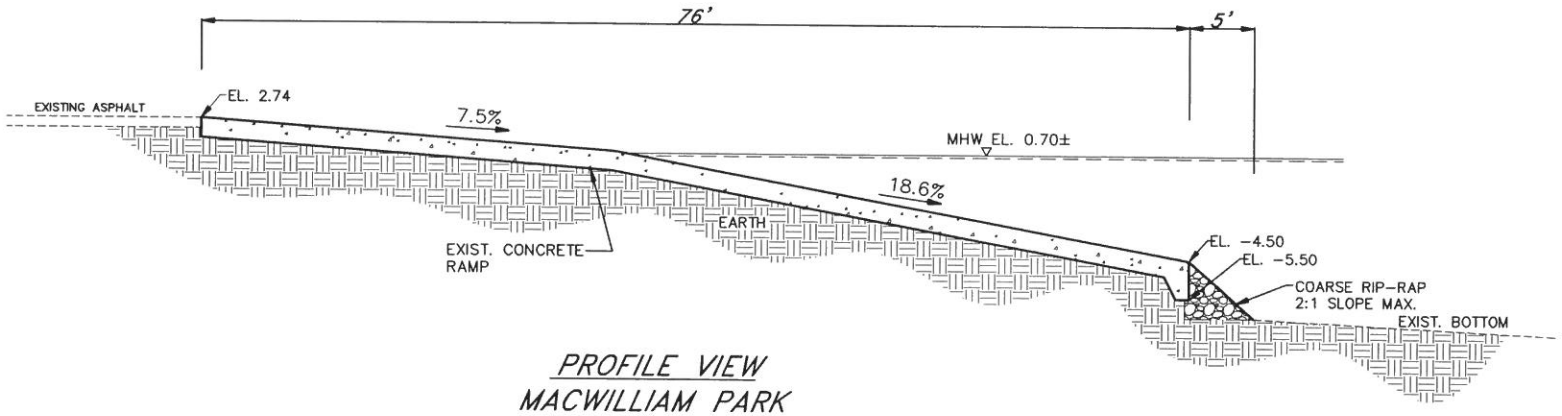
Within Brevard alone, projects include muck removal, upgrades to waste water treatment plants, upgrades from septic systems to sewers, and storm water projects. In addition, the work is expected to reduce nitrogen in the lagoon by nearly 97,000 pounds annually, and phosphorous would be reduced by more than 10,000 pounds a year.

Meanwhile, Michigan-based Greenfield Resources launched a pilot program in Indian River County in July to show that it could remove pollutants from water entering the Indian River Lagoon by shocking it with electricity.

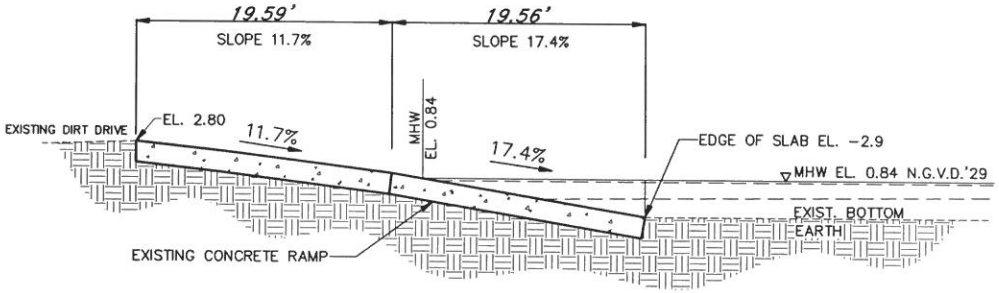
Greenfield tested raw water in Vero's Main Relief Canal for 10 different contaminants, then treated it, then tested again.

In all 10 samples, the level of contaminants was reportedly reduced. In three of those samples the contaminants (aluminum, boron and nitrites) were no longer detectable. In others, the reductions ranged as high as 67 percent and as low as less than 20 percent.

Existing Stormwater Runoff Effects



PROFILE VIEW
MACWILLIAM PARK
BOAT RAMP



PROFILE VIEW
OSLO BOAT RAMP

OSLO BOAT RAMP AND MACWILLIAM PARK BOAT RAMP
PROFILE COMPARISON

No.	Revision	Date	By

INDIAN RIVER COUNTY
1801 27th STREET
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(772) 567-8000

Department of Public Works
Engineering Division

DESIGNED BY:
DRAWN BY:
APPROVED BY:

SECTION
TOWNSHIP
RANGE
FIELD BOOK NO. PAGE

DATE: 5/7/14
COUNTY PROJECT NO.
0381

OSLO BOAT RAMP
EXHIBIT

SHEET 1 OF 1

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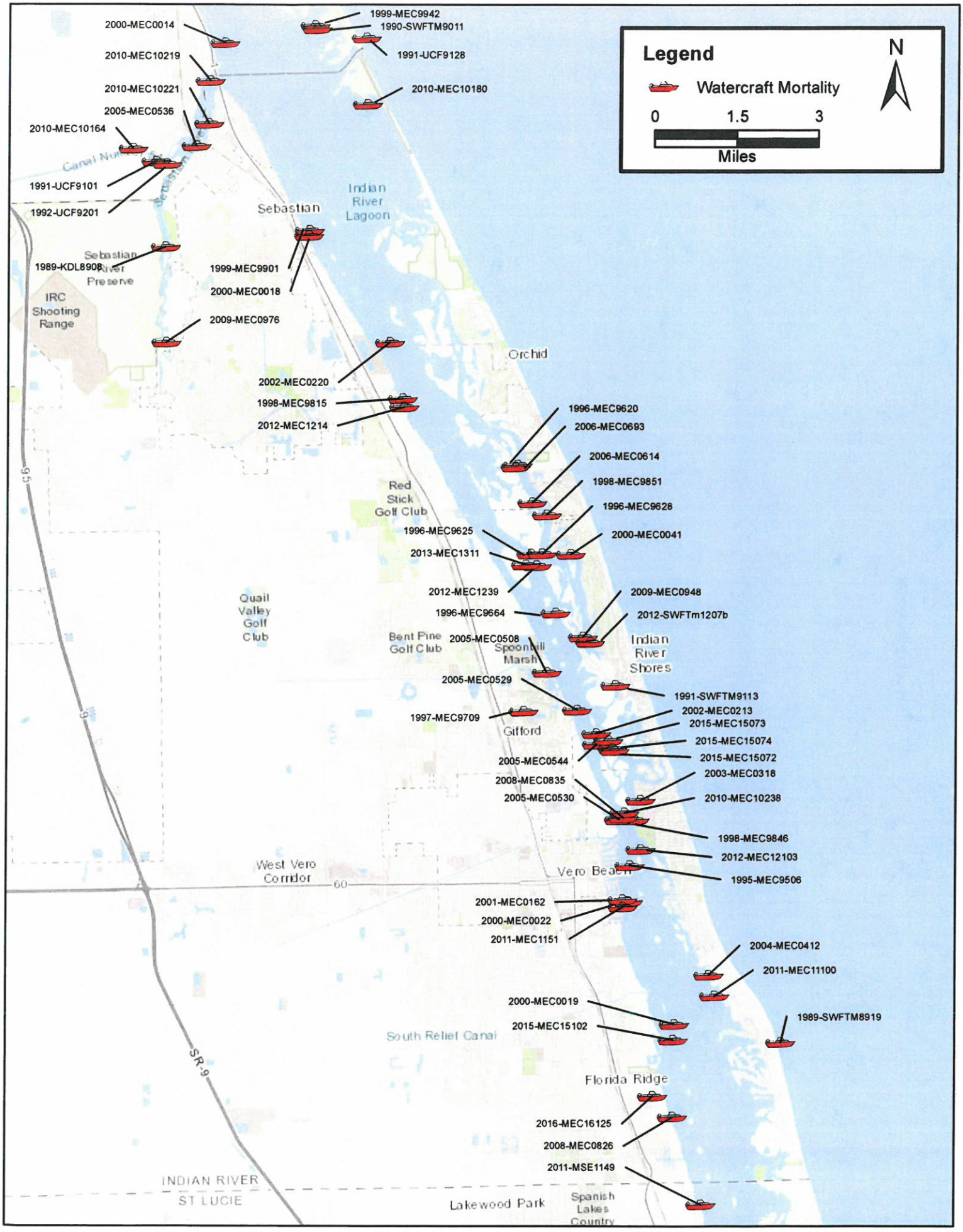

Manatee Watercraft Mortalities - Indian River County - 1989 through December 2016