

Manatee Mortalities on the Florida Atlantic Coast



Staff Report
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Florida Fish and Wildlife Conservation Commission

Division: Fish and Wildlife Research Institute; Division of Habitat and Species Management

Authors: Gil McRae, Melissa Tucker

Contact Phone Number: (727) 896-8626

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The Florida Manatee

- Herbivorous Aquatic Mammal
- Native to Florida
- Federally protected through the Endangered Species Act
 - Reclassified from Endangered to Threatened in 2017
- Poor insulation and low metabolism – not cold tolerant
- Winter range restricted to Florida
 - Summer range from Texas to North Carolina
- Long-lived, slow reproduction
 - Females give birth to a single calf every 2-5 years
- Calves dependent on mothers for up to 2 years



Background on the Florida Manatee

Manatees reach sexual maturity in 3-5 years (females) and 5-7 years (males) and may live over 65 years in captivity. Gestation is approximately 13 months and usually one calf is born. Twins are rare. The calf may stay with its mother for up to 2 years.

Long-term Threats

- Watercraft-related mortality
 - 96% of adult carcasses have scars from past boat strikes
- Red-tide and cold-kill mortality events
- Loss of warm-water habitat
- Loss of forage habitat (seagrass)
- Entrapments/Water-control Structures
- Entanglements/Ingesting debris



Long-term threats to the Florida Manatee Population

Florida Manatee Population Status

- Statewide Abundance, 2015-2016: 8,810
 - (7520-10,280) 95% credible interval
- Baseline Adult Survival is High (97-98%/yr)
- Status and Threats Analysis Completed in 2017
 - Probability of population reaching <500 adults on either coast was less than 0.5% over 100 years
 - Scenarios with increased threats increase this probability to as high as 6%
 - SW and ATL management units most likely to experience population declines in the coming decades.



Four Management Regions: Northwest (NW), Southwest (SW), upper St. Johns River (SJR), Atlantic (ATL)



Statewide population abundance for manatees was last estimated in 2015-2016 at 8810, with a 95% credible interval of between 7520-10,280. The credible interval indicates that there is a 95% probability that the true abundance lies between 7520-10,280.

For population assessment purposes, the Florida manatee population has been divided into four geographic regions (Northwest, Southwest, Atlantic, and upper St. Johns River), sometimes referred to as management units. These regions are not genetically distinct subpopulations but differences in habitats and major threats among these regions are useful for management planning.

Mean annual adult survival rates, *excluding additional mortality due to cold and red tide events*, are high (0.97-0.98) in all 4 regions. Given the sensitivity of manatee population growth rate to adult survival, this has allowed the population to grow, and it provides resilience in the face of current and future threats.

A status and threats analysis completed by the U.S. Geological Survey (USGS) and FWC in 2017 found that the probability of the manatee population dropping to less than 500 individuals on either coast in the next hundred years was less than 0.5%. Under future scenarios of increasing threats (more frequent and severe red tides and cold kills, increased watercraft mortality, loss of warmwater habitat and chronic mortality) increase the risk of quasi-extinction to as high as 6%. At a regional level, the SW and ATL management units are most likely to experience population declines in the coming decades. Odds are nearly 50:50 that the SW and ATL subpopulations (where most manatees currently reside) will decline by 30% or more over the coming century. These projection models will be revisited to determine if new analyses are needed based on the recent UME.

Summary of Unusual Mortality Event (UME)

- Manatee deaths occurred along the entire Atlantic Coast of Florida and the lower St. Johns River
- December 1, 2020 – May 31, 2021
 - 677 manatee carcasses reported
 - 67 manatees rescued
- By May 2021, the number of recorded carcasses returned to normal levels.
- As of 7/2/21 841 manatee deaths statewide
 - Previous annual high was 830 in 2013



The UME occurring on the Atlantic Coast represents the highest number of manatee deaths recorded over a six-month period. As of 7/2/21 a total of 841 manatee deaths have been documented for 2021. This 6-month number surpasses the previous annual high of 830 in 2013.

Orphaned Manatee Rescues: December 2020-May 2021

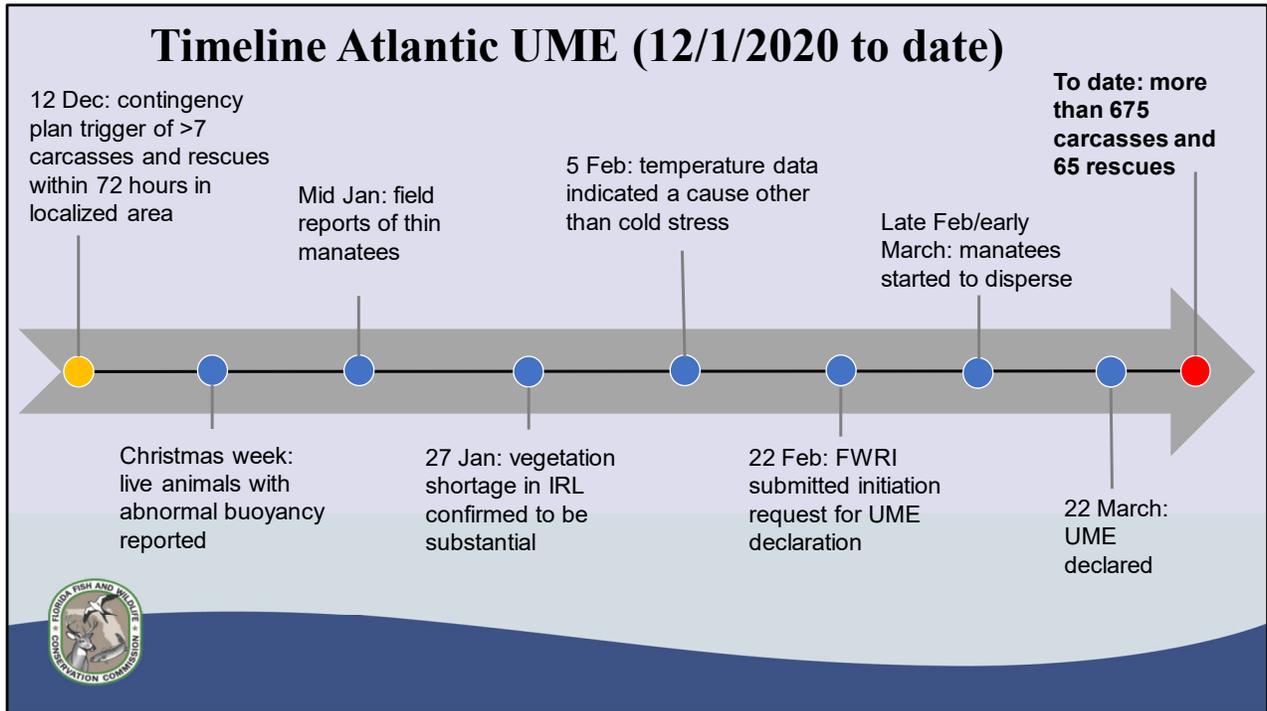


- 13 calves rescued
- East coast 5-year average is 5
- Four full time acute care facilities
 - Jacksonville Zoo
 - Miami Seaquarium
 - SeaWorld
 - ZooTampa
- Orphaned calves more expensive to care for
 - Housed separately
 - Hand fed until stabilized and weaned
- Calves must mature and gain weight before release (may be 2 years)

Statewide Rescue Numbers:

- 19 calves rescued statewide (1 Dec 2020 - 31 May 2021)
 - Statewide 5-year average is 8 (1 Dec - 31 May)
- 13 calves rescued on the east coast (1 Dec 2020 - 31 May 2021)
 - East coast 5-year average is 5 (1 Dec - 31 May)

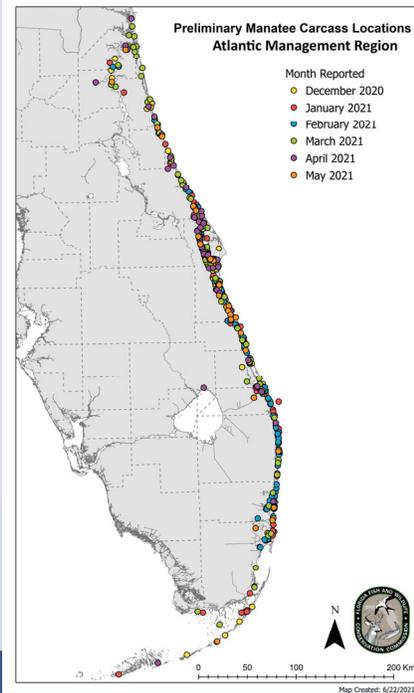
Timeline Atlantic UME (12/1/2020 to date)



- 12 Dec 2020: Contingency Plan Trigger of >7 carcasses and/or rescues within 72 hours in localized area leads to increased monitoring of the situation. Week of 25th Dec: live animals with abnormal buoyancy reported in the Central-east and Southeast regions.
- Mid-Jan 2021: field reports of manatees appearing thinner this winter. Late Jan: confirmation that reduced vegetation in IRL worse than ever before.
- Feb 2021: preliminary review of water temperatures indicate cause of increased mortality was not specifically cold-related. 22 Feb: UME initiation request submitted to the Working Group on Marine Mammal Unusual Mortality Events.
- March 2021: manatees begin to disperse from warm-water sites as ambient water temperatures increase. 22 Mar: UME declared.
- Currently, manatees are dispersed along the Atlantic Coast.

Unusual Mortality Event Declaration

- An element of the Federal Marine Mammal Protection Act
- UME declaration:
 - Event is unexpected
 - Involves a significant die-off of a marine mammal population
 - Requires immediate response
- Investigation is ongoing with multiple partners



An element of the Federal Marine Mammal Protection Act is the Marine Mammal Unusual Mortality Event Process.

The Working Group on Marine Mammal Unusual Mortality Events (WGMMUME) has the primary role to:

- Confirm when an unusual mortality event is occurring
- Help direct/provide input
- Confirm when event is over

A UME declaration means that the event is unexpected, involves a significant die-off of a marine mammal population, and requires immediate response.

Investigating events is key to understanding the cause and the potential impacts on the population as well as the role of environmental parameters.

Total Carcasses by Month:

- December: 81
- January: 148
- February: 193
- March: 160
- April: 66
- May: 28

Findings to Date

- Severe emaciation
 - Body Condition Indices up to 40% underweight
 - Widespread atrophy of muscle, fat
 - Severe atrophy of liver, heart, and other organs
- Blood data of rescued manatees suggest end-stage starvation
- The effects of prolonged starvation on the body are not always reversible despite resumption of foraging



UME carcasses



Emaciated calf with presumed mom

Findings to date

Cause of the Mortality Event

- Starvation due to continued seagrass loss
- Situation exacerbated by large numbers of manatees aggregating at winter warm water sites
- Consequences for manatees extend beyond the IRL
 - Manatees migrated both south and north from IRL in malnourished state
 - Generally poor body condition and additional deaths
- Potential for long term health effects on reproduction and metabolism



Mortalities were due to lack of seagrass, the manatee's preferred food. Little alternative food such as macroalgae (seaweed) was available.

Ecological Context



High manatee mortalities on the Atlantic coast are a consequence of complex water quality and ecological factors involving elevated nutrient loads to coastal waters, subsequent harmful algal blooms, reduced water clarity limiting light for submerged plants, significant reduction in the acreage of seagrass and macroalgae and manatee mortality due to lack of food.

Recurring Harmful Algal Blooms in Indian River Lagoon

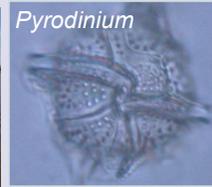
- Thick blooms of microscopic algae reduce light for seagrass and can cause low dissolved oxygen that results in fish kills.

Northern Indian River Lagoon

- *Pyrodinium bahamense* - toxic dinoflagellate that blooms in the summer nearly every year
- 2011 “superbloom” (green water), species not yet determined
- 2012, 2013, 2016, 2017-2019: brown tides (*Aureoanmbra lagunensis*)
- 2020 July – December: blue green algae bloom

Southern Indian River Lagoon

- Periodic freshwater blue green algae blooms



Pyrodinium



Brown tide

Photo: J. Torpey



The northern portion of the Indian River Lagoon has been affected by several large blooms in the last decade caused by different species of harmful algae. The Southern Indian River Lagoon is affected periodically by freshwater blue green algae blooms tied to Lake Okeechobee releases into the estuary. Two task forces have been formed to address Harmful Algal Blooms in Florida: Harmful Algal Bloom Task Force and Blue Green Algae Task Force.

Seagrass Loss in the Indian River Lagoon (IRL)

- Seagrass beds in the IRL have declined as a result of repeated phytoplankton blooms starting in 2011
- Since 2009 in Northern IRL:
 - 58% of seagrass area has been lost (>46,000 acres)
 - Within seagrass beds, 89% of cover has been lost (~20% to ~2%)
- These seagrass beds are prime manatee foraging habitat year-round



The St. Johns River Water Management District has been monitoring seagrass in the Northern Indian River Lagoon for nearly 30 years. Since 2009 this portion of the lagoon has lost a substantial portion of its seagrass acreage (>46,000 acres). Overall, 58% of the seagrass acreage in this area has been lost, and loss in some areas has been much higher. The Banana River Lagoon had a 96% decline from 2009-2019.

Imagery shows Mosquito Lagoon. Reduction of seagrass abundance on the back side of the barrier island from 2013 to 2020 is apparent.

Issues complicating seagrass recovery



- Frequent nutrient over-enrichment events destabilize the Indian River Lagoon (IRL), resulting in macroalgae and phytoplankton outcompeting seagrass
- Northern IRL nitrogen management strategy focuses on conditions necessary for seagrass regrowth



Recovery of seagrass in the Indian River Lagoon will depend on increasing the availability of light by reducing the intensity and duration of phytoplankton blooms. Achieving this goal depends on successfully implementing projects designed to reduce loads of nutrients to the lagoon, particularly nitrogen. In February 2021, the Basin Management Action Plan (BMAP) was established for the Indian River Lagoon. The nutrient reduction goals for the Northern Indian River Lagoon are based on the water quality conditions necessary for seagrass regrowth.

Full report available here:

http://publicfiles.dep.state.fl.us/DEAR/BMAP/IndianRiverLagoon/BMAP_Documents/2021_IRL_BMAP_Final/NIRL/Final_NIRL_BMAP20210216.pdf

Previous Florida Manatee UMEs

Causes of Past Mortality Events:

- Since UMEs due to red tide since 1996
 - Up to 300 deaths in a single event (2013)
- 2 severe-cold UMEs (covered large regions on both coasts)
- Shift in diet to macroalgae (Brevard County in 2013)

Differences between Current UME and past ones:

- First UME due to starvation
- Duration is uncertain vs. being time-limited
- Higher proportion of adult carcasses
- Year-round feeding grounds affected



The Florida Manatee has been impacted by a number of unusual mortality events in recent years. Red tides and cold kills have caused the highest number of deaths historically:

- 1996-2007 total of 6 UMES declared due to red tide (~450 deaths)
- 2010-2011 winter cold kills (>670 deaths)

Current UME in context of Population Status

Manatee Abundance along Atlantic Coast:

- 2016: 3,920 animals

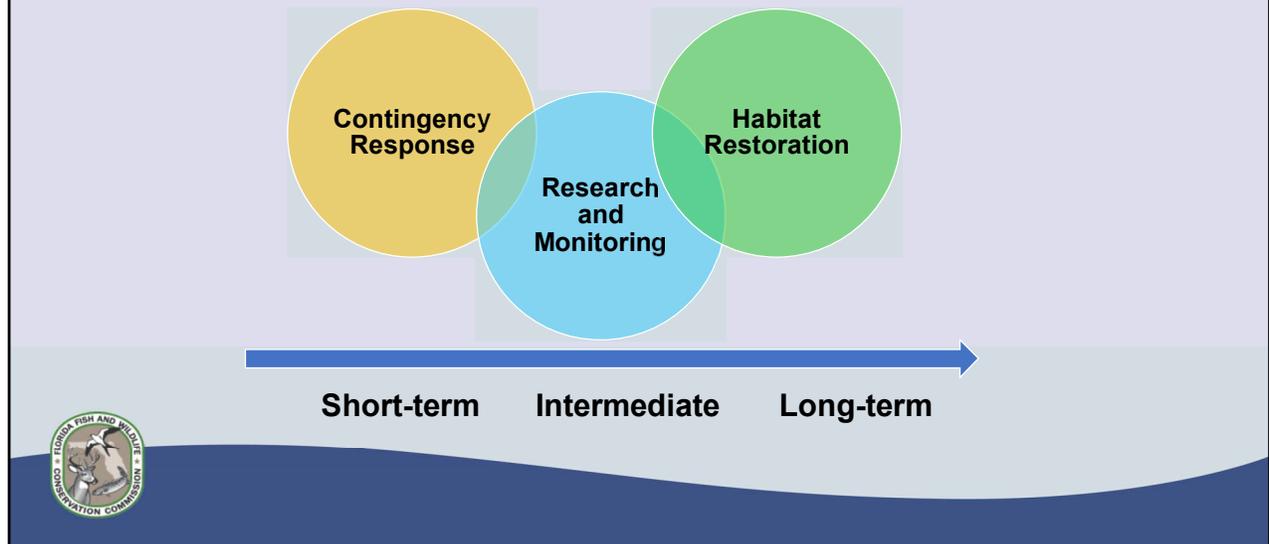
Preliminary Carcass Counts in UME Region:

- Dec 2020 – May 2021 (6 mos.): 677
 - 18% of most recent population estimate
 - Mortality rate 5 times normal
- 5-year Average (Dec-May): 156
- ~40% are Adults, greater population impact



Prior to the current mortality event, the manatee population in the Atlantic Coast of Florida was estimated at 3920. Mortality from the UME represents approximately 18% of the most recent population estimate for the Atlantic Coast. The mortality rate during this period was around 5 times the normal rate, which is around 2% annually.

Response, Research, and Management Strategies Moving Forward



Research & Management Activity related to the ongoing manatee mortality event:

Contingency Response: Immediate response to the situation.

Carcass Salvage and Necropsy: assess cause of event and determine any underlying pathology

Rescues: save as many manatees in distress as possible by working closely with partners, including acute care facilities for rehabilitation and ultimate release

Research & Monitoring: Understand how surviving manatees are responding to the event

Manatee Distribution & Relative Abundance: aerial surveys flown in March, April and June 2020 to determine how manatees are re-distributing within the northern Indian River Lagoon. Additional detailed aerial surveys are planned to estimate minimum abundance for the entire Indian River Lagoon (Ponce to Jupiter).

Manatee Vital Rates: Photo-identification of distinctly scarred individuals and genetic sampling used to estimate adult survival and reproductive rates.

Manatee Behavior: a joint interagency project to deploy satellite-linked tags on rehabilitated manatees at release to understand behavioral response to seagrass loss. Three animals have been tagged as of June 22, 2020.

Habitat Restoration: In the long term, the focus needs to be on improving water quality and, where feasible, habitat restoration. Water quality efforts will focus on nutrient reduction.

Habitat Workshop planned for July 2020: 2 pre-workshop surveys underway. Goal is to understand ongoing and proposed habitat restoration work; avoid redundancy; identify promising avenues and pilot projects; move forward on projects that are ready to go. FWC has \$8 million dedicated funding in FY 21/22 for improving manatee habitat and access to springs. The habitat workshop will assist in determining how to direct this funding most efficiently.

Planning: Now and Next Winter

- Investigate health effects
- Rescues: continue to save as many manatees as possible
 - Partner meetings this summer to enhance response capability and coordination
- Investigate population-level impacts
 - Abundance surveys, photo identification for survival rates, and calving
- Conduct fine scale assessment of seasonal distribution in association with habitat using aerial surveys and tagging



In the short term, FWC will continue to investigate health effects of the UME using data from necropsies and clinical findings and bloodwork from rescued manatees. FWC will continue to prioritize rescues and work with partners to expand response capability. Existing work involving aerial surveys and photo identification will help determine longer term population impacts. Additional detailed assessments focused on seasonal distribution of manatees and their behavior will help guide response efforts.

Contingency Planning

Manatee Rescue & Rehabilitation Partnership (MRP):

- MRP members rescue, rehabilitate, release, and monitor manatees
- Contingency Working Group to expand rescue and rehabilitation capacity
- MRP members will hold workshops on provisioning (supplemental feeding)



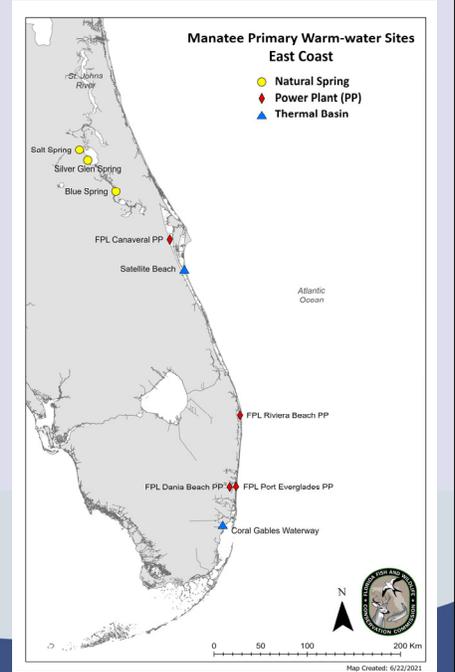
Manatee Rescue and Rehabilitation Partnership Members

The Manatee Rescue and Rehabilitation Partnership is a cooperative of agencies, organizations, and oceanaria that rescue, rehabilitate, release, and monitor Florida manatees. Contingency site planning involves identifying all aspects of care including space, veterinary oversight, animal care staffing and food.

Manatee Habitat Considerations

Atlantic Coast Warm-water Sites:

- 6 primary warm-water sites on Atlantic coast
 - 4 power plants and 2 passive thermal basins
- Primary warm-water sites can support manatees during the coldest winters, whereas secondary sites serve as temporary warm-water habitat
- No natural springs serve as warm-water habitat on the Atlantic coast



Manatees depend on warm water thermal refuges during periods when the water temperature is below 68 degrees for an extended period. On the Atlantic Coast of Florida, these warm water refuges consist of power plant thermal effluent and passive thermal basins. Passive thermal basins are warm-water habitats where physical conditions (aquifer seeps, deep water basins) temporarily retain pockets of warm water.

In addition to the primary sites pictured, there are 21 passive thermal basins on the Atlantic coast (13 in the Indian River Lagoon but only three are significant secondary sites – DeSoto canal, Berkeley canal and the Sebastian River at the C-54 canal)

Warm-Water Habitat Action Plan (updated 2020)

- Joint FWC and US Fish and Wildlife Service (FWS) plan
- Plan has both short-term and long-term goals
 - Short term goal (<30 years): Maintain the current winter range and distribution of manatees in Florida.
 - Long term goal (>30 years): a network of sustainable warm-water habitat with a minimal dependence on technology sufficient to implement the Florida manatee recovery plan.
- Florida Power and Light (FPL), FWC, and FWS are planning a workshop for the spring of 2022 with key stakeholders to identify obstacles, develop solutions and timelines to achieve the goals of the plan.



The Warm Water Habitat Action Plan is a joint product of FWC and the US Fish and Wildlife Service that establishes both short and long term goals for manatee warm water habitat.

Habitat Restoration Efforts

- FWC has 7 eelgrass restoration projects in tributaries to the IRL expected to be completed this year.
- FWC habitat restoration staff are also conducting aquatic vegetation restoration near springs in the St. Johns River and a restoration project at Blue Spring State Park.
- FWC staff have organized a workshop for summer 2021 with agencies and organizations actively involved in aquatic habitat restoration projects.



FWC has a number of projects in progress that will benefit manatees in the Indian River Lagoon. The planned workshop on manatee habitat will identify and prioritize projects and discuss collaboration opportunities, including funding.

Photos: planted eelgrass growing inside an enclosure; bank stabilization to reduce sedimentation at Blue Spring State Park

New Habitat Funding

- Legislature provided funding to restore manatee access to springs and provide habitat restoration in manatee concentrated areas.
- FWC has 18 months to encumber the \$8,000,000 and 5 years to complete the projects.
- FWC staff are currently identifying and prioritizing internal projects and will be working with partners to identify additional restoration projects.



New funding from the Florida Legislature to FWC for manatee habitat projects.

Photos: removal of organic matter to prepare for eelgrass planting; planted eelgrass.

Thank You



No action is requested at this time, but Commissioner input is welcomed.