



The Impact of Hurricanes Ian and Nicole on Coastal Development in Florida

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Coastal Damage Assessment

A snapshot of DEP data points collected within the Coastal Building Zone on Estero Island after Hurricane Ian.





Hurricane Ian – Major Structural Damages

County	# Single-Family Dwellings Damaged	# Multi-family Dwellings ¹ Damaged	# Other Major Structures ² Damaged	Total # Damaged
Sarasota	32	12	1	45
Charlotte	156	62	5	223
Lee	2,791	502	220	3,513
Collier	173	69	20	262
St. Johns	16	3	0	19
Flagler	61	5	10	76
Volusia	272	68	24	364
TOTAL	3,501	721	280	4,502



Hurricane Nicole – Major Structural Damages

County	# Single-Family Dwellings Damaged	# Multi-family Dwellings ¹ Damaged	# Other Major Structures ² Damaged	Total # Damaged
St. Johns	10	2	1	13
Flagler	7	1	1	9
Volusia	35	12	62	109
Brevard	14	3	2	19
Indian River	2	3	2	7
Broward	0	0	1	1
TOTAL	68	21	69	158



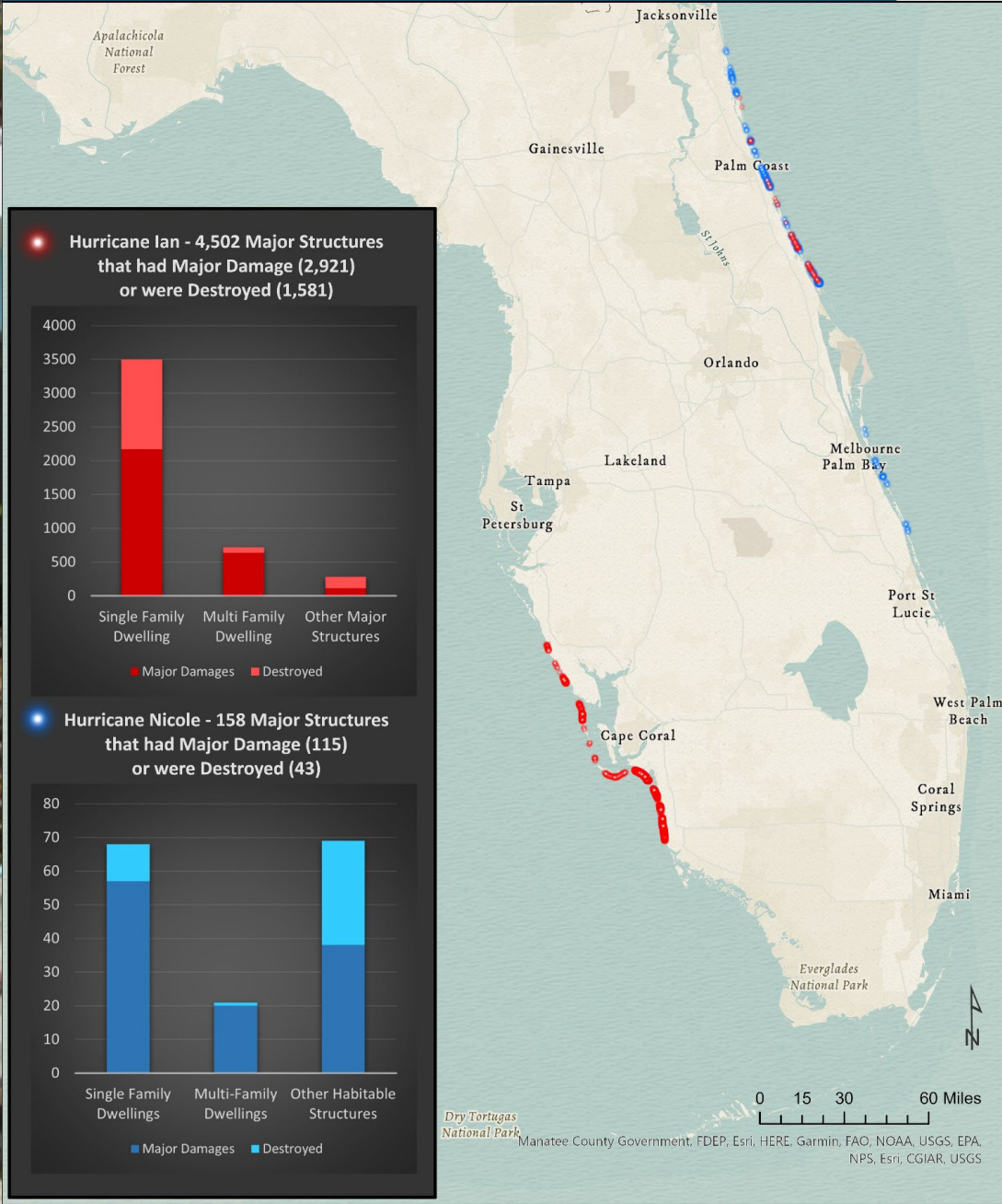
Historical Damage Perspective

YEAR	Hurricane	# of Major Structures
2022	Ian	4,503
2018	Michael	2,725
1995	Opal	1,129
2004	Ivan	1,000+
2017	Irma (non-Keys)	813
2004	Jeanne	644
2004	Frances	546
2005	Dennis	448
2020	Sally	336
2004	Charley	~250
1985	Kate	242
2016	Matthew	187
1985	Elena	165
2022	Nicole	158
1979	Frederic	101

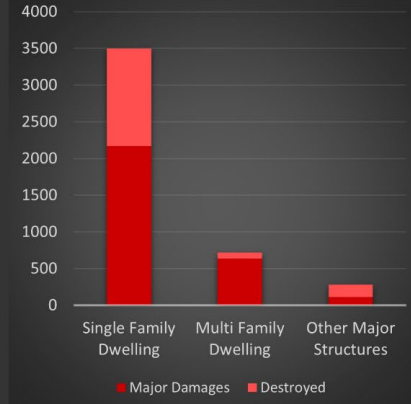


Coastal Damage Assessment

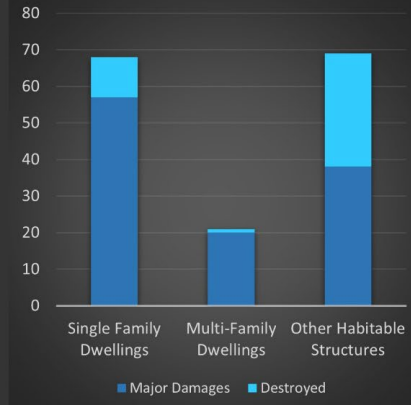
Overview Buildings Armoring Beach Condition Emergency Locations Dwelling Summary Focal Photos



Hurricane Ian - 4,502 Major Structures that had Major Damage (2,921) or were Destroyed (1,581)

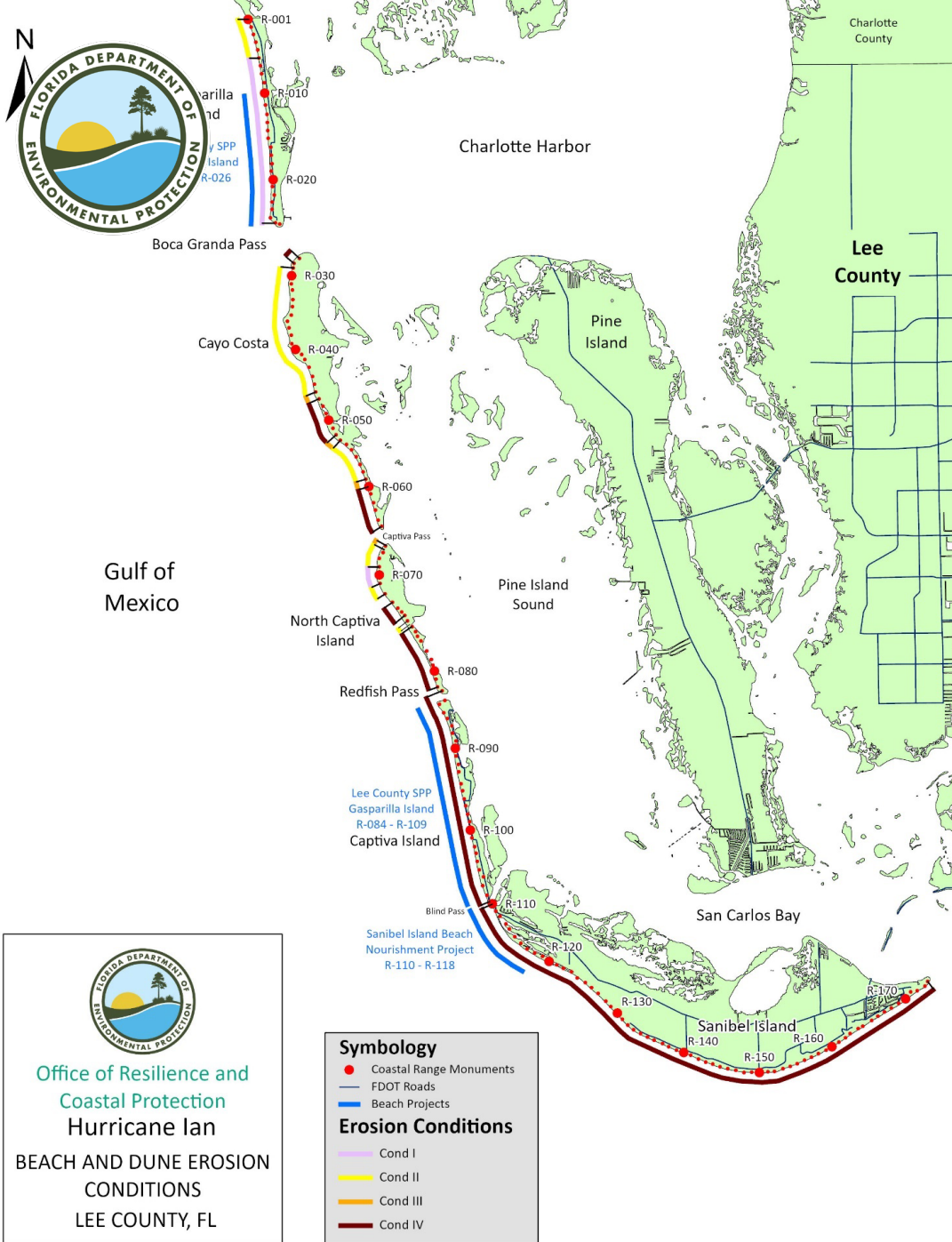


Hurricane Nicole - 158 Major Structures that had Major Damage (115) or were Destroyed (43)



Dry Tortugas National Park Manatee County Government, FDEP, Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS, Esri, CGIAR, USGS

10/14/2022



<u>Island</u>	<u># Damaged</u>	<u>% Wind/Surge</u>
Gasparilla	254	100 / 0
Cayo Costa	12	100 / 0
North Captiva	50	86 / 14
Captiva	78	92 / 8
Sanibel	536	70 / 30



Ground Zero Estero Island

100 Year Storm Surge +13 feet

2,329 major structures with
major damage (2/3 of county)

56% destroyed

Most damage due to storm
surge and waves





LAT: 26.451102
LNG: -81.957398
UTC: 2022-10-02 19:05:12

FROM: Begin (23030.1 m)
TO: R-181 (262.8 m)





Hurricane Ian – Armoring Damage

County	Major Damage (Feet)	Minor Damage (Feet)
Lee	4,756	1,525
Collier	3,036	0
St. Johns	0	845
Flagler	1,200	9,350
Volusia	6,330	3,435
TOTAL	15,322 (2.9 miles)	15,155 (2.87 miles)

Hurricane Nicole – Armoring Damage

County	Major Damage (Feet)	Minor Damage (Feet)
St. Johns	2,008	1,243
Flagler	7,790	2,036
Volusia	13,262	3,265
TOTAL	23,060 (4.37 miles)	6,544 (1.24 miles)



Historical Armoring Perspective

YEAR	Hurricane	Length of Armoring Damage (Miles)
1985	Elena	6.95
2022	Ian	5.77
2022	Nicole	5.61
2016	Matthew	3.75
1995	Opal	3.30
2017	Irma (non-Keys)	3.06
2022	Ian-Nicole Combined	11.38

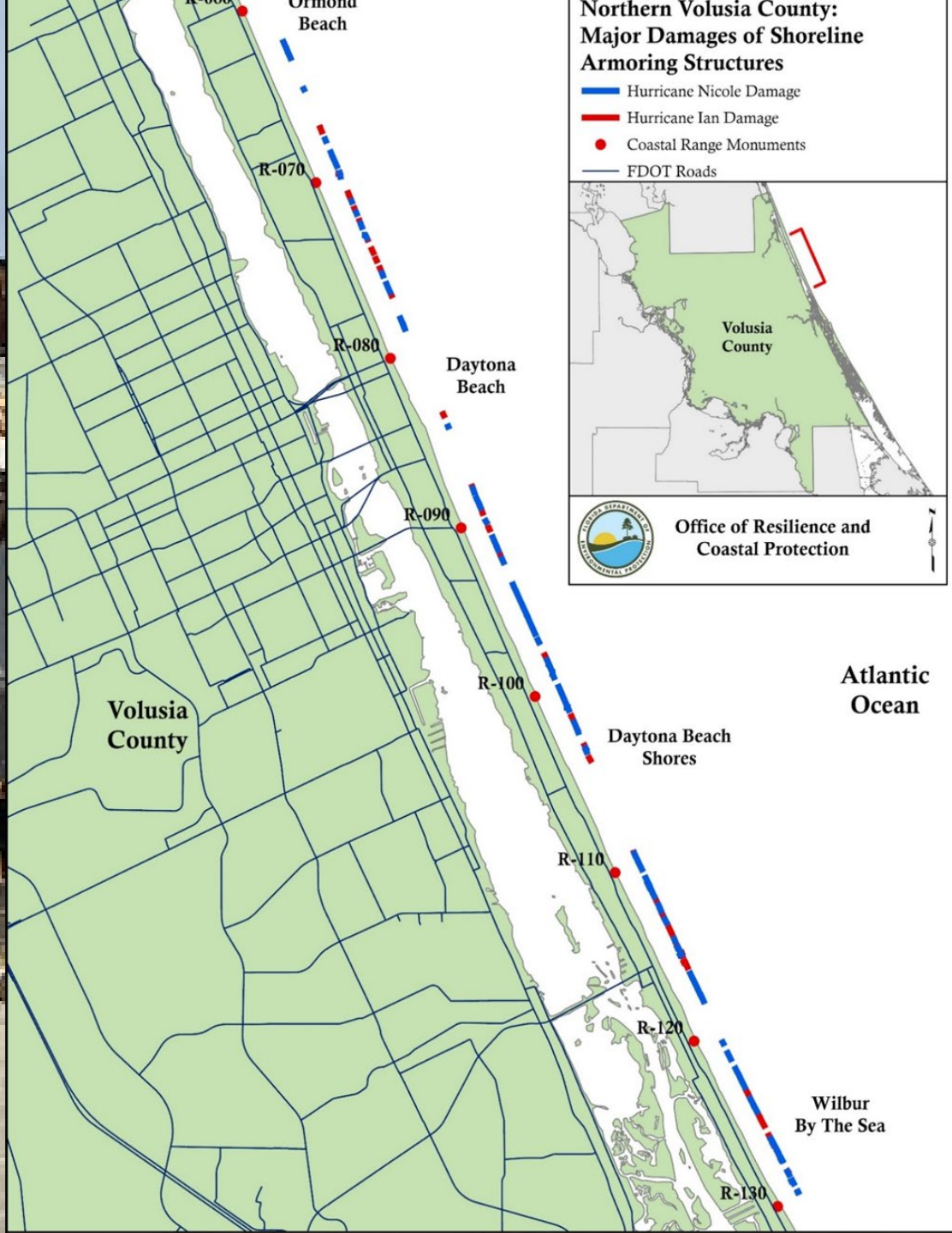


Flagler Beach revetment – catastrophic failures



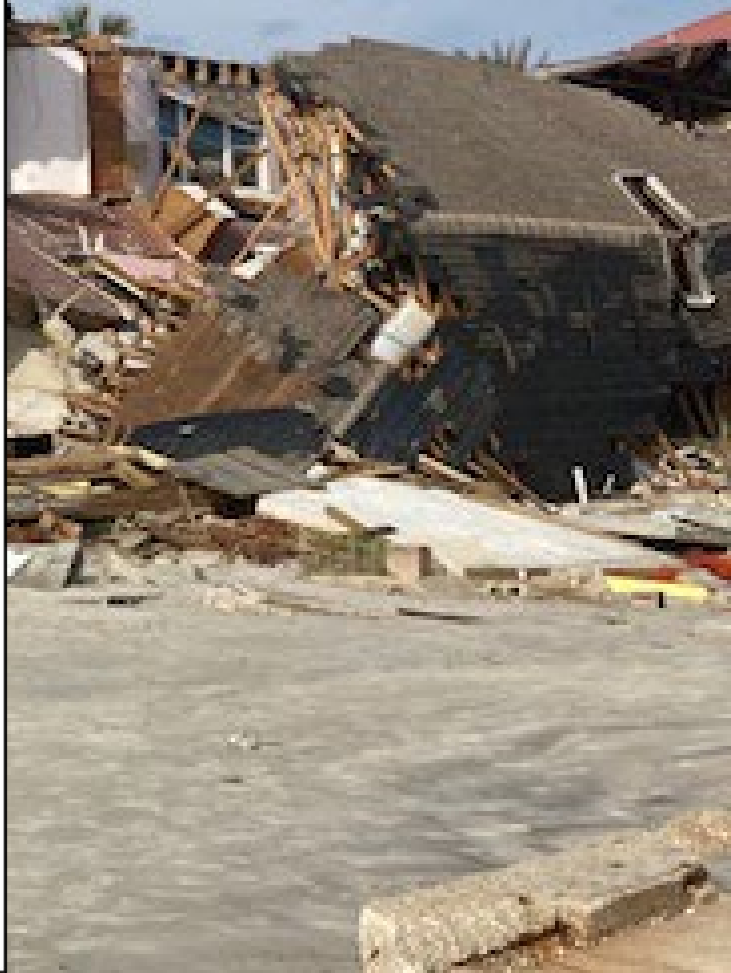


Northern Volusia County



Hurricane Ian
53 seawalls destroyed

Hurricane Nicole
98 seawalls & 3 revetments destroyed





Why all the seawall damage?
Doesn't anybody know how to build a seawall?





Reasons for seawall damage

- Age (most were over 30 years old)
- Corroded reinforcement steel
- Inadequate tie-backs (or none at all)
- Insufficient pile penetration (short panels)
- Inadequate wall thickness (typically only 4 inches)
- Lack of an adequate filter drainage system behind the walls
- All the above coupled with the significantly lowered beach profile, high storm tides and wave conditions extended over multiple days



Inadequate seawall panel thickness & lack of tie-backs





Inadequate sheet pile penetration & corroded reinforcing steel





Wilbur-by-the-Sea

Along a 13-mile segment of northern Volusia County, 127 buildings and 8.4 miles of surviving seawalls are now threatened or vulnerable to another major coastal storm.



Buildings in danger of collapse with inadequate foundations for the open coast



Examples of threatened dwellings in northern Volusia County



Want to swim? Bring your own ladder!





Where do we go from here?



THANK YOU

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