Preliminary Field Investigation of Damage Caused by Hurricane Matthew

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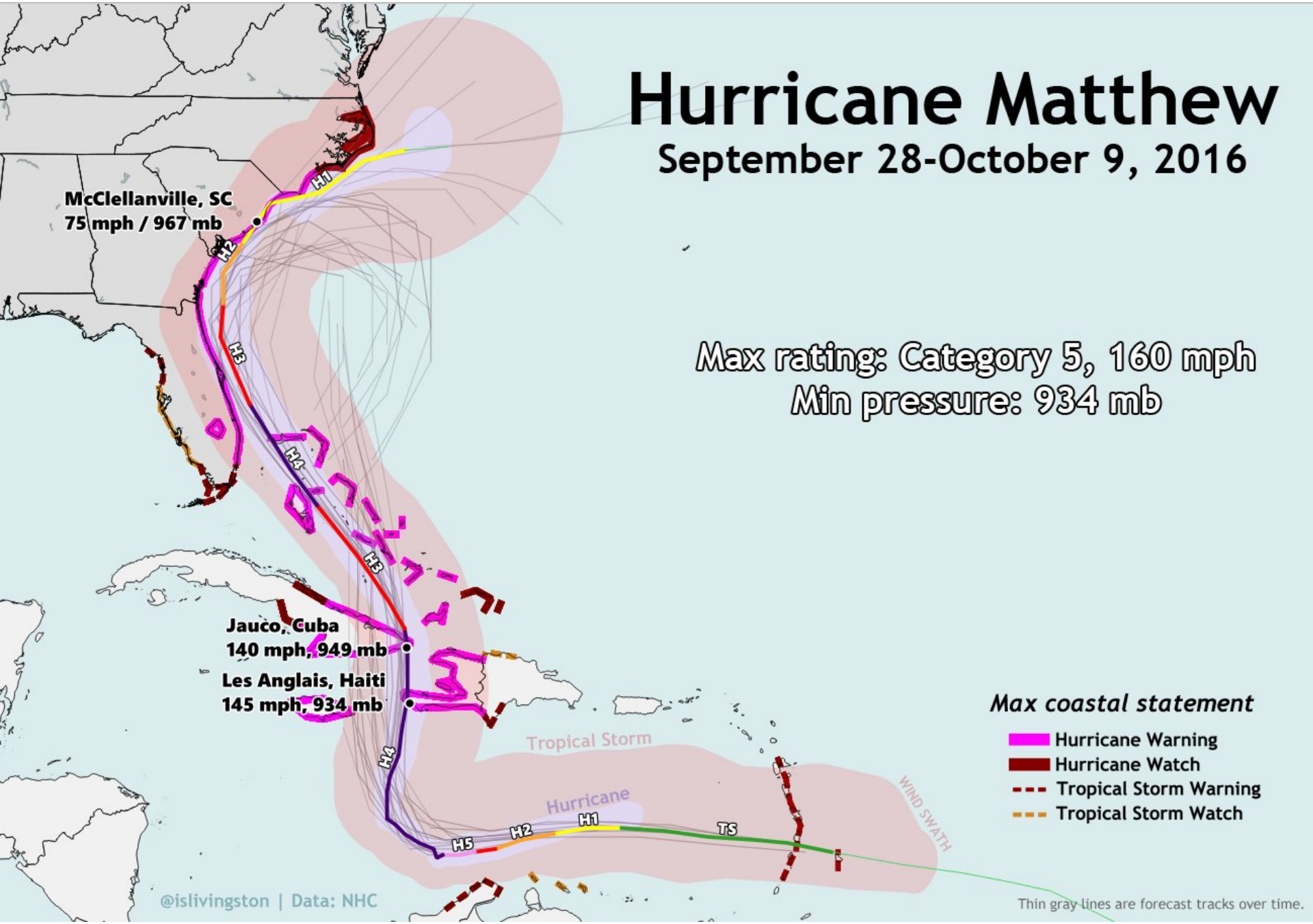
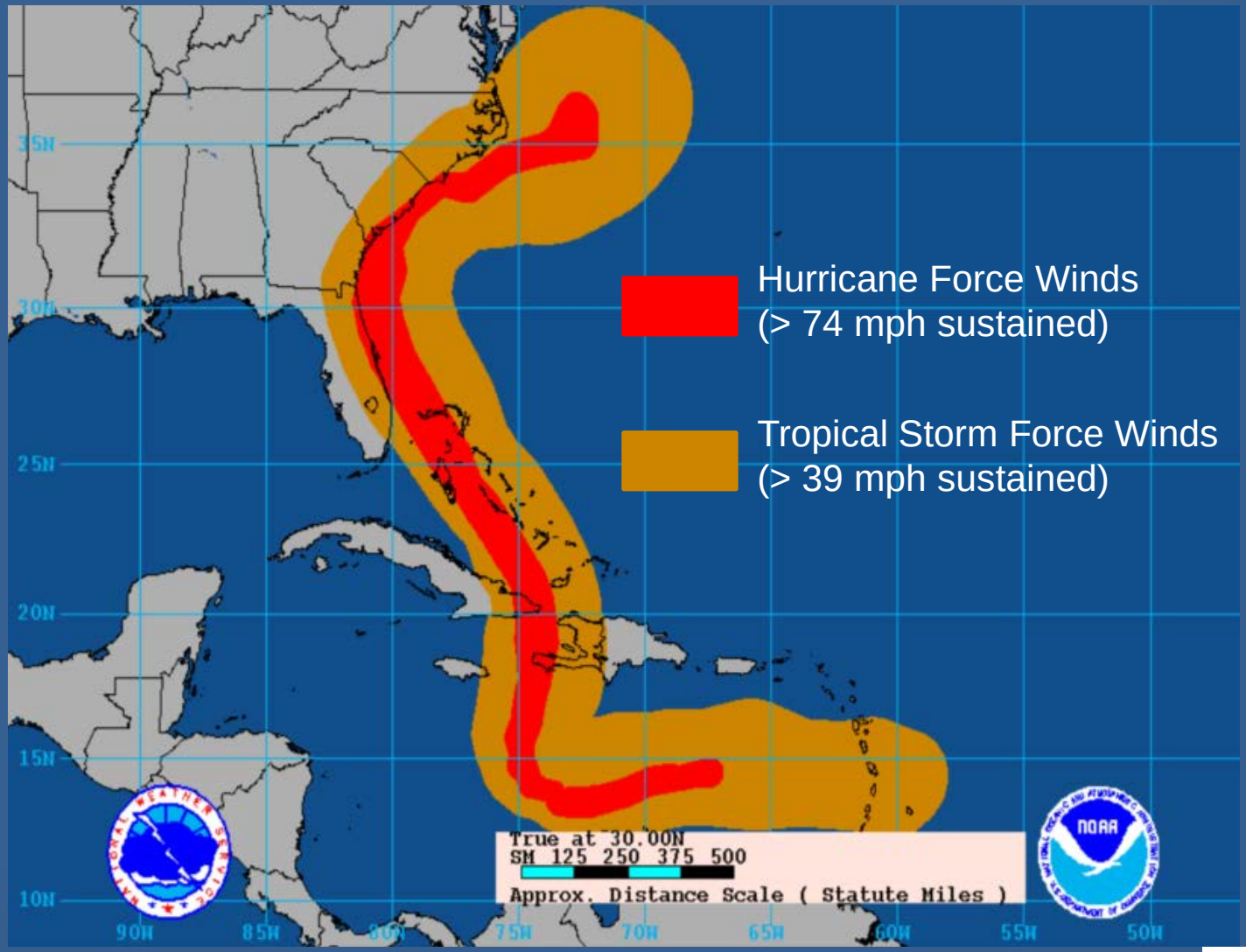
13 October 2016
Gainesville, FL

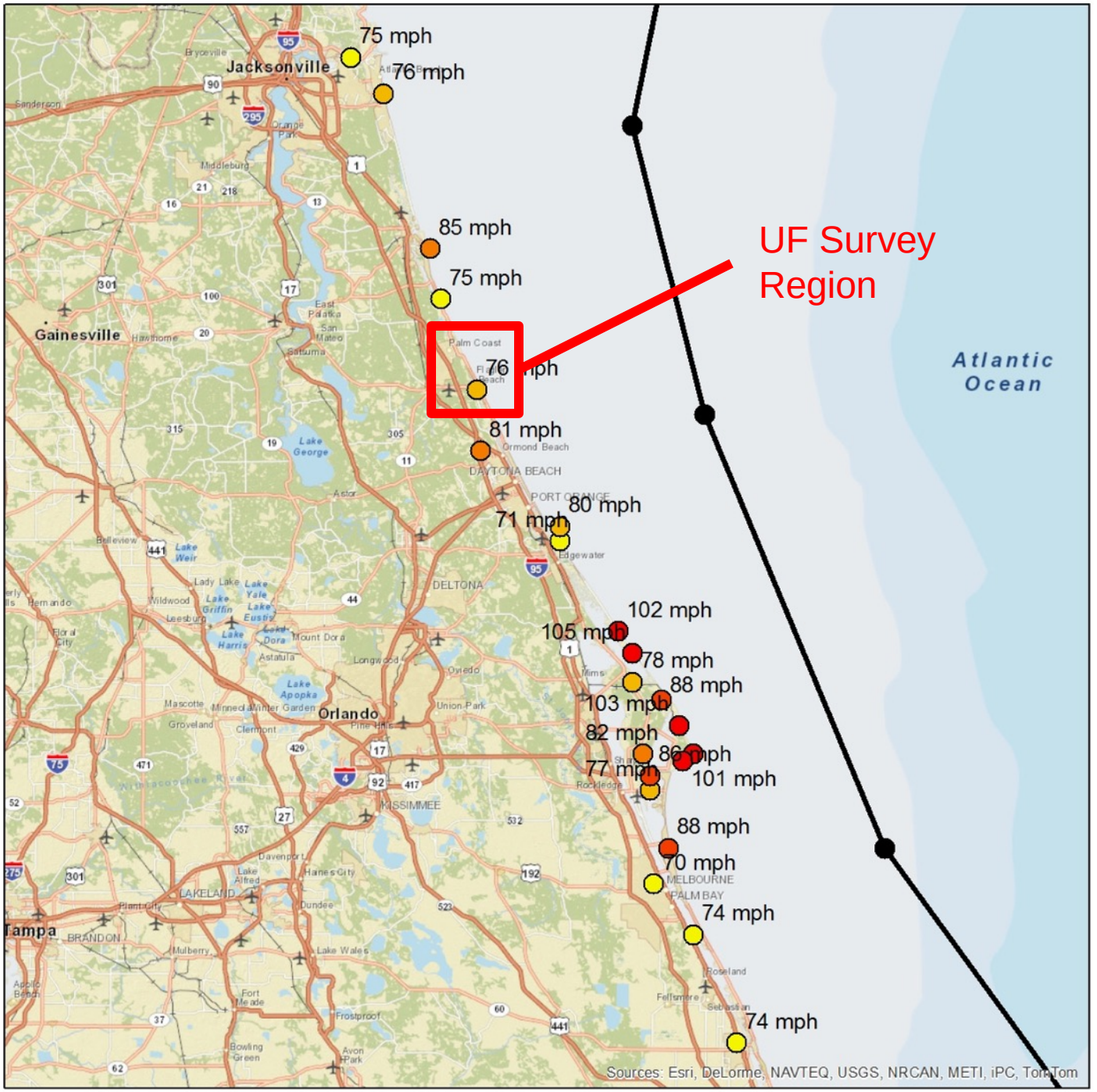
FBC Florida Building Commission


Hurricane Matthew
September 28-October 9, 2016
Max rating: Category 5, 160 mph
Min pressure: 934 mb
McClellanville, SC
75 mph / 967 mb
Jauco, Cuba
140 mph, 949 mb
Les Anglais, Haiti
145 mph, 934 mb
H1
H2
H3
H4
H3
H4
H5
H2
H1
TS
Tropical Storm
Hurricane
WIND SWATH
Max coastal statement
Hurricane Warning
Hurricane Watch
Tropical Storm Warning
Tropical Storm Watch
@islivingston | Data: NHC
Thin gray lines are forecast tracks over time.

Hurricane Matthew Wind Speeds



Hurricane Matthew Wind Speed Observations



N
W E
S

Legend

- Hurricane Track

Wind Gusts

- 70-75 mph
- 75-80 mph
- 80-85 mph
- 85-90 mph
- 90-105 mph

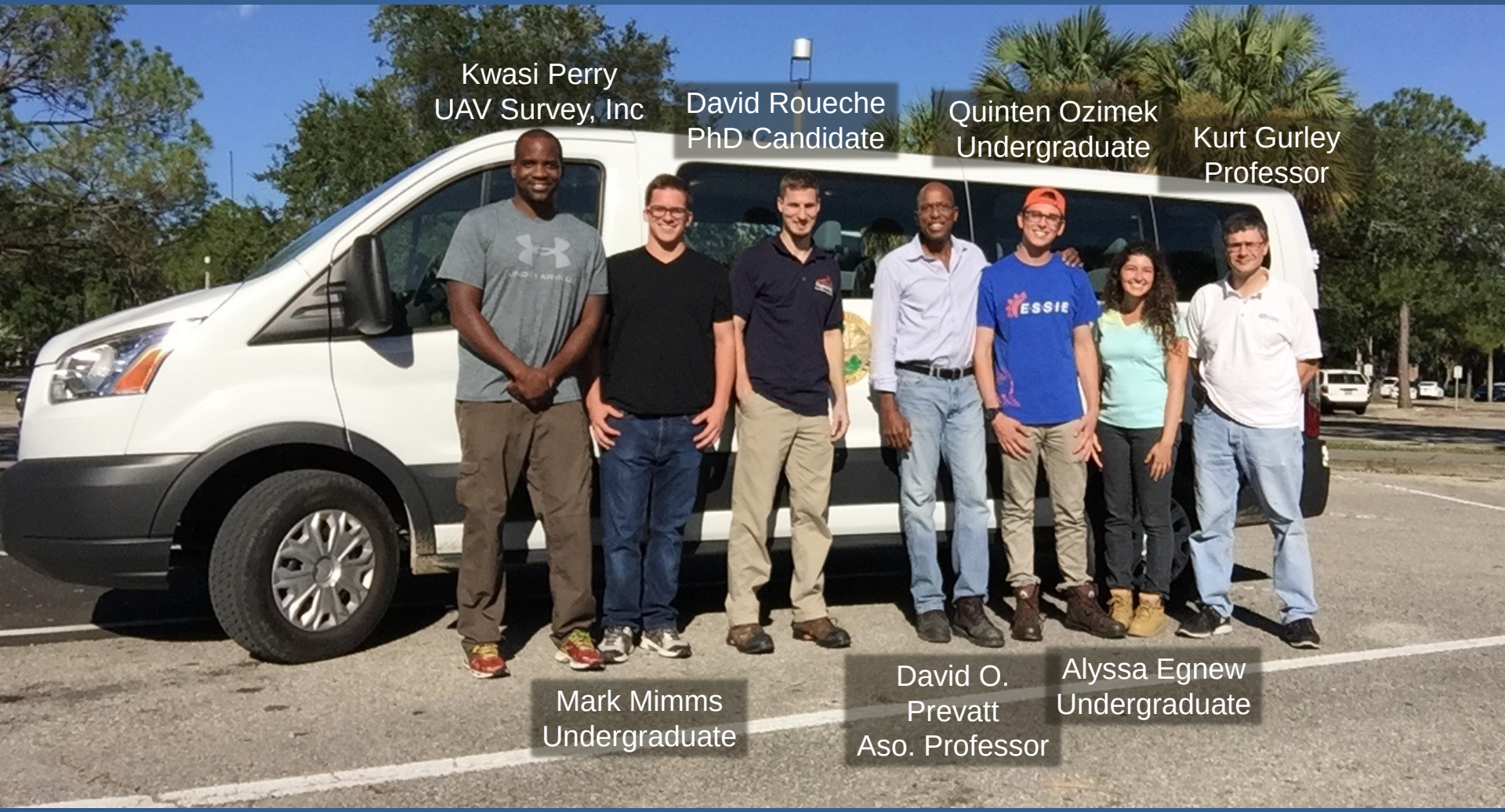
0 5 10 20 30 40 Miles

UF Damage Assessment

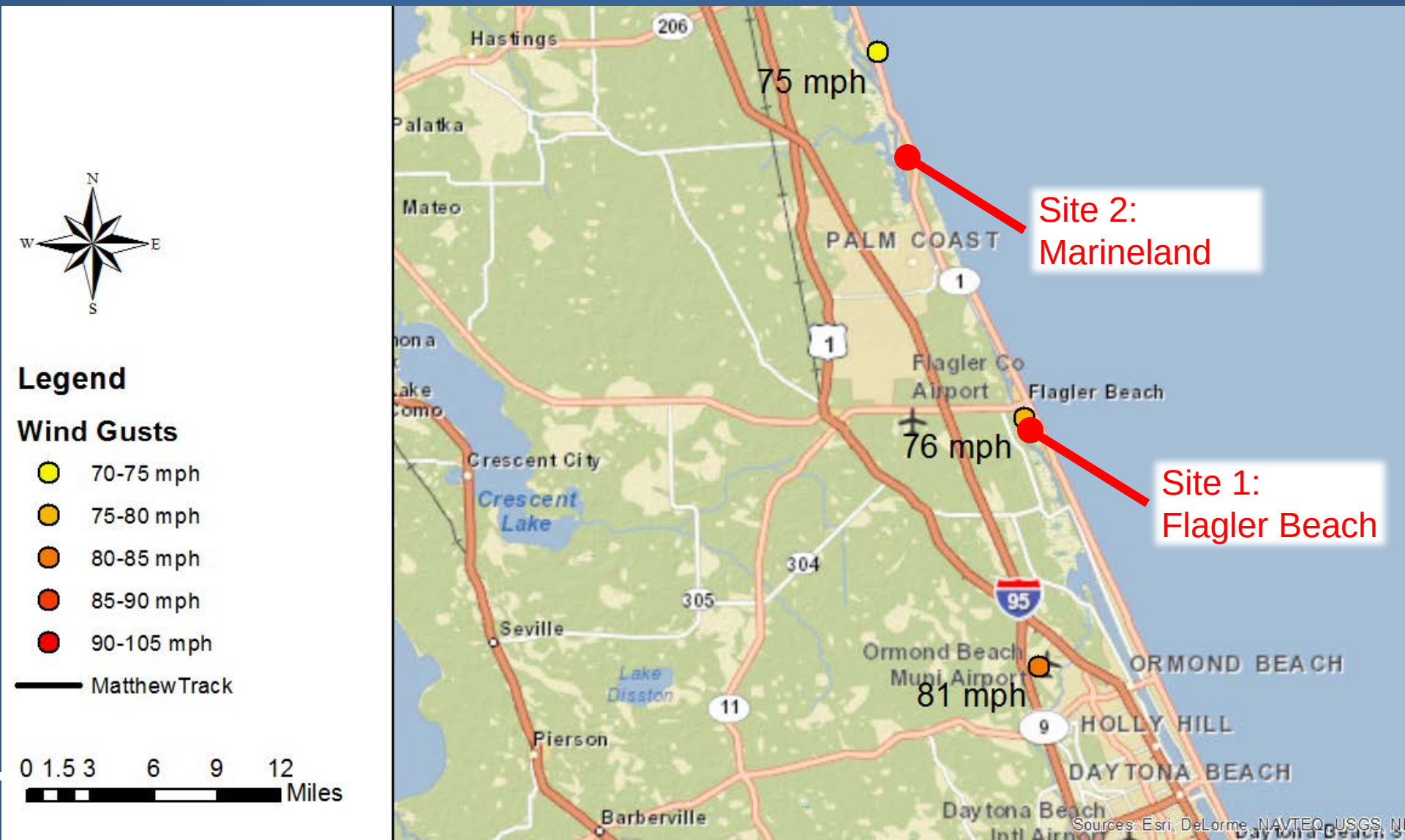
Objectives:

- Investigate regions along the Florida coast that experienced hurricane force wind speeds
- Demonstrate survey methodologies:
  - Ground survey: Survey123 app
  - Aerial Survey: UAV flights
- Provide recommendation for a full assessment

UF Damage Assessment Team

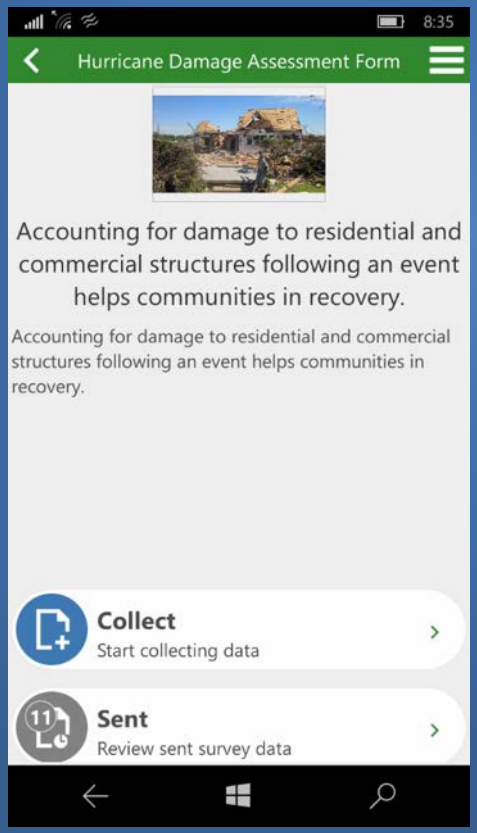


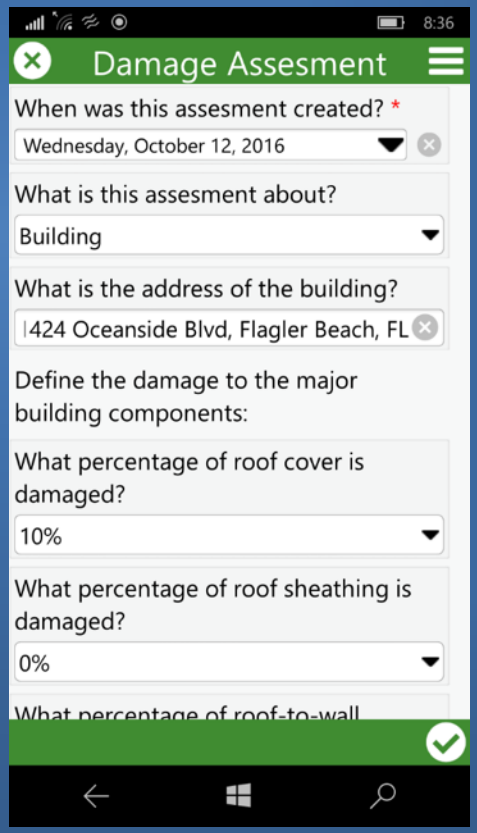
Assessment Sites

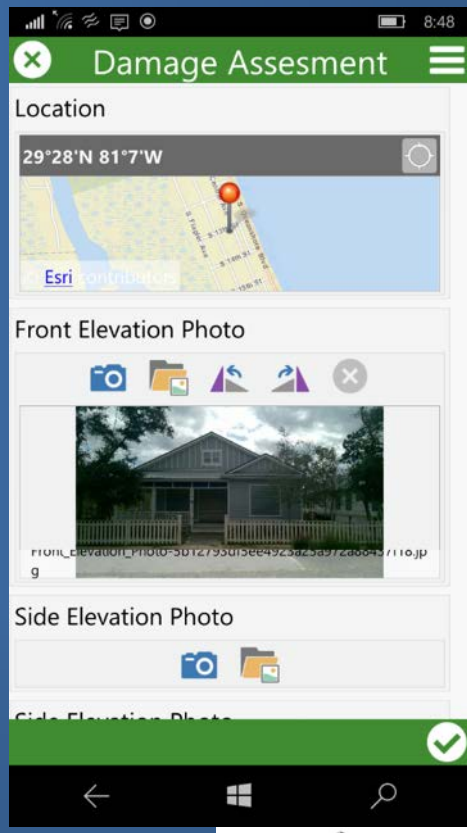


Ground Survey

- ESRI Survey123 for ArcGIS mobile survey app
- Allows for creation of custom survey forms that are accessed and submitted via smartphone

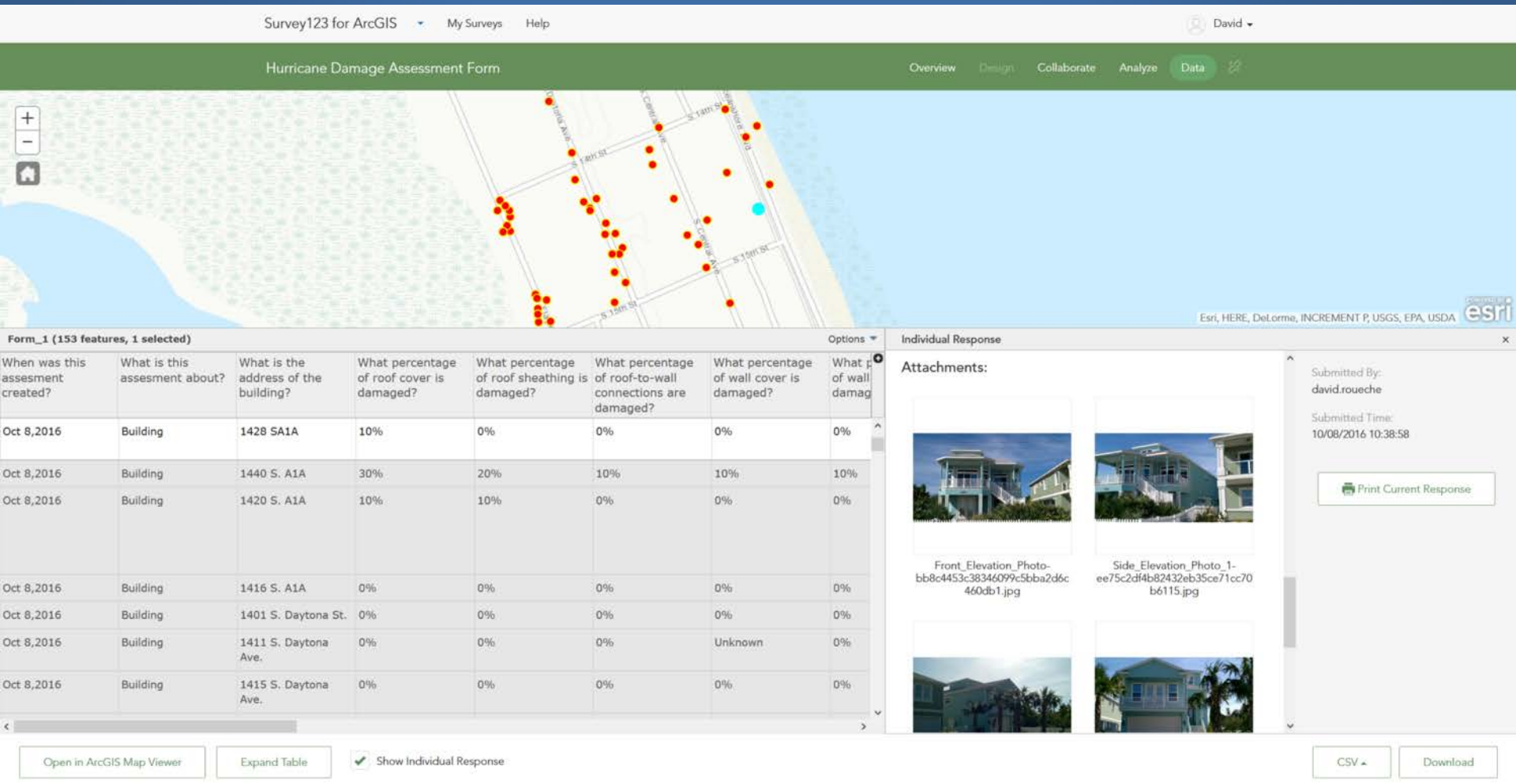






Ground Survey

- Submitted surveys are automatically compiled into online database that can be shared with stakeholders



UAV Survey

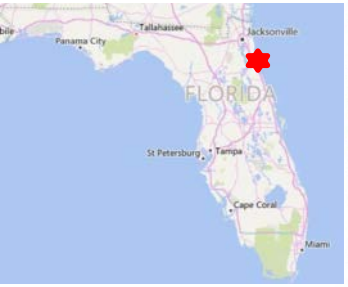
- Quad copter UAV
- Flight Elevation:
  220 ft
- Flight Speed:
  ~30 mph
- Imagery Pixel Size:
  5 cm (2 in.)
- Total high Resolution Photos: 581
- Survey completion time:
  15 minutes


Flagler Beach, FL


Marineland, FL

3D Model from UAV Data

Flagler Beach
Flagler County, FL



N

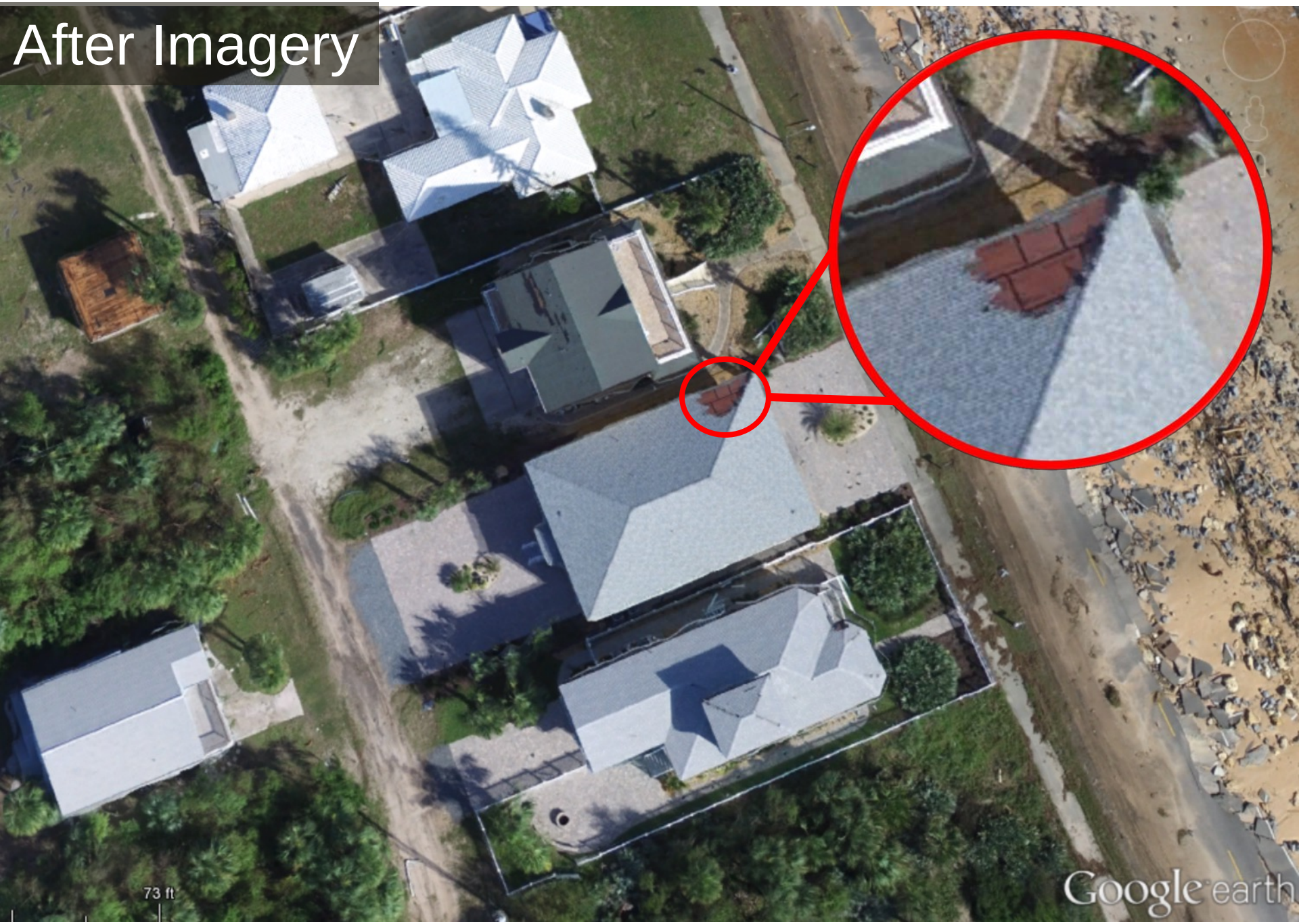
Legend

Year Built

- <1950
- 1951 - 1960
- 1961 - 1970
- 1971 - 1980
- 1981 - 1990
- 1991 - 2000
- 2001 - 2010
- > 2010

0 0.02 0.04 Mile


Before Imagery
73 ft
Google earth

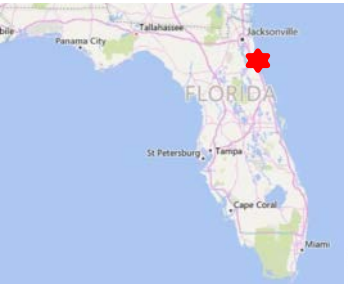

After Imagery
73 ft
Google earth

1424 S Oceanshore Blvd, Flagler Beach, FL
Year Built: 2015

UAV Imagery

Ground Survey Photo

Marineland
Flagler County, FL



N

Legend

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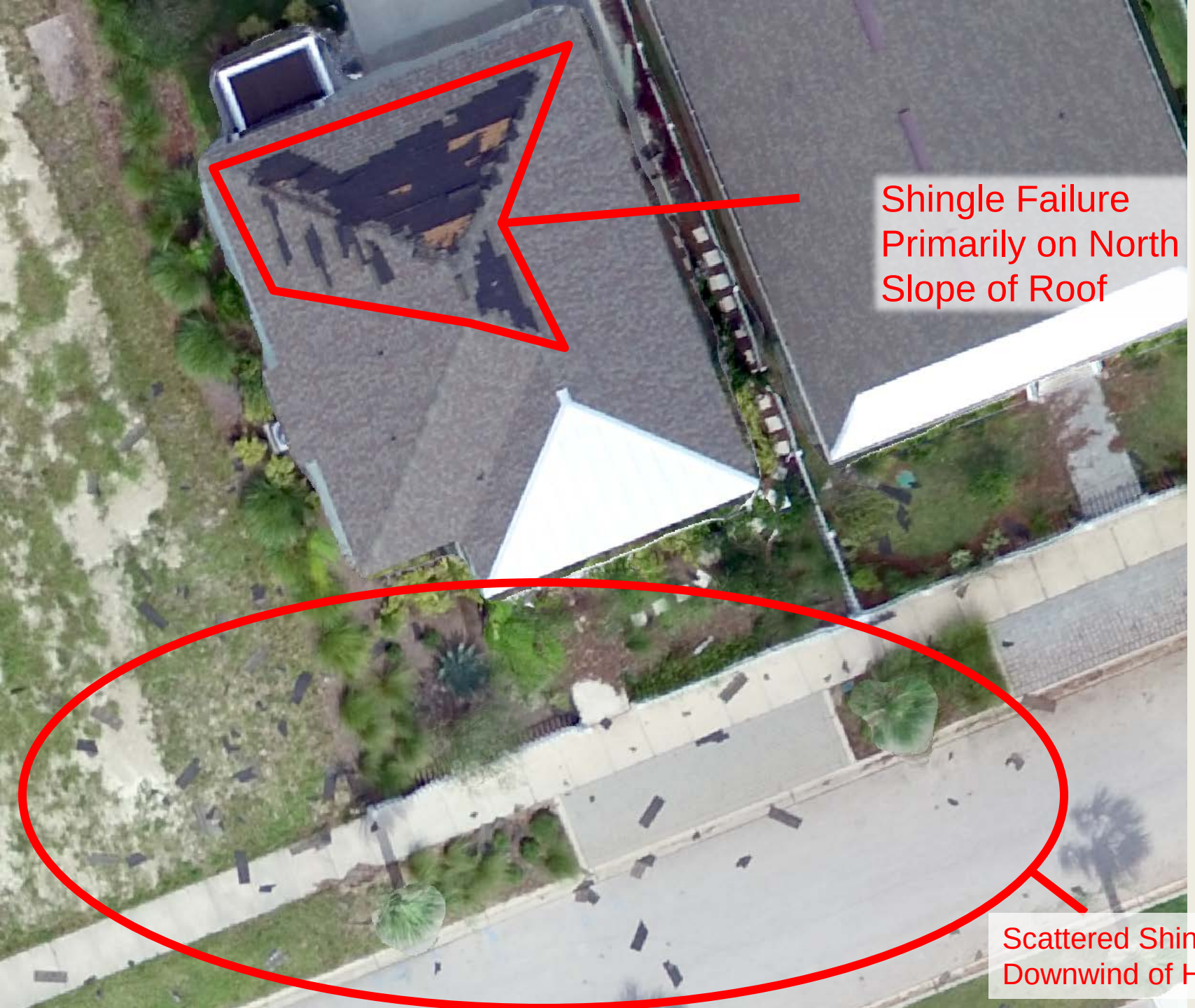
0 0.02 0.04 Miles

Laughing Gull Ln
Beach Haven Pkwy
Smiling Fish Ln
Turtle Beach Dr
Coquina Way
Sandy Beach Way
Cedar Point Rd

Sources: Esri, DeLorme, NAVTEQ, USGS, NRCAN, METI, IPC, TomTom, Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors


Shingle Failure
Primarily on North
Slope of Roof
Scattered Shingle Debris
Downwind of Home

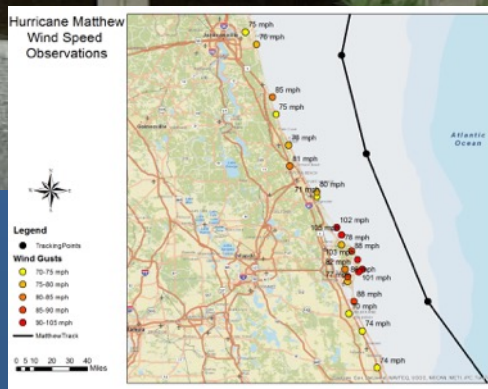
Soffit Damage Observed to a Few Homes

Preliminary Damage Observations

- 90 homes surveyed in Flagler County (experienced 3-second wind gusts of 70-80 mph)
- 44 homes surveyed in Flagler Beach, 46 homes surveyed in Marineland
- Damage limited to roof cover, soffits, fascia, windows
- 13% homes experienced roof cover damage (12 of 90)
- Shingle damage mainly on north-facing roof slopes (confirming strongest winds were out of the North)

Other Damage Observations (from Social Media 1/4)

Orlando, FL
(from @weshchopper2)



Other Damage Observations (from Social Media – 2/4)

Orlando, FL
(from @wesh)

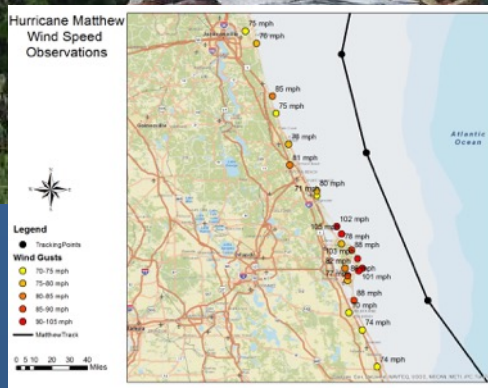
Other Damage Observations (from Social Media – 3/4)

Daytona Beach, FL
(from @wesh)

Daytona Beach, FL
(from @maryzimnik)

Other Damage Observations (from Social Media – 4/4)

Edgewater, FL
(from Shayna L Keller)



Summary

- Both suburbs experienced similar wind strengths – the newer houses performed better
- Using the UAV survey techniques provides substantially more complete survey than on-the-ground survey
  - Enables dimensioning to measure % damage to walls windows
  - Accurate measure for roof damage particularly with tree cover
- Survey123 tool enables quick capture and uploading of geo-located house info., but some bugs still exist.
- UF proposes a follow-up survey to identify level of interior damage (water and wind) experienced
  - Survey also would associate house age and characteristics to damage
  - Consideration of social/behavioral questions – retrofit, evacuation, risk

Thank You For your Attention!

Questions?

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