DELRAY BEACH COASTAL IMPACTS FROM HURRICANE NICOLE

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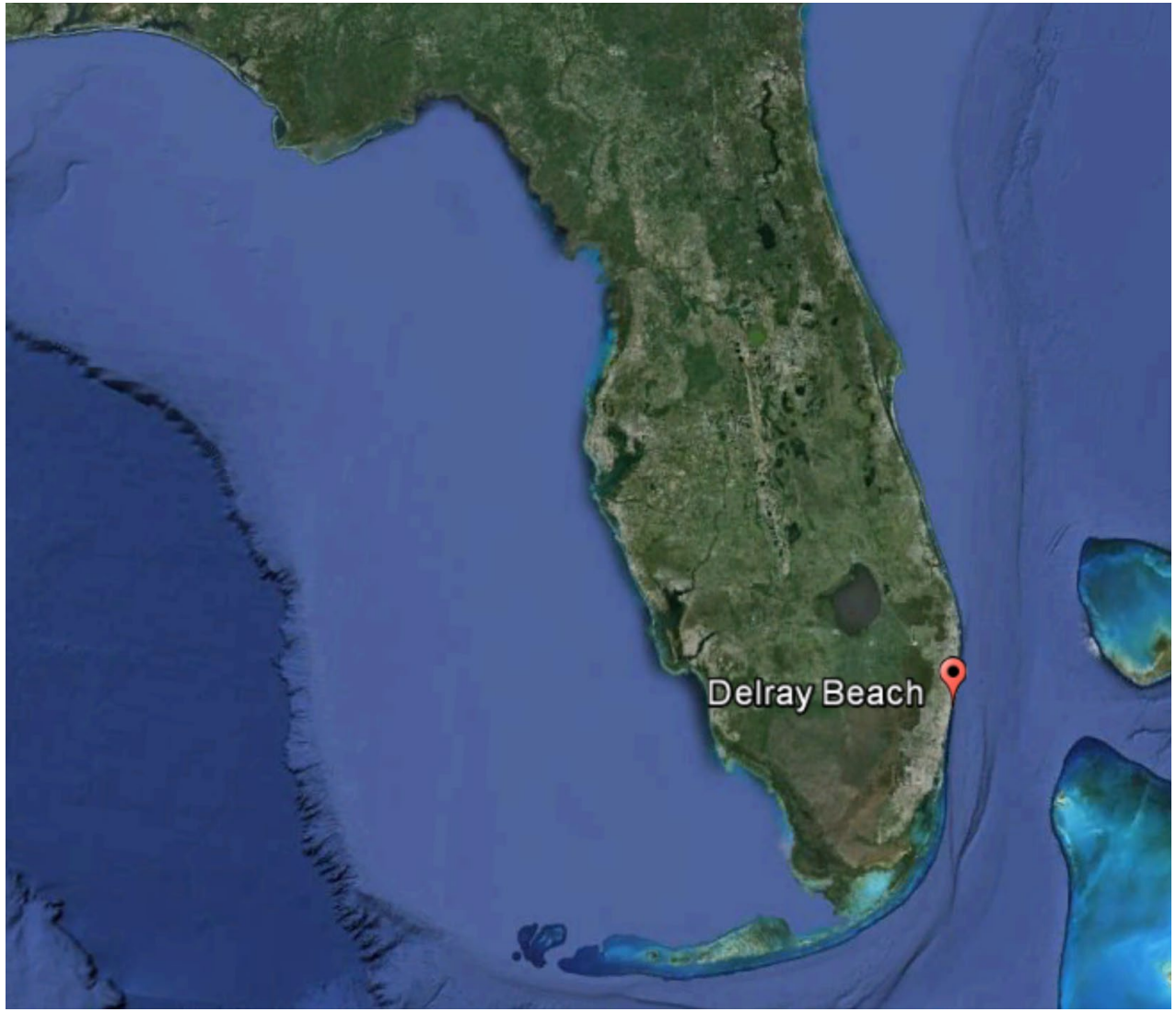
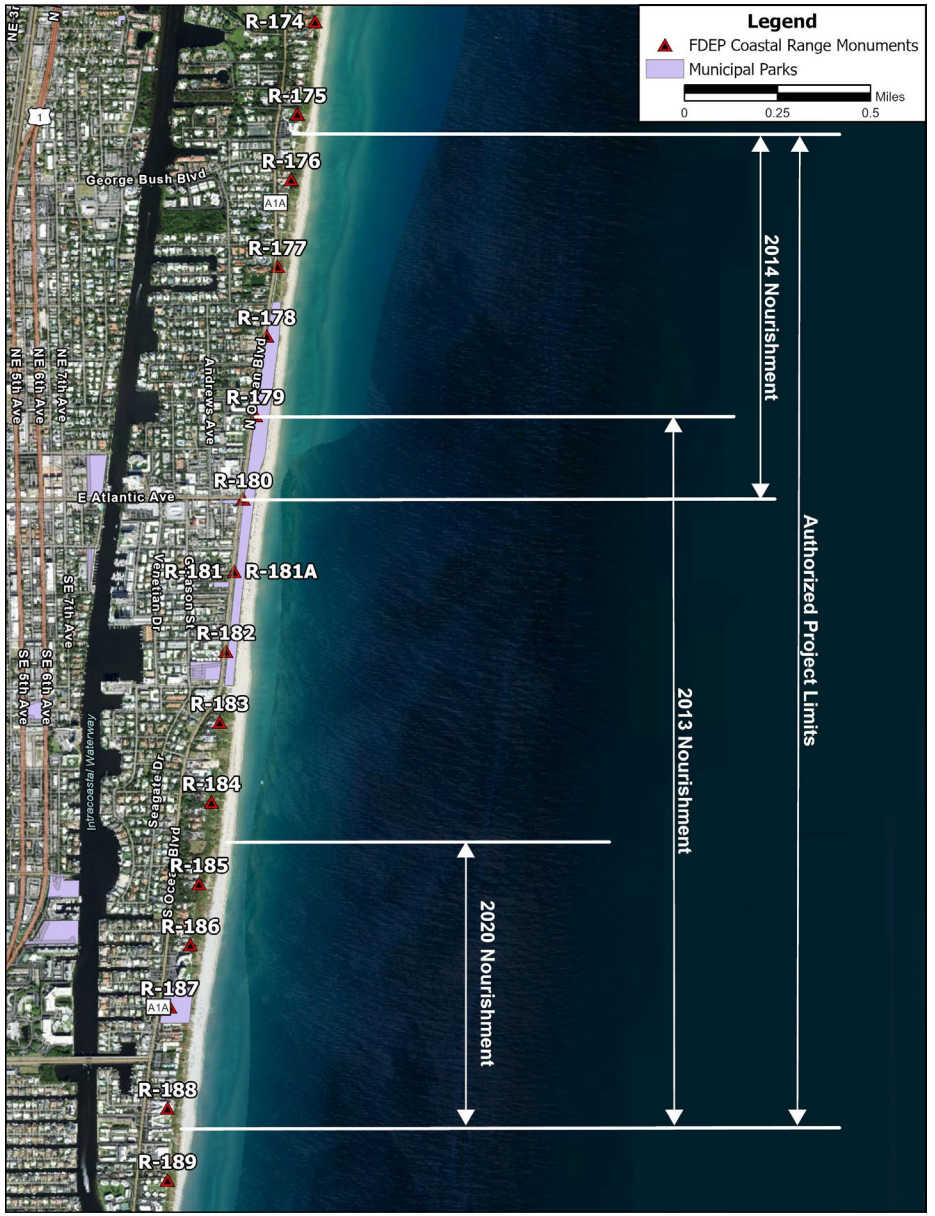
INTRODUCTION



BACKGROUND

Delray Beach Shore Protection Project

- Federally authorized by the USACE and initially constructed in 1973.
- Project extends for 2.65 miles along the Atlantic Ocean
- The federally authorized project area is from FDEP R-Monument R-175+300 to R-188A within the City limits.



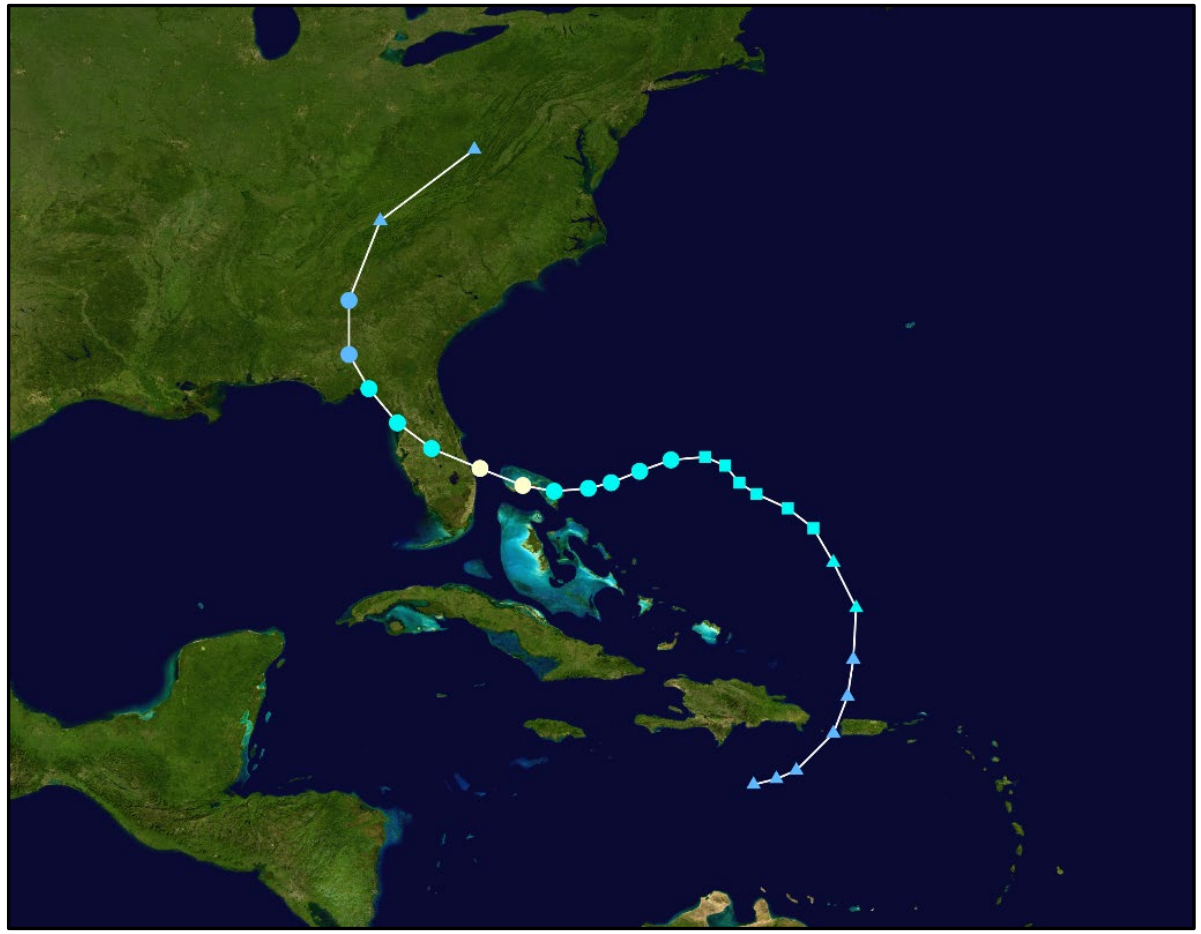
PROJECT HISTORY

Construction Date	Placed Volume (CY)	Location	Permit Number
1973	1,634,500[1]	R-175 to R-188	BBS 72-24
1978	701,300[1]	R-176 to R-182 and R-186 to R-188	BBS 75-10
1984	1,311,000[2]	R-175 to R-188	BBS 75-10M1
1992	1,196,500[3]	R-180 to R-188.5	DBS890242 and 501662809
2002	1,230,000[3]	R-179 to R-188A	0178582-001-JC
2005	250,000[4]	R-175 to R-188	0178582-003-EM
2013	1,158,500[5]	R-179 to R-188A	0303553-001-JC and 0303553-002-BV
2014	381,200[6]	R-175+300 to R-180	0303553-001-JC
2020	364,400[7]	R-184+397 to R-188+465	0303553-001-JC
Total to Date	8,227,400	R-175 to R-188.5	-

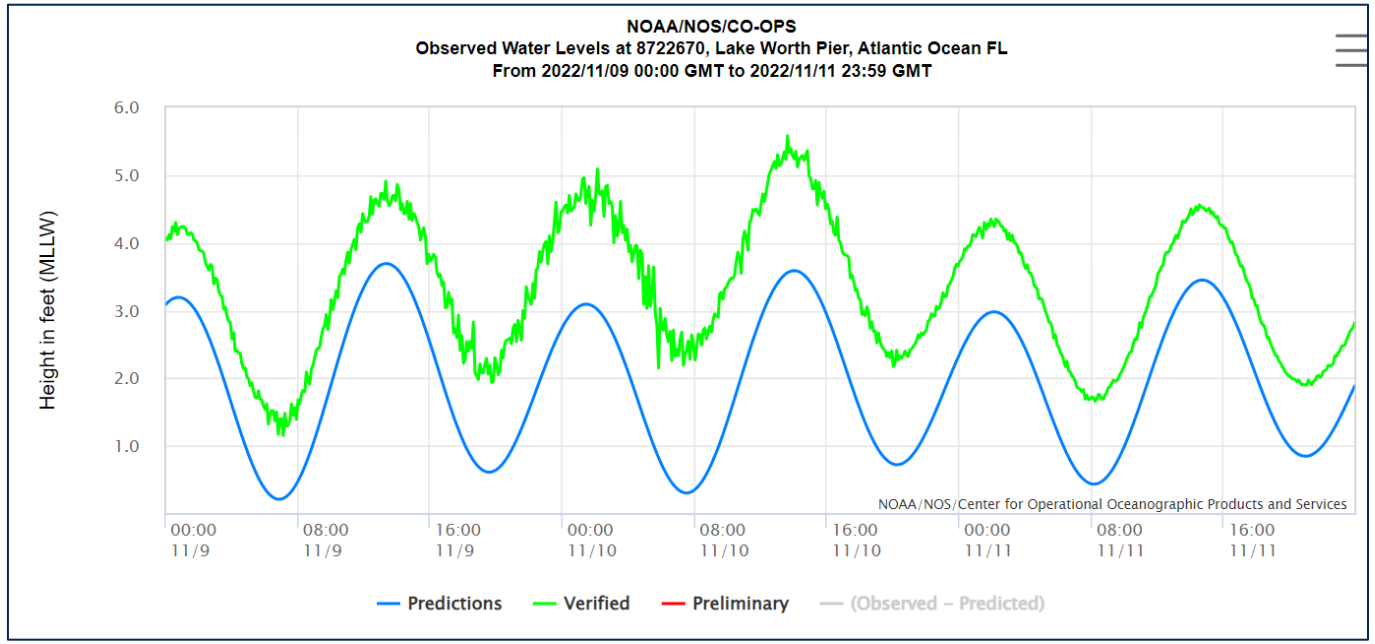
References: (1) 1990 LRR (USACE, 1990), (2) 2001 LRR (USACE, 2001), (3) 2002 Post-Construction Report (CPE, 2003), (4) 2005 Post-Construction Report (CPE, 2006) (5) 2013 Post-Construction Report (CPE, 2013), (6) 2014 FCCE Post-Construction Report (CB&I, 2014), (7) 2020 FCCE Post-Construction Report (APTIM, 2020).

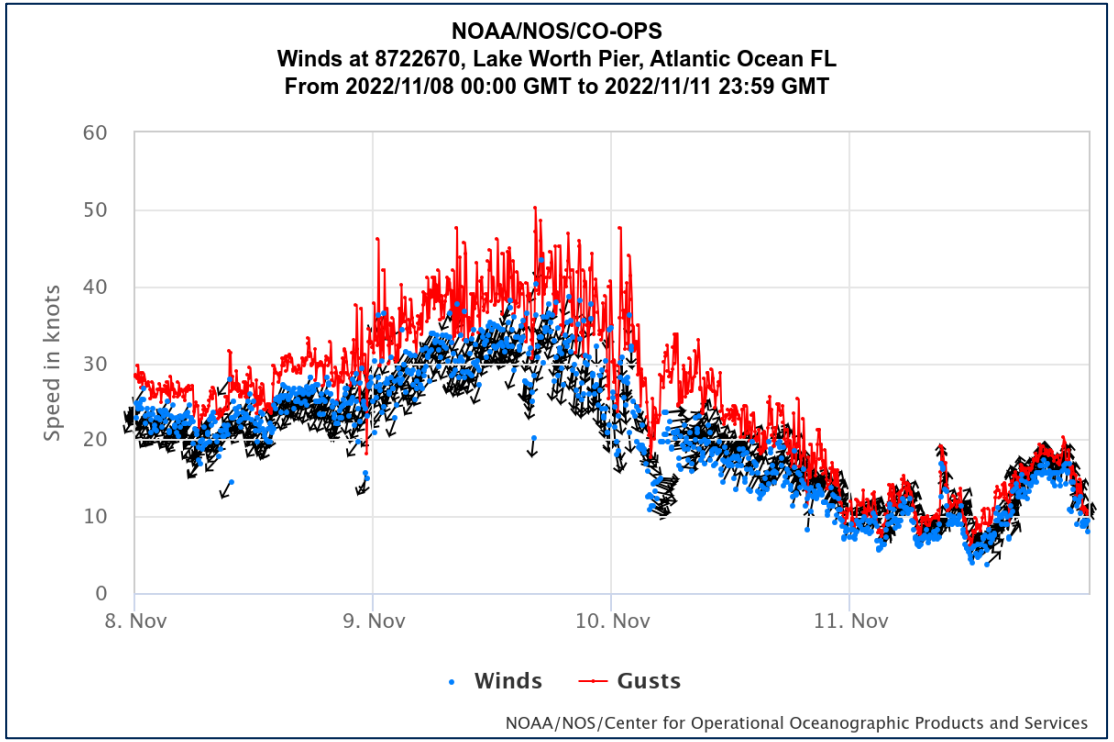
HURRICANE NICOLE

- On November 10th, Hurricane Nicole made landfall as a Category 1 Hurricane near Vero Beach, Florida on Hutchinson Island.
- Approximately 80 miles north of Delray Beach.
- Storm surge, waves and winds created by the storm were observed for multiple days.



WATER LEVELS AND WIND CONDITIONS





SURVEY DATA COLLECTION

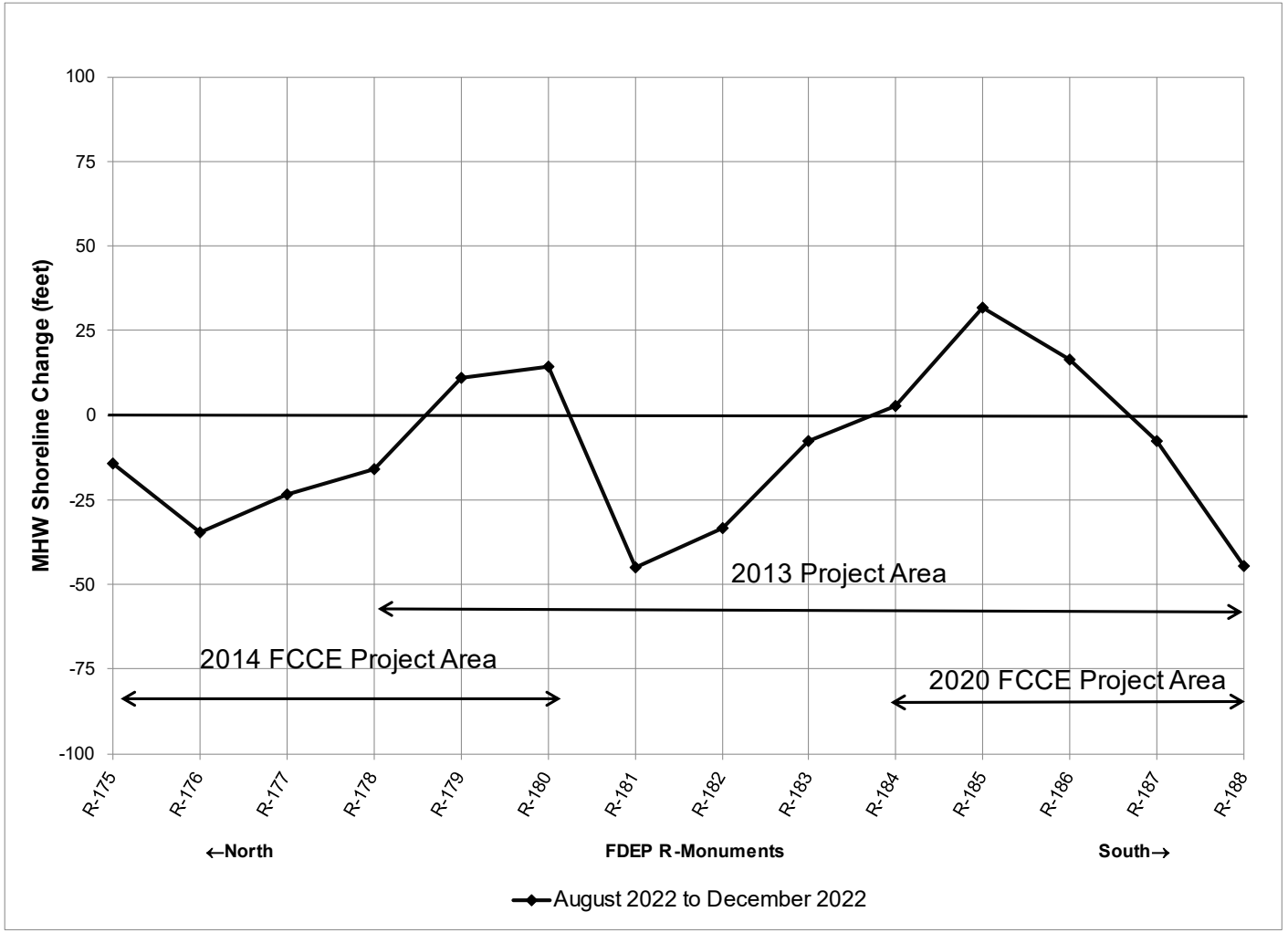
- APTIM surveyors collected post-storm topographic and hydrographic surveys in December 2022.
- The monitoring area included profile surveys at each of the published FDEP reference monuments between R-175 and R-188.
- The 2022 City of Delray Beach Annual Monitoring Survey conducted in August 2022 was used as pre-storm conditions.

STORM IMPACTS

BEACH SHORELINE CHANGES

August 2022 (Pre-Nicole) to December 2022 (Post-Nicole)		
R-MONUMENT	EFFECTIVE DISTANCE (FT)	MHW Shoreline Change (+.44 FT)
R-175	1,130	-14.1
R-176	1,089	-34.5
R-177	1,122	-23.3
R-178	1,069	-15.8
R-179	1,169	11.2
R-180	1,110	14.3
R-181	1,071	-45.1
R-182	1,065	-33.2
R-183	1,077	-7.7
R-184	1,156	2.6
R-185	1,022	31.9
R-186	897	16.5
R-187	1,171	-7.5
R-188	1,221	-44.6
Project Area (R-175 to R-188A)	**14,457**	**-10.5**

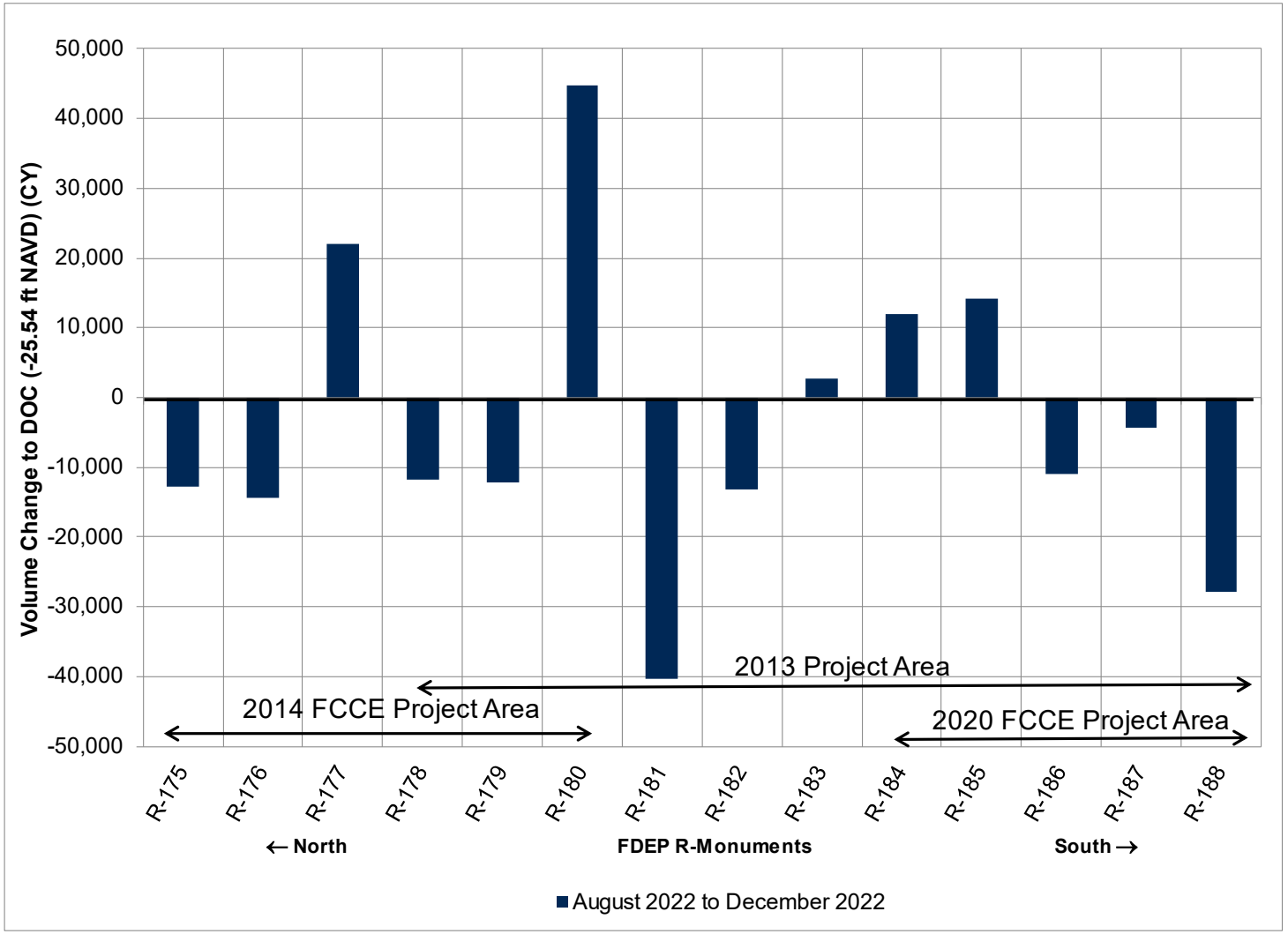
BEACH SHORELINE CHANGES



BEACH VOLUMETRIC CHANGES ABOVE DOC

August 2022 (Pre-Nicole) to December 2022 (Post-Nicole)			
R-MONUMENT	EFFECTIVE DISTANCE (FT)	DENSITY (CY/LF)	VOLUME (CY)
R-175	1,130	-11.2	-12,700
R-176	1,089	-13.1	-14,300
R-177	1,122	19.6	22,000
R-178	1,069	-11.0	-11,700
R-179	1,169	-10.4	-12,200
R-180	1,110	40.2	44,700
R-181	1,071	-37.6	-40,300
R-182	1,065	-12.4	-13,200
R-183	1,077	2.5	2,700
R-184	1,156	10.3	11,900
R-185	1,022	13.9	14,200
R-186	897	-12.3	-11,000
R-187	1,171	-3.8	-4,400
R-188	1,221	-22.9	-27,900
Project Area (R-175 to R-188A)	**14,457**		**-39,100**

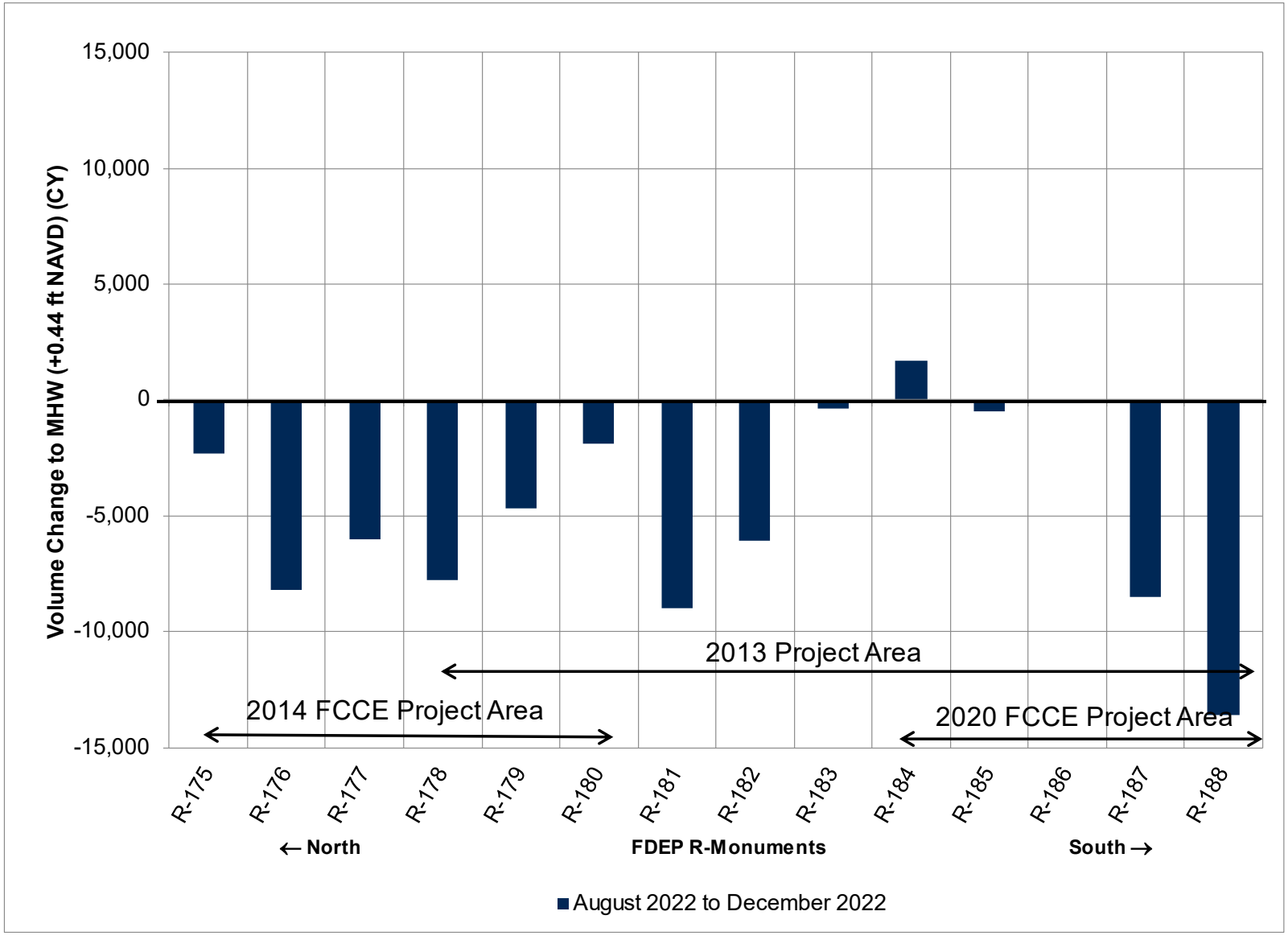
BEACH VOLUMETRIC CHANGES ABOVE DOC



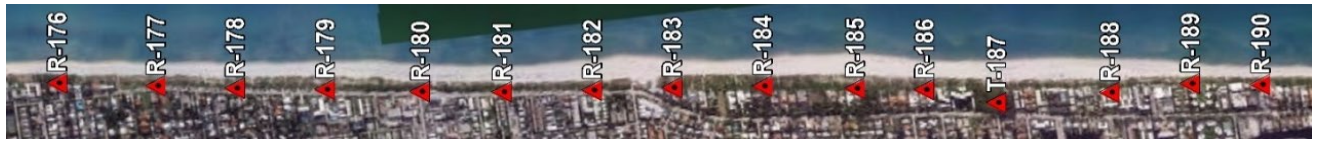
BEACH VOLUMETRIC CHANGES ABOVE MHW

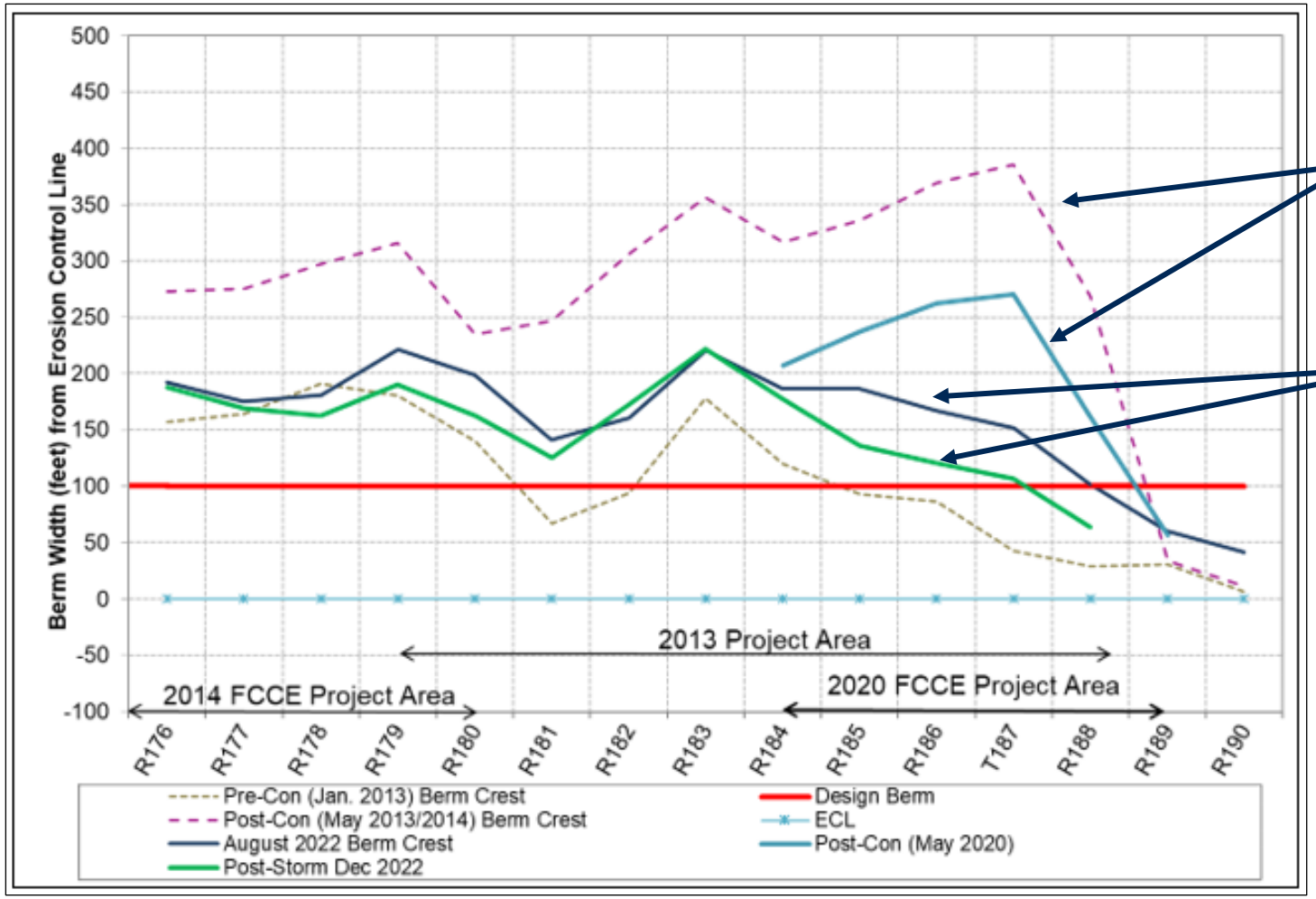
August 2022 (Pre-Nicole) to December 2022 (Post-Nicole)			
R-MONUMENT	EFFECTIVE DISTANCE (FT)	DENSITY (CY/LF)	VOLUME (CY)
R-175	1,130	-2.0	-2,300
R-176	1,089	-7.5	-8,200
R-177	1,122	-5.3	-6,000
R-178	1,069	-7.3	-7,800
R-179	1,169	-4.1	-4,700
R-180	1,110	-1.7	-1,900
R-181	1,071	-8.4	-9,000
R-182	1,065	-5.8	-6,100
R-183	1,077	-0.4	-400
R-184	1,156	1.5	1,700
R-185	1,022	-0.4	-500
R-186	897	-0.1	-100
R-187	1,171	-7.2	-8,500
R-188	1,221	-11.1	-13,600
Project Area (R-175 to R-188A)	**14,457**		**-63,200**

BEACH VOLUMETRIC CHANGES ABOVE MHW



PERFORMANCE ASSESSMENT



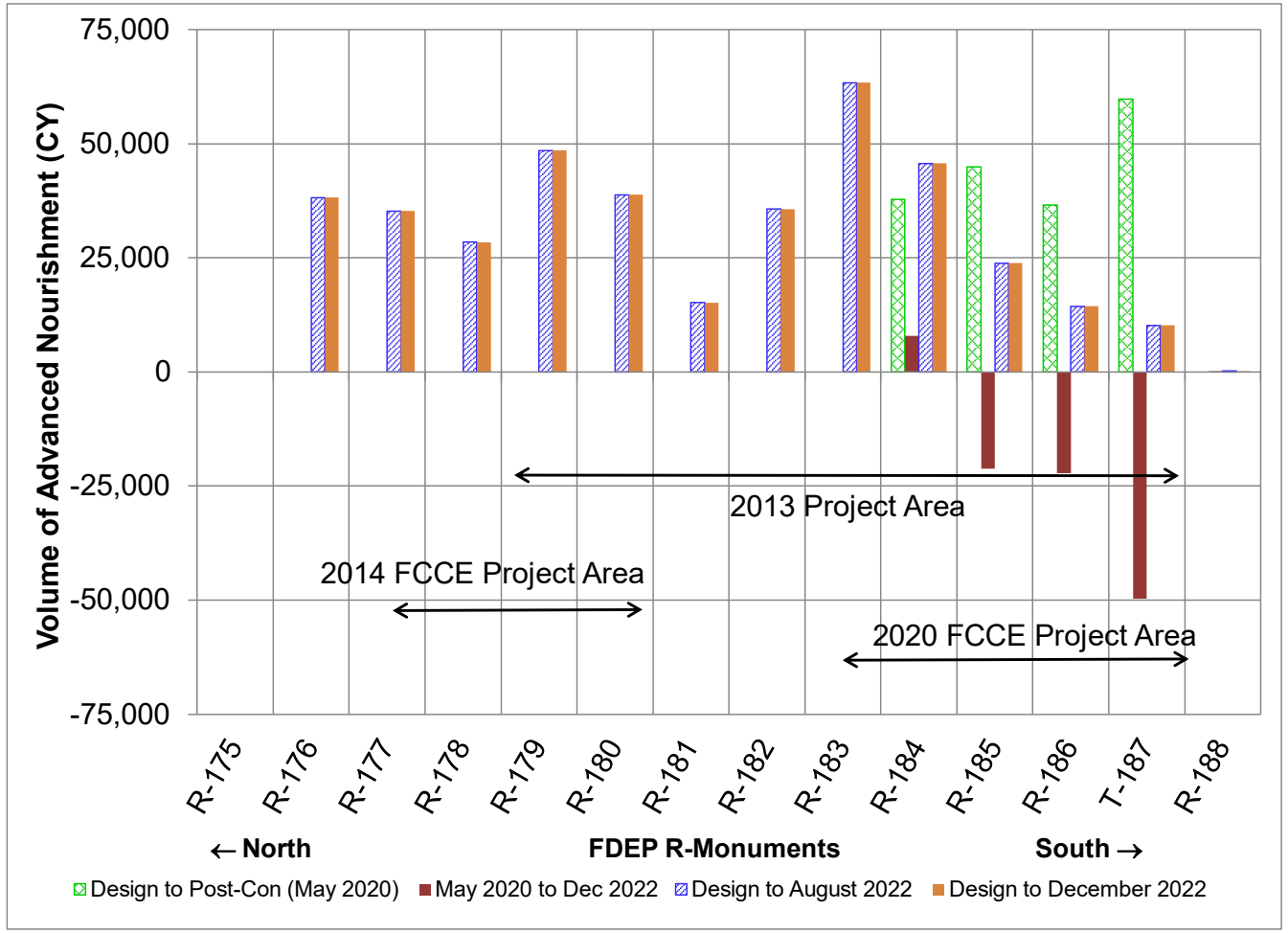


Post-Con

Summer 2022
to
Post-Nicole

Berm Performance (+7.5 ft. NAVD88)

PERFORMANCE ASSESSMENT



Advanced Nourishment Above MHW (+0.44 FT, NAVD) by R-monument

USACE PROJECT INFORMATION REPORT

- Post-storm inspection conducted by USACE on 15 November 2022.
- Project Information Report (PIR) was prepared at the request of the project sponsor.
- The PIR found that there was sufficient justification for Flood Control and Coastal Emergencies (FCCE) rehabilitation of the Delray Beach Shore Protection Project.
- The proposed emergency work will include nourishment of the full construction template with approximately 301,700 cubic yards (cy) of sand from the projects approved offshore borrow area.


(USACE, 2023)


(USACE, 2023)

SUMMARY

- Hurricane Nicole impacted the Delray Beach nourishment project area in November 2022, resulting in visible impacts to the beach and dune.

- Based on pre-storm and post-storm beach profile surveys, the Delray Beach project area lost an average beach width of 10.5 feet and eroded approximately 39,100 cubic yards above the depth of closure, with 63,200 cubic yards of the erosion measured on the dry beach.

- According to the USACE PIR significant damage has occurred to the project and nourishment will be needed to ensure continued coastal storm risk management for the property, structures, and infrastructure that this project is designed to protect. The proposed emergency work will fully restore the project's construction template at federal expense.

- Project construction is anticipated for FY 2025/2026.

QUESTIONS

THANK YOU

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Expect the Extraordinary.