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Florida Fish & Wildlife Conservation Commission

Coastal Habitats Integrated Mapping and Monitoring Program Workshop

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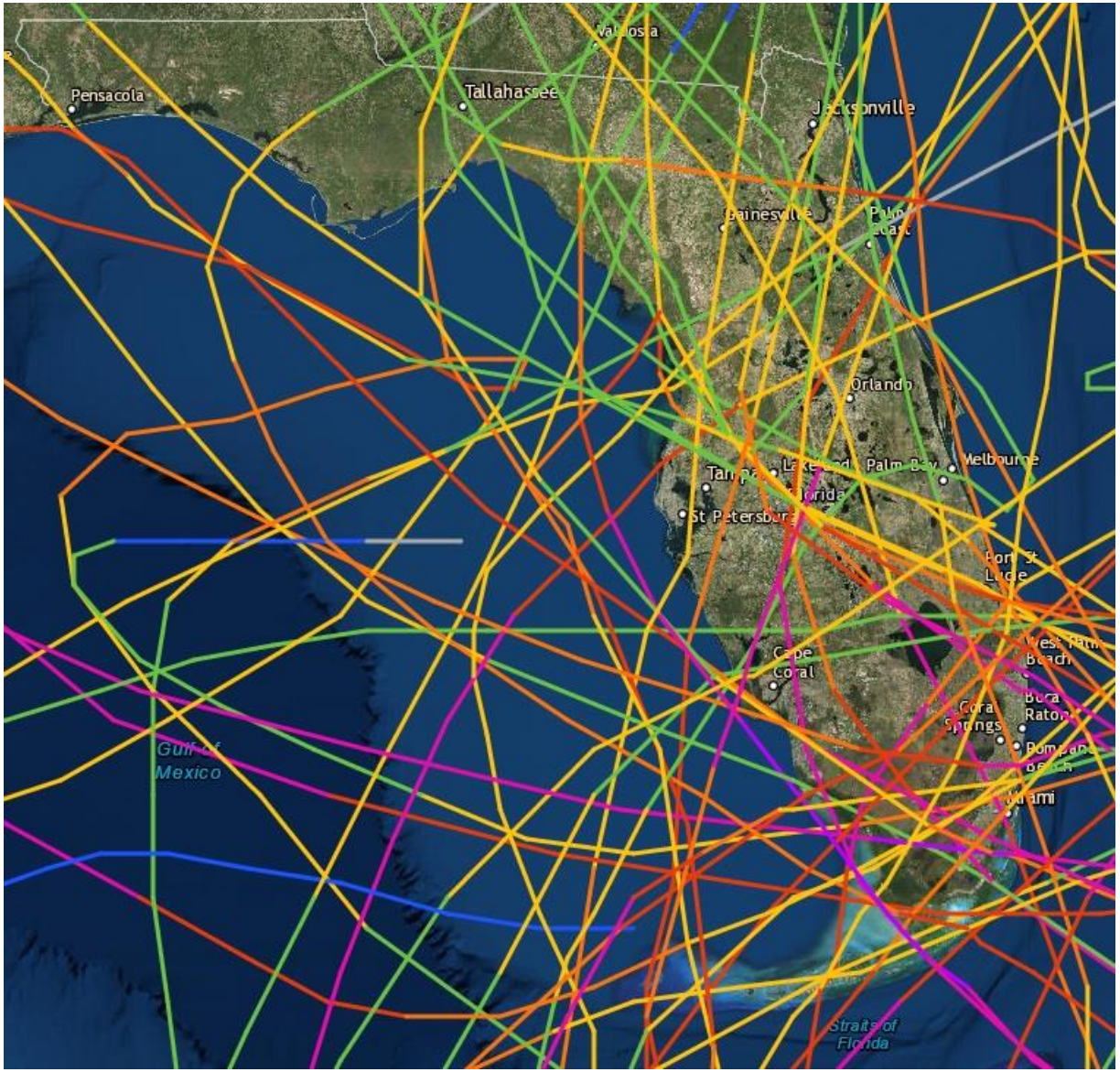
A Fact of Life in Florida:

Landfalling hurricanes 1916 - 2016



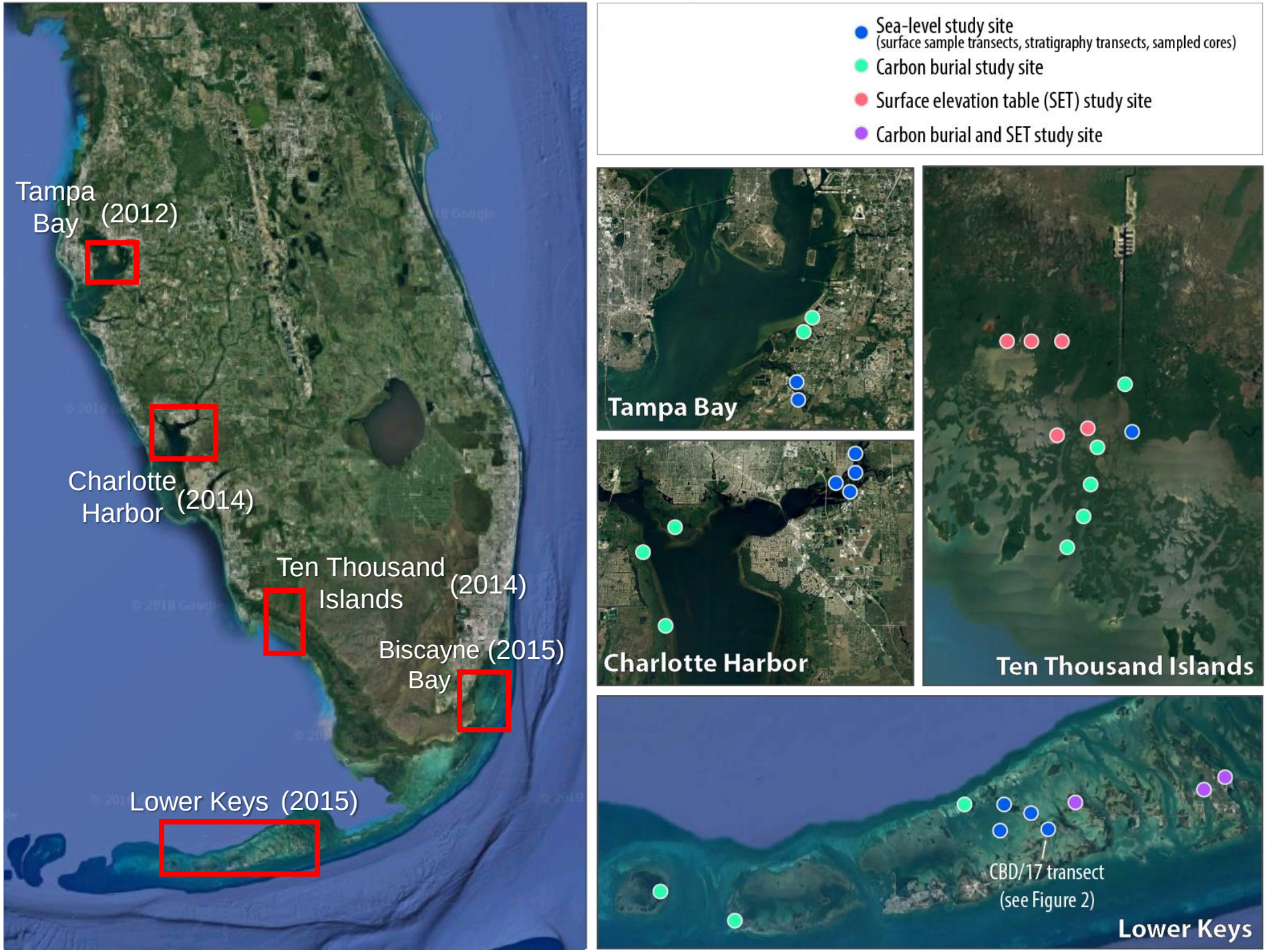
(Image: NOAA/USA Today)

Intensity:

- T.D.
- T.S.
- Cat. 1
- Cat. 2
- Cat. 3
- Cat. 4
- Cat. 5

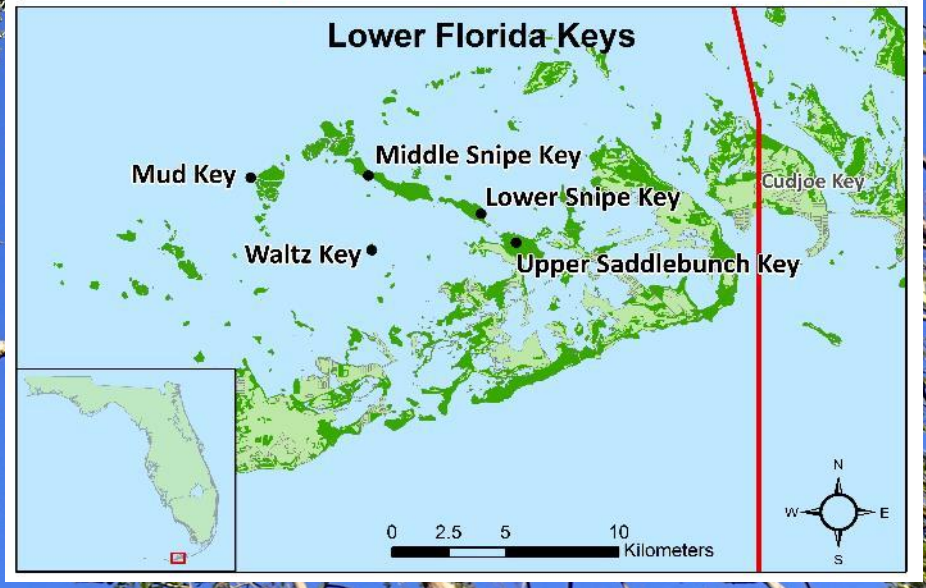
Potential Hurricane Impacts to Florida's Coastal Ecosystems

	Wind	Storm Surge	Precipitation
 Mangroves	Defoliation; Stem & branch breakage	Sediment import and/or erosion; Debris; Altered hydrology	Salinity; Nutrients; Altered hydrology
 Marshes	Negligible; Some bent stems	Sediment import and/or erosion; Debris; Altered hydrology	Salinity; Nutrients; Altered hydrology
 Seagrass	Increased turbidity; Increased wave energy	Sediment import and/or erosion	Salinity; Altered hydrology; Turbidity; Nutrients


Tampa Bay (2012)
Charlotte Harbor (2014)
Ten Thousand Islands (2014)
Biscayne Bay (2015)
Lower Keys (2015)
Sea-level study site
(surface sample transects, stratigraphy transects, sampled cores)
Carbon burial study site
Surface elevation table (SET) study site
Carbon burial and SET study site
Tampa Bay
Charlotte Harbor
Ten Thousand Islands
CBD/17 transect
(see Figure 2)
Lower Keys

Post-Irma Ecosystem Monitoring

- Damage Assessments: October 2017
- Two landfall areas chosen for recovery monitoring: Ten Thousand Islands & Lower Florida Keys
- Recovery Monitoring: Nov. 2017 – Dec. 2019
  - Year 1: every 3 months
  - Year 2: every 6 months

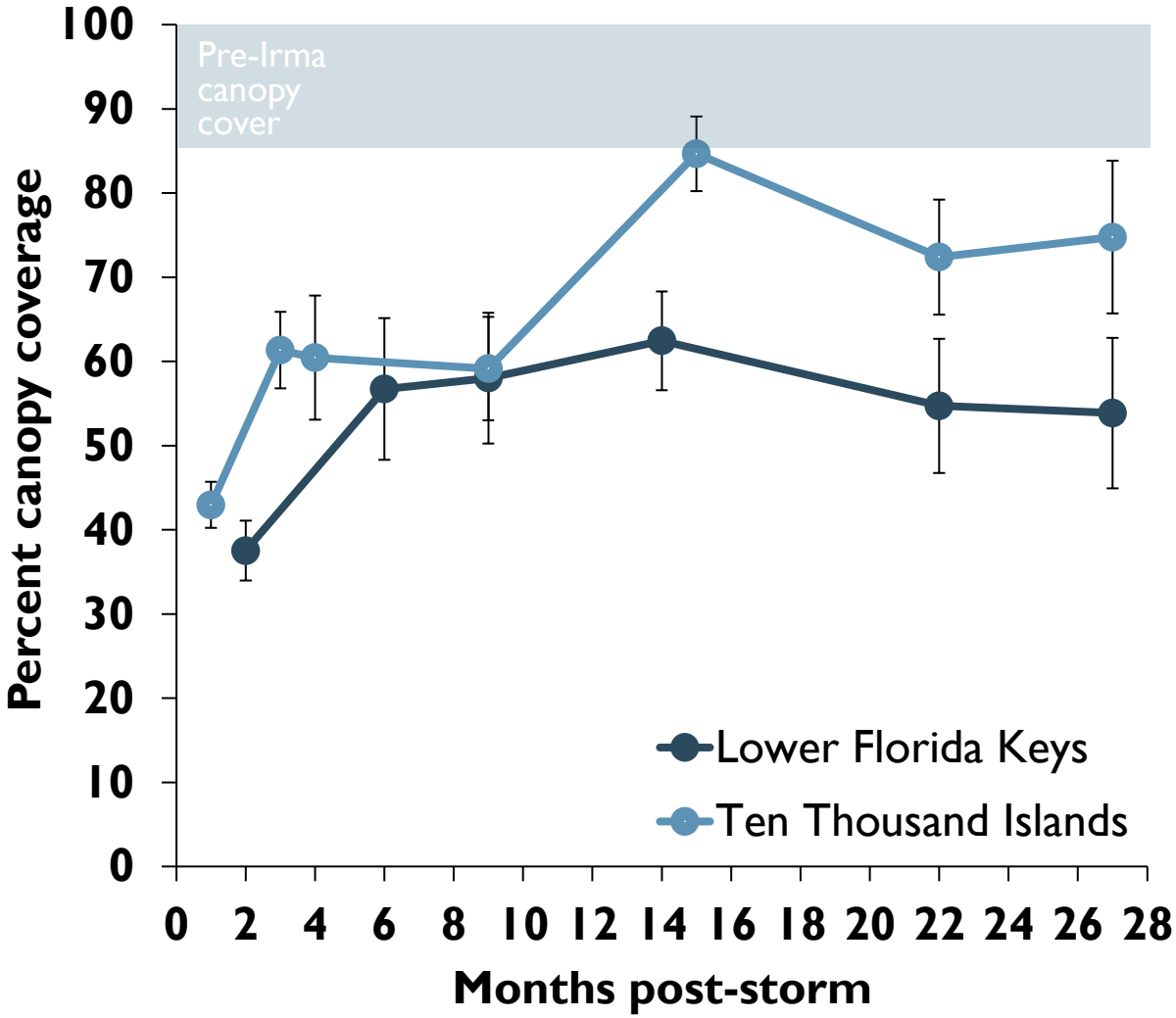


Visible Signs of Damage:
Defoliation & snap-offs

BEFORE

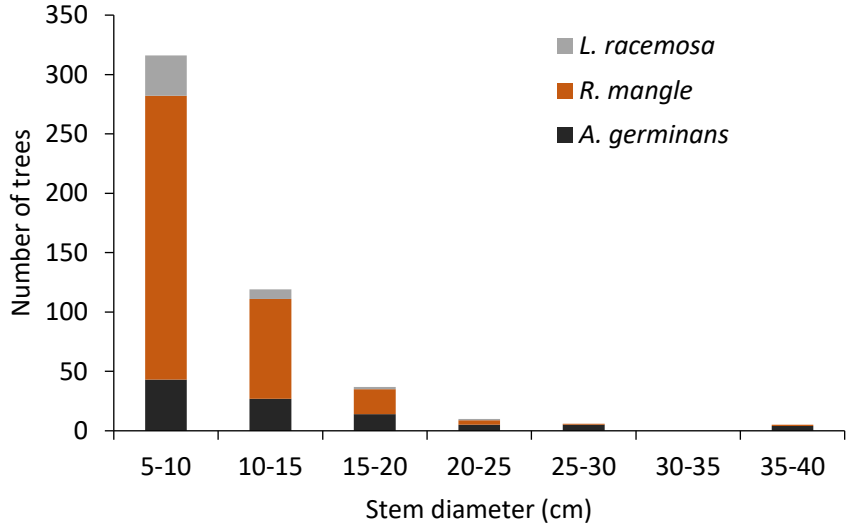
AFTER

Canopy Damage & Regrowth

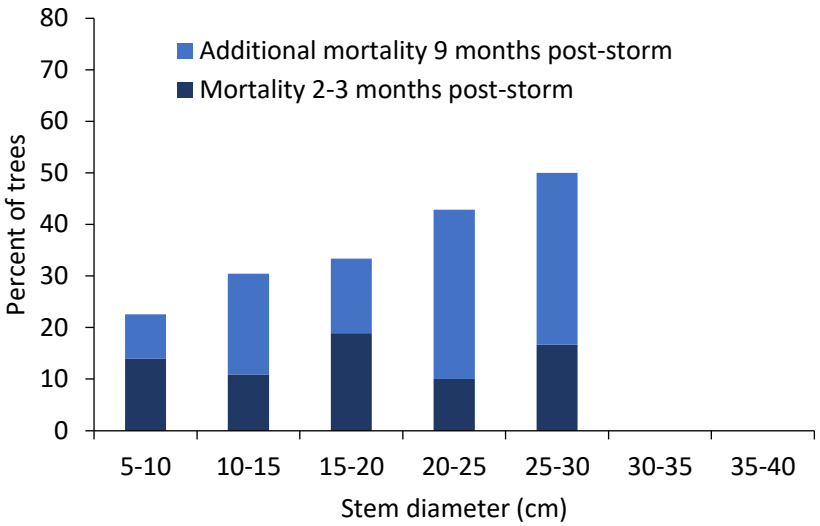


Tree Damage & Delayed Mortality

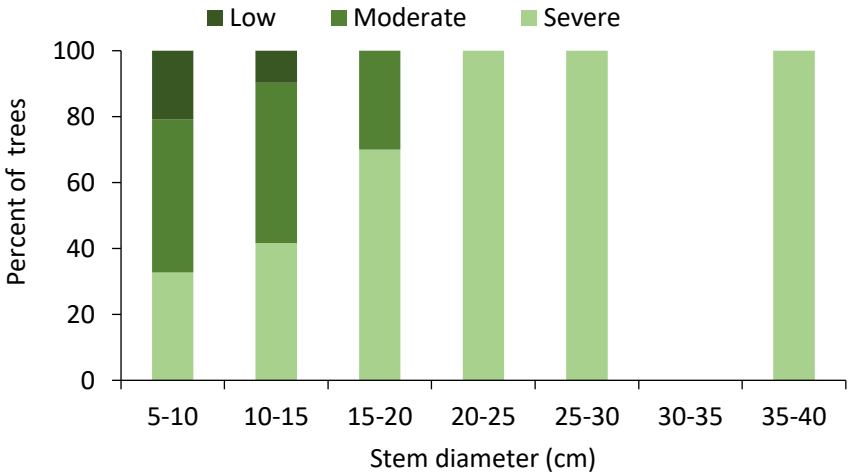
a. Tree species composition



c. Tree mortality



b. Tree branch damage



- Most severe damage observed in larger trees
- No initial trend in mortality by size class, but delayed mortality was greater in larger trees

(Radabaugh et al. 2019)

Up in the Air:
Recovery via epicormic growth

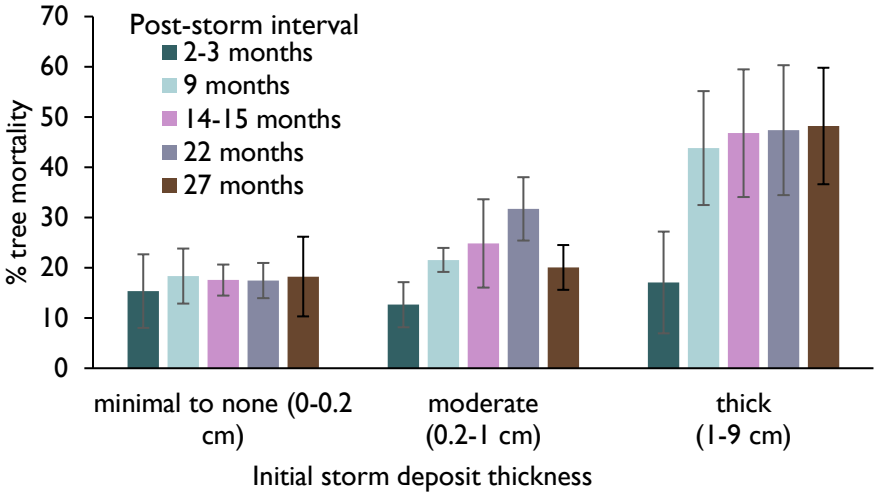
- Extensive canopy damage from high storm winds
- Black and white mangroves exhibited epicormic growth
- Red mangroves had minimal epicormic growth

Telling the Understory:
Recovery from the ground up

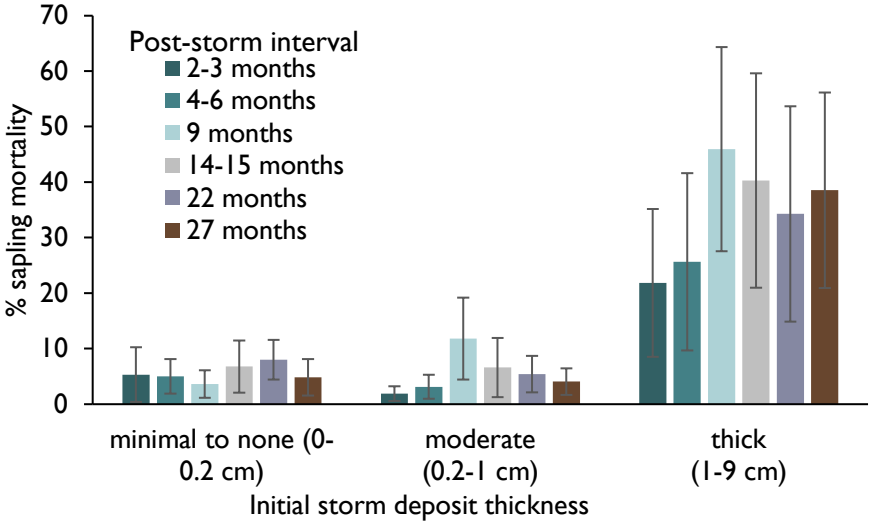
- Extensive growth of established seedlings and saplings after 3 months
- 90% of all seedlings red mangrove while 75% of all trees red mangrove
- Not all sites have seedling growth, and not all seedling/saplings survived

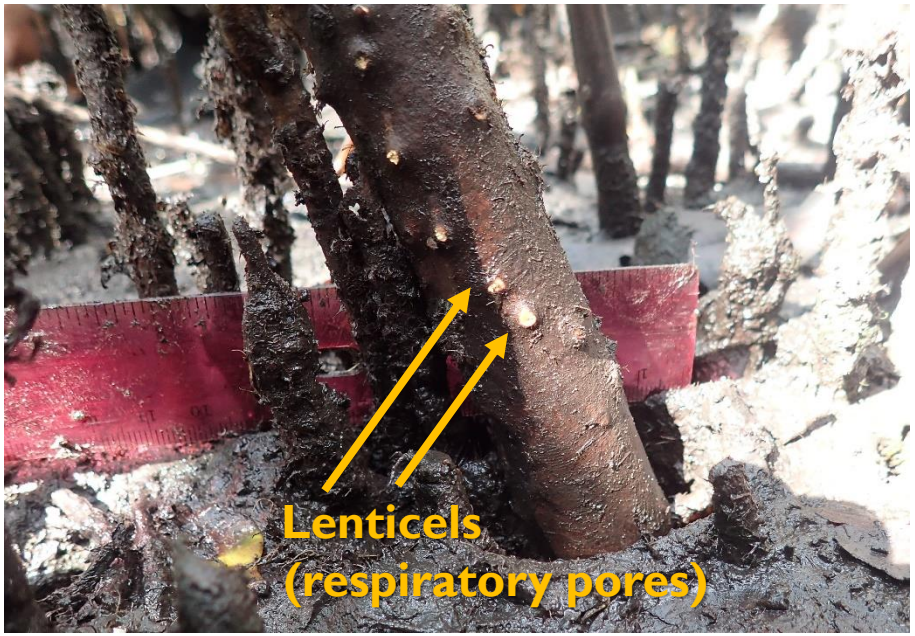
Not So Fast:
Drivers of delayed mortality

a. Tree mortality (Updated from Radabaugh et al. 2019)



b. Sapling mortality





Shoreline Stability Monitoring

The Road to Recovery:
Trajectories and timelines

- Mangrove forests with appropriate elevation, hydrology, and a source of propagules should experience natural recovery
- Can take 10 – 20 years for a mangrove forest to recover and mature
- Few opportunities for restoration

- Signs of concern:
  - No living seedlings
  - Stagnant pools of water at all tidal stages
  - Root decay & peat collapse

Summary

- **Large storms drive change in Florida's mangrove ecosystems**

- **Impacts of Hurricane Irma in SW Florida**
  - Severe stem and canopy damage due to wind
  - Thick storm-surge deposit causing delayed mortality
  - Signs of recovery, but full recovery could take 10 – 20 years
  - Limited opportunities for enhancement or restoration

Estuaries and Coasts
https://doi.org/10.1007/s12237-019-00564-8

SPECIAL ISSUE: IMPACT OF 2017 HURRICANES

Check for updates

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Questions?

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