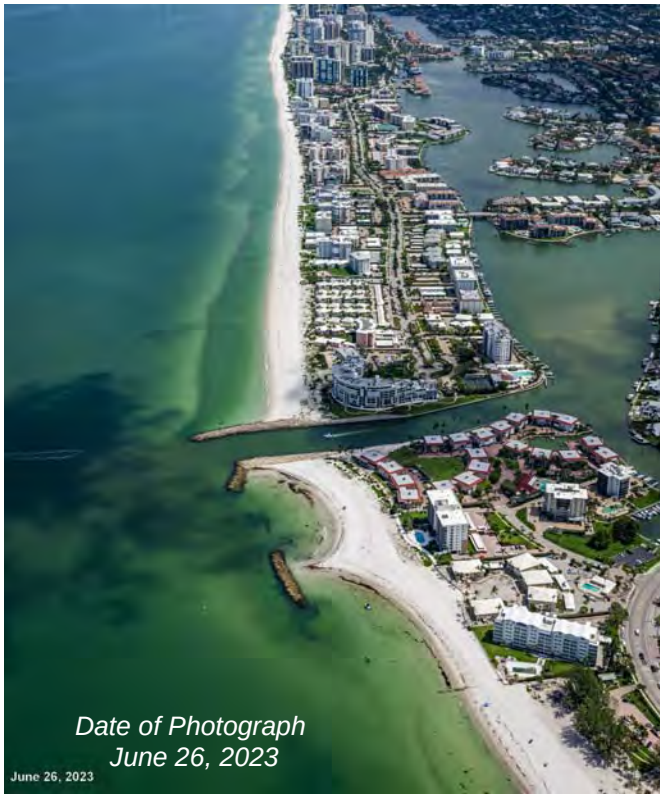
COLLIER COUNTY BEACH NOURISHMENT PROJECT
2023 POST-CONSTRUCTION ANNUAL MONITORING SUMMARY

August 2023

DEP PERMIT 0331817-005-JC
USACOE PERMIT SAJ-2003-12405 MOD (MOD-KS)

COLLIER COUNTY

PREPARED BY
HUMISTON & MOORE ENGINEERS
HM File No. 28019



SUBMITTED TO:
FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

Main Office :
5679 Strand Court
Naples, FL 34110
Phone 239 594 2021
Fax 239 594 2025
e-mail :
mail@humistonandmoore.com

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COLLIER COUNTY

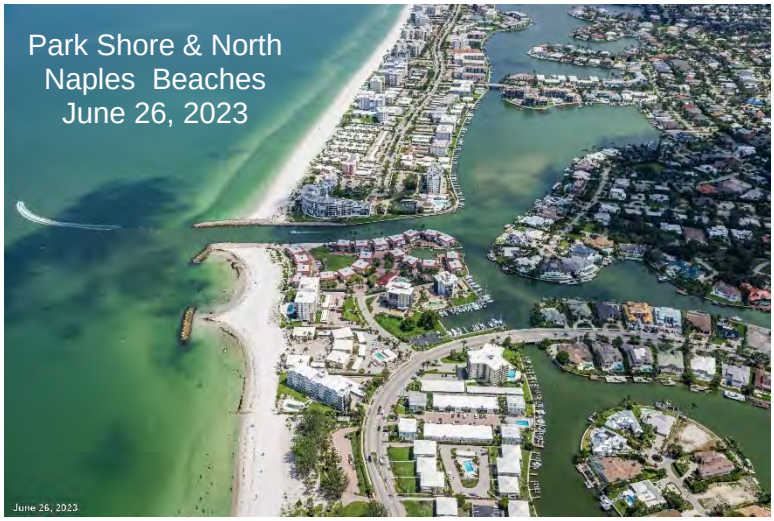
I. INTRODUCTION

This report by Humiston & Moore Engineers (H&M) presents the analysis of an annual monitoring survey conducted in November 2022, approximately one month after the passing of Hurricane Ian, and the post-construction survey for the subsequent emergency berm project for Collier County commencing approximately 6 months post-Ian; these surveys are compared to previous surveys on behalf of Collier County, Coastal Zone Management. The post-Ian survey was conducted between November 2nd and December 9th, 2022, and the post-construction survey for the emergency berm project was conducted in May 2023: both surveys were conducted by APTIM Coastal Planning & Engineering (APTIM). The survey scope is consistent with the requirements of the State of Florida Department of Environmental Protection (DEP) permit number 0331817-001-JM dated October 2, 2015, U.S. Army Corps of Engineers permit number SAJ-2003-12405 (MOD-KS), and the approved Monitoring Plan dated August 2017 included in **Appendix A**. Recent DEP permit history is summarized in **Table 1**.

Table 1. Permit History for DEP Permit Number 0331817-001

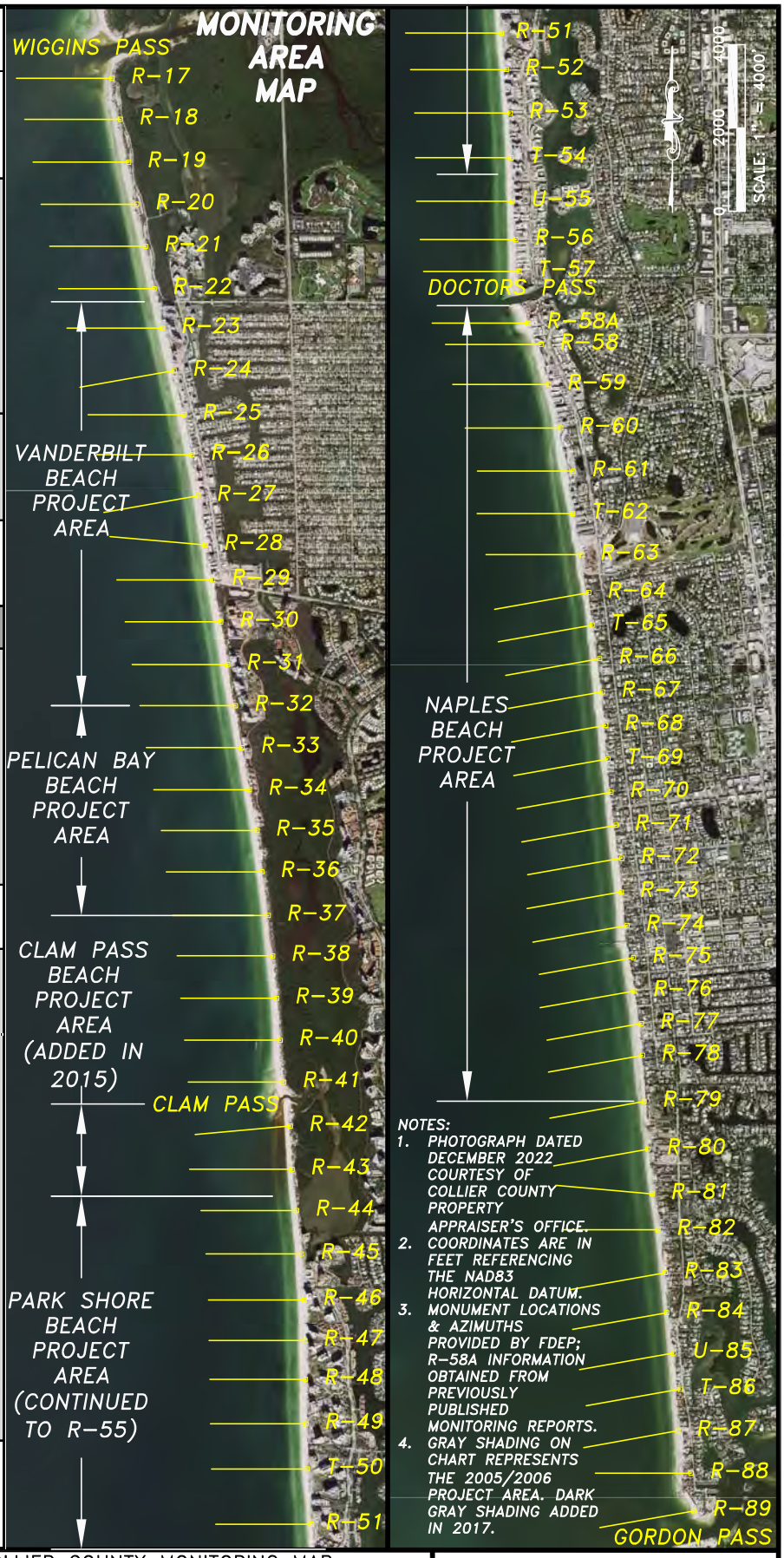
Permit Modification Number	Date of Issuance	Description of Modification
-001	October 2, 2015	Original Permit
-002	October 23, 2015	Revised Biological Monitoring Plan
-003	January 8, 2016	Authorizes Dune Vegetation Planting
-004	November 20, 2017	Major Modification Adding Clam Pass Park to the Project Area
-005	July 23, 2018	Revised Hardbottom Biological Monitoring Plan

Collier County, located on the southwest coast of Florida, includes 148 DEP reference monuments from Barefoot Beach south to Marco Island. The monitoring area for this report shown in **Figure 1,** overlaid on an aerial image acquired in December 2022, includes DEP reference monuments R-17 located south of Wiggins Pass in Delnor-Wiggins Pass State Park, south to R-84, one mile north of Gordon Pass in Naples.



CONTROL INFORMATION & PROJECT DESIGNATION

FDEP MON	NORTHING (Feet)	EASTING (Feet)	AZIMUTH (Degrees)	PROJECT LOCATION
R-17	710889.5	383927.4	270	DELNOR-WIGGINS PARK BEACH SOUTH OF WIGGINS PASS
R-18	709906.7	384127.0	270	
R-19	708878.0	384326.0	270	
R-20	707866.6	384517.5	270	
R-21	706858.3	384728.9	270	
R-22	705839.5	384938.9	270	VANDERBILT BEACH PROJECT AREA
R-23	704891.6	385137.3	270	
R-24	703871.6	385417.1	260	
R-25	702813.9	385647.5	270	
R-26	701850.5	385847.4	270	
R-27	700866.9	385990.2	260	
R-28	699684.0	386161.7	275	
R-29	698847.1	386341.5	270	
R-30	697837.4	386537.6	270	
R-31	696813.6	386705.3	270	
R-32	695824.5	386891.1	270	
R-33	694818.9	387046.2	270	PELICAN BAY BEACH PROJECT AREA
R-34	693808.1	387226.5	270	
R-35	692827.8	387408.2	270	
R-36	691835.2	387522.6	270	
R-37	690789.1	387678.2	270	
R-38	689818.1	387783.7	270	PELICAN BAY BEACH NORTH OF CLAM PASS
R-39	688799.5	387874.7	270	
R-40	687793.8	387963.8	270	
R-41	686785.6	388051.6	270	
R-42	685731.0	388209.4	265	CLAM PASS PARK BEACH
R-43	684692.3	388248.5	270	
R-44	683701.5	388359.1	270	PARK SHORE BEACH PROJECT AREA
R-45	682660.0	388478.9	270	
R-46	681554.5	388538.8	270	
R-47	680581.0	388553.8	270	
R-48	679648.1	388568.5	270	
R-49	678581.0	388583.3	270	
T-50	677495.2	388612.9	270	
R-51	676169.5	388714.1	270	
R-52	675291.9	388834.0	270	
R-53	674247.9	388929.6	270	
T-54	673177.4	388951.4	270	
U-55	672131.1	388974.6	270	PARK SHORE BEACH NORTH OF DOCTORS PASS
R-56	671211.8	389065.2	270	
T-57	670447.6	389142.0	270	
R-58A	389353.6	669202.4	270	NORTH NAPLES BEACH PROJECT AREA
R-58	668693.6	389668.6	270	
R-59	667728.9	389847.3	270	
R-60	666685.1	390145.2	270	
R-61	665648.5	390438.0	270	NAPLES BEACH PROJECT AREA
T-62	664628.1	390431.8	270	
R-63	663641.5	390641.5	270	
R-64	662732.0	390814.4	260	
T-65	661954.0	390899.0	260	
R-66	661148.1	391078.4	260	
R-67	660351.0	391148.4	260	
R-68	659545.1	391220.2	260	
T-69	658735.7	391274.6	260	
R-70	657941.3	391351.4	260	
R-71	657147.2	391469.6	260	
R-72	656356.0	391609.0	260	
R-73	655544.4	391593.8	260	
R-74	654741.2	391736.2	260	
R-75	653966.1	391888.5	260	
R-76	653165.9	391908.9	260	
R-77	652384.9	392074.4	260	
R-78	651619.7	392106.6	260	
R-79	650514.4	392141.7	260	
R-80	649367.2	392232.4	260	BEACH NORTH OF GORDON PASS
R-81	648294.8	392335.7	275	
R-82	647432.1	392476.3	270	
R-83	646399.6	392651.2	260	
R-84	645439.8	392689.3	260	



HUMISTON & MOORE ENGINEERS
COASTAL ENGINEERING DESIGN AND PERMITTING

COLLIER COUNTY MONITORING MAP
FDEP REFERENCE MONUMENTS & AZIMUTHS

FOR: COLLIER COUNTY		
DATE: 3/30/22	FILE: MAP	SCALE: 1"=4000'
JOB: 25026	DATUM: NAD83	FIGURE: 1

5679 STRAND COURT
NAPLES, FL 34110
FAX: (239) 594-2025
PHONE: (239) 594-2021
www.humistonandmoore.com

II. HURRICANE IAN

Collier County was impacted by Hurricane Ian as a Category 4 major storm on September 28, 2022, causing significant damage to public infrastructure, private property, and public lands. The path of the storm along with intense hurricane force winds, slow forward speed (9 mph), and high storm surge subjected Collier County to large scale impacts ranging from the gulf beaches to the mainland.

Figure 2a shows the track of Hurricane Ian approaching and landfalling in southwest Florida. The unique combination of factors including wind speeds in excess of 155 mph, position, track and slow forward movement of 9 mph resulted in extreme storm surge levels along the coastal barrier islands of Collier County and southwest Florida. **Figure 2b** provides documented storm water levels from Wiggins Pass south to Marco Island. USGS deployed over 175 sensors between the Florida Keys and the Panhandle prior to Hurricane Ian's landfall. These sensors were deployed as part of a FEMA/National Hurricane Center mission to document and better understand storm surge. The high storm surge produced by Hurricane Ian over a long duration from the slow-moving storm has resulted in significant morphologic changes including flattening of the beach and dune areas. For the most part, sand eroded has not left the system, but some was overwashed landward covering gulf front parcels and inland roadways with sand. It is typical for sand to also be eroded into the nearshore during early phases of the storm, and also when surge levels decline.

Figure 2a. Hurricane Ian Track

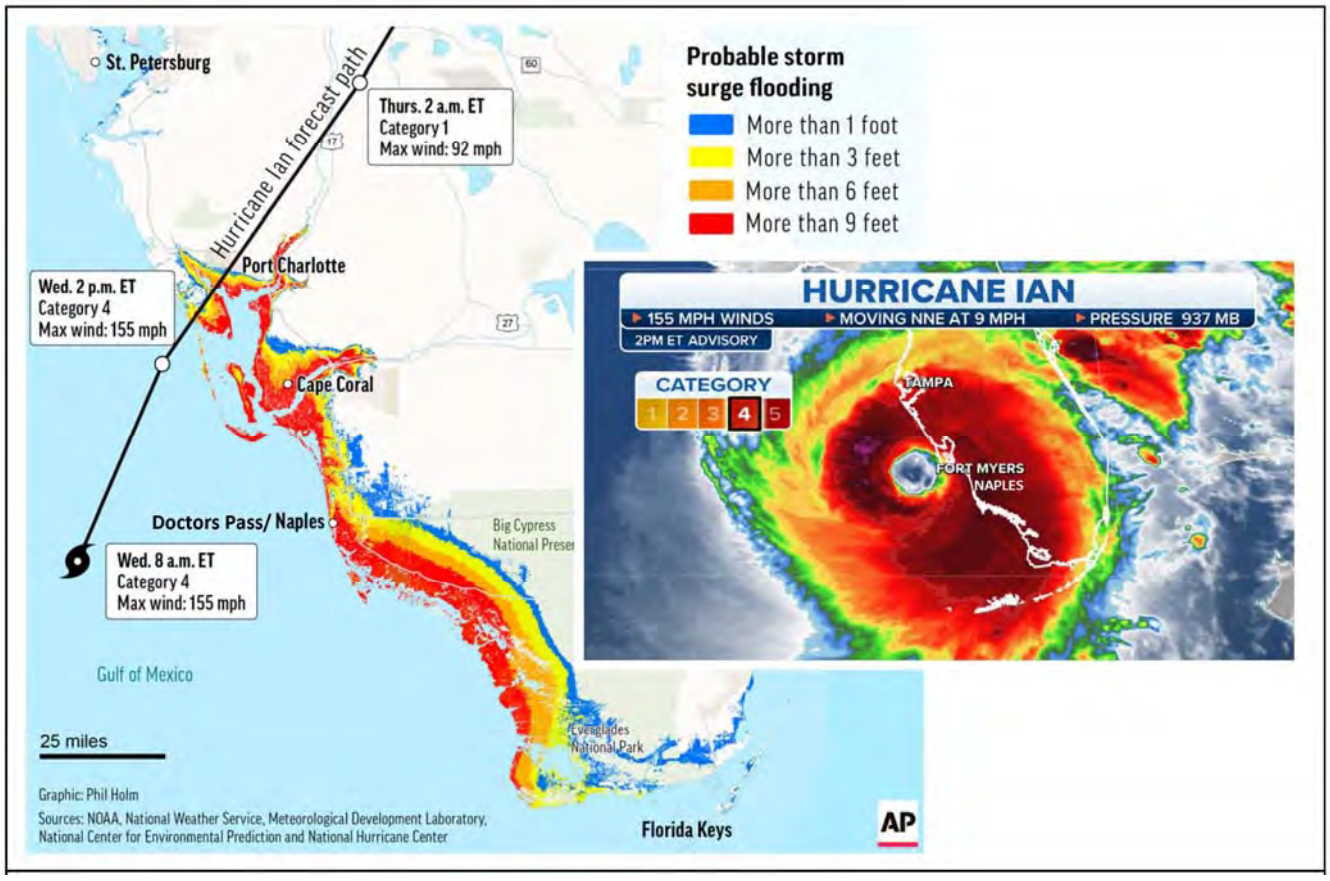


Figure 2b. Documented Surge Data

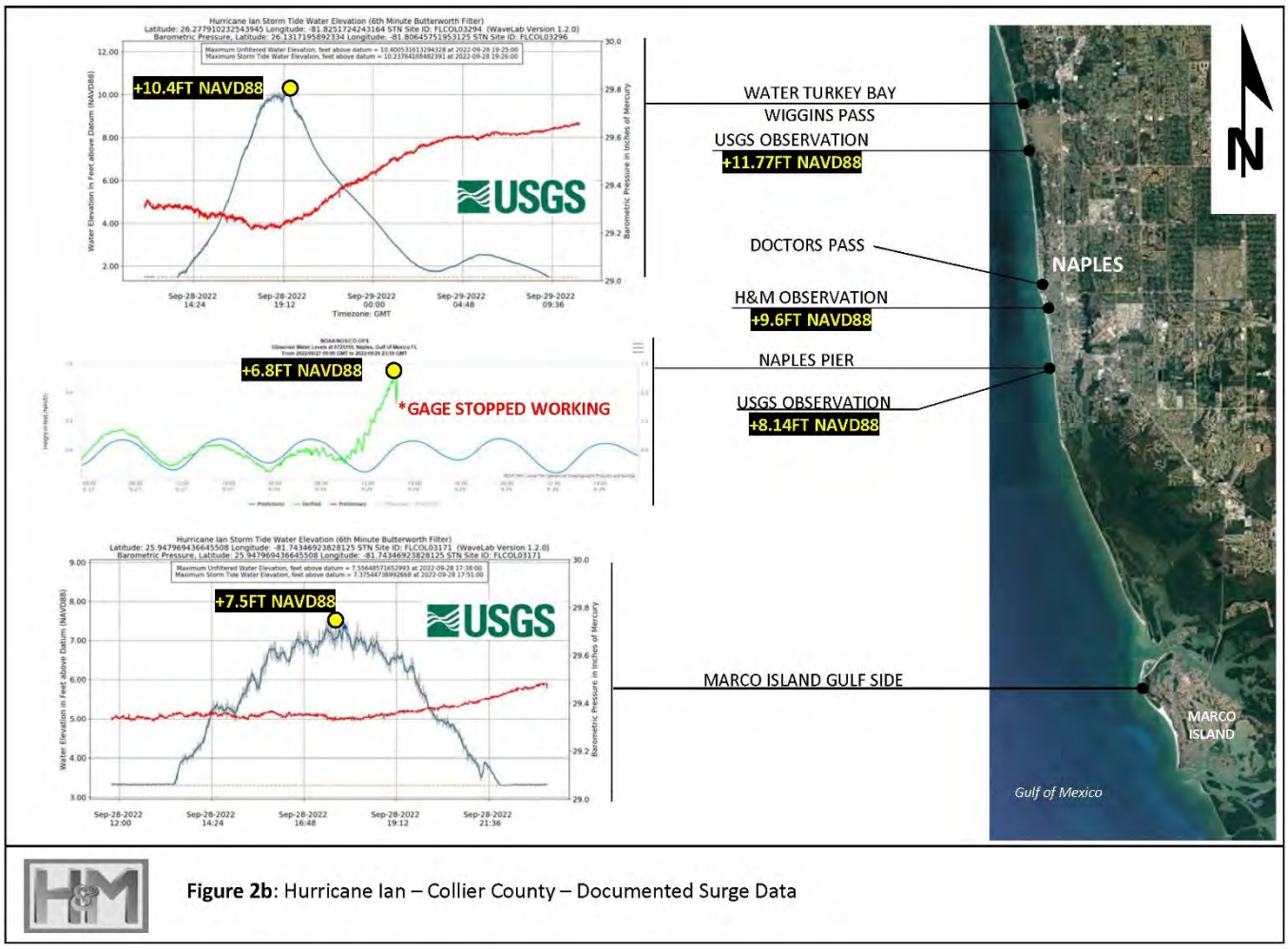


Figure 2b: Hurricane Ian – Collier County – Documented Surge Data

III. BACKGROUND

Permitting

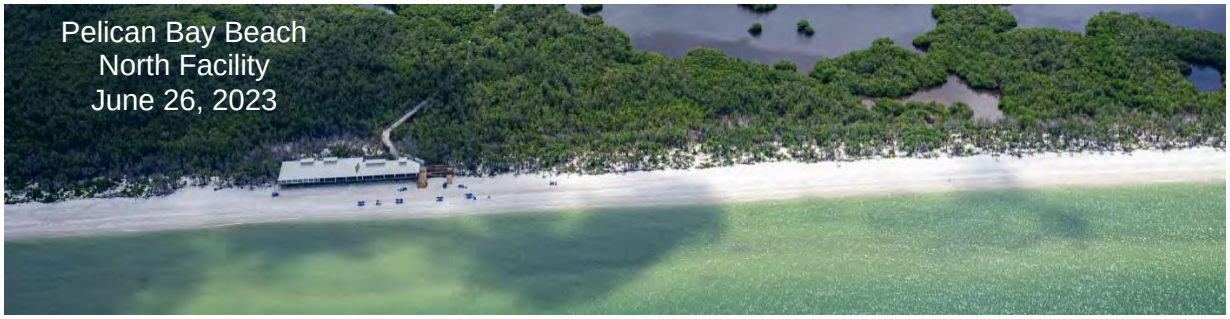
The Department issued permit 11-254473-9 for the construction of the Collier County Beach Restoration Project in 1996 authorizing the placement of approximately 1.2 million cubic yards of sand between monuments R-21 and R-79; this permit expired in April 2006. In January 2005, JCP Permit 0222355-001-JC was issued to maintain the restored beach authorizing the distribution of 670,000 cubic yards of sand. In July 2013, a DEP permit modification (-012) was issued for the placement of sand in five areas experiencing high erosion along Collier County Beaches, and in September 2013, a permit modification (-013) was issued for the placement of sand on Pelican Bay Beaches. A 15-year multi-use permit was issued on October 2, 2015, superseding permit 0222355-001-JC, authorizing periodic nourishment of the Collier project area beach including the: Clam Pass Park beach from R-42 south to R-43.5 (2017), and the beach south of Doctors Pass utilizing an offshore borrow area, sand dredged from Doctors Pass, or compatible sand obtained from an upland source. Since the construction of the 2006 nourishment project, sand has been placed within the monitoring area from dredging of three inlets (Wiggins, Clam and Doctors Passes) as well as emergency truck-haul projects from 2010 through 2023. A chronological summary of the sand placed within the monitoring area from 2005 to 2023 is shown in **Table 2b** while **Table 2a** provides contractor information for the 2006-2023 Collier Beach nourishment projects.

Nourishment (Truck Haul Projects)

After the 2006 restoration there were emergency truck haul projects from 2010 to 2012 for Vanderbilt, Park Shore, and Naples beaches utilizing relatively smaller quantities of fill than previous hydraulic renourishment projects. The December 2013 project distributed 225,000 cubic yards of sand on Vanderbilt, Pelican Bay, North Park Shore, Park Shore and Naples Beaches, while the December 2014 project renourished only Naples Beach with 52,350 cubic yards of sand. No sand was placed in 2015. As part of the December 2016 project, approximately 76,000 cubic yards of sand were placed on Vanderbilt, Pelican Bay and Park Shore beaches. The Park Shore reach was nourished with approximately 130,000 cubic yards of truck hauled sand from October to December 2019, and Naples Beach from October 28 to December 28, 2020 was nourished with approximately 37,400 cubic yards[1] of sand from the south jetty of Doctors Pass to approximately R-60. Vanderbilt, Pelican Bay and Naples Beaches were nourished with approximately 155,000 cubic yards[2] of sand in November 2021 through January 2022. Most recently Vanderbilt, Pelican Bay, Park Shore and Naples Beaches were nourished with approximately 190,000 cubic yards of sand to create an emergency berm in April and May 2023 after the passing of Hurricane Ian as described in the completion documents provided in **Appendix B**. In addition, emergency sand was also placed along Barefoot Beach at the north end of Collier County, north of the monitoring area. Specific quantities, locations and timing of the maintenance beach fill projects are presented in **Figures 3a, 3b, and 3c; and Tables 6b, 7b, and 8b** of this report. The sand for all Collier Beach nourishment projects (2013-2023) was supplied from an upland source, distributed by mechanically truck and grading equipment.

Table 2a. Collier County Beach Nourishment Project Contractor History

Project	Type of Project	Contractor
2006	Hopper Dredge	Great Lakes Dredge & Dock Co., LLC
2013	Truck Haul	Eastman Aggregate Ent., LLC and Phillips & Jordan, Inc.
2014	Truck Haul	Earthtech Ent. Inc. and Phillips & Jordan, Inc.
2016	Truck Haul	Earthtech Enterprises Inc.
2019	Truck Haul	Earthtech Enterprises Inc.
2020	Truck Haul	Earthtech Enterprises Inc.
2021	Truck Haul	Phillips and Jordan, Inc.
2023	Truck Haul	Earthtech Ent. Inc. and Phillips & Jordan, Inc.



[1] The pay quantity was 63,978 tons of truck hauled sand. Discrepancies between pay quantity and the volume determined by the pre and post surveys is largely due to Tropical Storm Eta redistributing material during construction.
[2] Based on preliminary quantities provided by CPE.

Table 2b. Collier County Beach Nourishment History (R-17 to R-84 for 2005 thru 2023)

Date	Project	Project Type	Sand Placement	Volume (CY)
2005	Collier Beach Restoration	Offshore Dredge	R-21 to R-79	667,620
2005	Wiggins Pass Dredging - Nearshore Disposal	Inlet Dredge	R-11 to R-14	68,500
2006	Doctors Pass Dredging - Nearshore Disposal	Inlet Dredge	R-60 to R-62	53,600
2007	Wiggins Pass Dredging	Inlet Dredge	R-18 to R-19.5	48,400
2007	Clam Pass Dredging	Inlet Dredge	R-42 to R-43.5	20,600
2009	Wiggins Pass Dredging - Nearshore Disposal	Inlet Dredge	R-11 to R-14	50,000
2009	Doctors Pass Dredging - Nearshore Disposal	Inlet Dredge	R-60 to R-62	32,500
2010	Naples Beach - Emergency Truck Haul	Truck Haul	R-58A to R-58	3,000
2011	Park Shore Beach -Emergency Truck Haul	Truck Haul	R-45 to R-46	7,800
2011	Naples Beach -Emergency Truck Haul	Truck Haul	R-58A to R-58	22,400
2011	Wiggins Pass Dredging - Nearshore Disposal	Inlet Dredge	R-11 to R-14	50,000
2012	Vanderbilt Beach - Emergency Truck Haul	Truck Haul	R-26 to R-30	11,000
2012	Naples Beach - Emergency Truck Haul	Truck Haul	R-61 to R-63.5	12,000
2013	Wiggins Pass Dredging (Partial Nearshore)	Inlet Dredge	R-12 to Inlet	66,000
2013	Clam Pass Dredging	Inlet Dredge	R-40 to Inlet	10,400
2013	Clam Pass Dredging	Inlet Dredge	Inlet to R-44	9,600
2013	Doctors Pass Dredging	Inlet Dredge	Inlet to R-58	44,000
2013	Vanderbilt Beach	Truck Haul	R-23 to R-30	68,370
2013	Pelican Bay	Truck Haul	R-31 to R-36	24,760
2013	Park Shore (Segmented Fill Template)	Truck Haul	R-44 to R-55	66,090
2013	Naples Beach (Segmented Fill Template)	Truck Haul	Inlet to R-69	65,850
2014	Naples Beach (Segmented Fill Template)	Truck Haul	Inlet to R-78	52,350
2015	Wiggins Pass Dredging (Nearshore)	Inlet Dredge	R-16 (N. of Inlet)	13,000
2016	Clam Pass Dredging	Inlet Dredge	R-42 to R-43.5	14,300
2016	Vanderbilt Beach	Truck Haul	R-24 to R-30	35,470
2016	Pelican Bay	Truck Haul	R-34.6 to R-36.4	8,500
2016	Park Shore (Segmented Fill Template)	Truck Haul	R-43.6 to R-53	31,820
2017	Clam Pass Dredging	Inlet Dredge	R-40.5 to Inlet	3,000
2017	Clam Pass Dredging	Inlet Dredge	Inlet to R-43	2,400
2018	Clam Pass Dredging	Inlet Dredge	R-42 to R-43	8,500
2018	Wiggins Pass Dredging - Nearshore Disposal	Inlet Dredge	R-12 to R-14	37,700
2018	Wiggins Pass Dredging - Nearshore Disposal	Inlet Dredge	R-16 (N. of Inlet)	4,500
2018	Wiggins Pass Dredging - Nearshore Disposal	Inlet Dredge	R-18 to R-20	56,280
2018	Doctors Pass Dredging - Nearshore Disposal	Inlet Dredge	Jetty to R-58.5	5,800
2018	Doctors Pass Dredging - Nearshore Disposal	Inlet Dredge	R-60 to R-62	25,000
2019	Clam Pass	Truck Haul	R-42 to R-43.5	20,000
2019	Park Shore	Truck Haul	R-43.5 to R-54.4	110,000
2020	Water Turkey Bay Dredging - Nearshore Disposal	Inlet Dredge	R-12 to R-14	26,650
2020	Wiggins Pass Dredging - Nearshore Disposal	Inlet Dredge	R-12 to R-14	21,400
2020	Naples Beach (Segmented Fill Template)	Truck Haul	Inlet to R-60	37,440
2020	Clam Pass Dredging - Beach Placement	Inlet Dredge	R-40 to R-41	3,900
2021	Vanderbilt Beach	Truck Haul	R-22 to R-32	77,340
2021	Pelican Bay	Truck Haul	R-33 to R-36	20,000
2021	Naples Beach	Truck Haul	R-62 to R-74	57,330
2022	Wiggins Pass Dredging - Beach Placement	Inlet Dredge	R-12 to R-14	39,000
2022	Wiggins Pass Dredging - Beach Placement	Inlet Dredge	R-18 to R-20	26,000
2022	Doctors Pass Dredging - Beach Placement	Inlet Dredge	R-60 to R-62	12,500
2022	Clam Pass Dredging - Beach Placement	Inlet Dredge	R-40 to Inlet	15,000
2022	Clam Pass Dredging - Beach Placement	Inlet Dredge	Inlet to R-43	2,500
2023	Vanderbilt Beach	Truck Haul	R-22 to R-30	42,100
2023	Pelican Bay	Truck Haul	R-30 to R-36	27,500
2023	Park Shore Beach	Truck Haul	R-44 to R-57	46,000
2023	Naples Beach	Truck Haul	R-58A to R-79	73,200
	Total Volumes (Cubic Yards)			
			Beach Placement in the Collier Beach Project Area (Offshore Dredge):	667,620
			Beach Placement in the Collier Beach Project Area (Truck Haul):	920,320
			Beach Placement in the Collier Beach Project Area (Inlet Dredge):	146,700
			Nearshore Disposal Doctors Pass Dredging (Jetty to R-62):	116,900
			Delnor-Wiggins - Beach & Nearshore Disposal within Monitoring Area (North of Project):	130,680
			Delnor Wiggins - Sand Placement Outside of Monitoring Area (North of Wiggins Pass):	376,750
			Total Project Area Sand Placement:	**1,851,540**
			Total Monitoring Area Sand Placement:	**1,982,220**

The volumes in cubic yards (CY) have been rounded for clarity.

Wiggins Pass

The 2018 Wiggins Pass project placed sand both north, outside of the monitoring area; and south of the inlet along Delnor-Wiggins State Park within the monitoring area. The 2019 dredging of Wiggins Pass and Water Turkey Bay placed sand in the nearshore, north of the inlet and outside of this monitoring area. Most recently, the 2022 project, completed in March, dredged approximately 66,000 cubic yards from the dredge template and disposed of the sand on the beach; approximately 60% was placed north of the inlet from monument R-12.3 south to R-14.3, and approximately 40% was placed on the beach south of the pass from monument R-18.2 south to R-19.8 consistent with the inlet management plan.

Clam Pass

Although sand was placed both north and south of the Clam Pass inlet in 2017 as part of the maintenance dredging project, the only sand placed within the project area for 2017 was approximately 2,400 cubic yards placed south of the inlet to monument R-43, the reach added to the project as part of the 2017 permit modification. In 2018 another 8,500 cubic yards of sand, dredged from the inlet, were placed in the project area from Clam Pass south to monument R-43. In April 2020, both sides of the inlet were regraded, and in December 2020 approximately 3,900 cubic yards were dredged mechanically from the inlet while another 6,400 cubic yards of sand were regraded; the material placed on the adjacent banks and in the vicinity of R-41. Most recently, the pass was dredged in March/April 2022 placing approximately 15,000 cubic yards of sand north of the inlet to R-40 and 2,500 cubic yards south of the inlet to R-43.

Doctors Pass

The Doctors Pass project conducted in August/September 2018 placed sand in two areas south of the pass within the project limits. Approximately 5,800 cubic yards of the sand dredged from the pass were placed immediately south of the inlet within the Doctors Pass Erosion Control Structures Project (0338231-002-JN) area after construction of the structures was completed in June 2018. The majority of the maintenance dredged sand, approximately 25,000 cubic yards[3], was placed further south near Lowdermilk Park. In both cases, the sand was placed in the nearshore. The most recent project, constructed in March and April 2022, included the dredging of 12,535 cubic yards of sand from Doctors Pass with disposal south of the inlet on the beach between DEP reference monuments R-60 and R-61.8, located approximately 3,000 feet south of the inlet near Lowdermilk Park.

[3] Based on volume change calculations from the Doctors Pass Erosion Control Structures Project 2018 Post-Construction Monitoring Summary, H&M Engineers, December 2018

Major Storms

Seven major storms have impacted Collier County since 2004: Hurricane Charlie (2004), Hurricane Katrina (2005), Hurricane Wilma (2005), Tropical Storm Fay (2008), Tropical Storm Debby (2012), Hurricane Irma (2017) and Hurricane Ian (September 2022). Hurricane Ian is discussed in Section II of this report while storm tracks and a brief description of other storms are included in **Appendix C**. The City of Naples experienced a meteotsunami[4] in January 2016 and again on December 20, 2018. A graph of the observed water levels at the Naples Tide Station on those days documenting the meteostunami is also included in **Appendix C**. Additionally in 2016, west and southwest Florida were impacted by Tropical Storm Colin (June), Hurricane Hermine (September), and in 2020 by Tropical Storm Eta (November).

IV. SURVEY INFORMATION – MAJOR RENOURISHMENT PROJECTS

Monitoring surveys were conducted annually from 2006 to 2022. Representative surveys presented in this report are listed in **Table 3** showing the approximate date of survey, type of survey (pre-construction, post-construction, or monitoring) and the surveyor. The monitoring surveys analyzed in this report were conducted post-Ian by APTIM between November 2nd and December 9th, 2022 and post-construction during the Collier County emergency berm project from April to May 2023. The scope of the post-Ian survey included monuments R-1 to R-148; monuments R-17 to R-84 are presented in this report, while the scope of the emergency berm post-construction survey was limited to the upland portion of the beach profile within the project reach. No sand was placed seaward of the mean high water line (MHWL). The certification for the November 2022 post-Ian survey is provided in **Appendix D-1**. This report analyzes the most recent surveys in comparison to the January 2022 monitoring survey, pre/post 2006 project survey, and to the post-construction monitoring surveys for the most recent nourishment projects: January 2022 (Vanderbilt, Pelican Bay, Naples), March 2020 (Park Shore), and December 2014 survey (South Naples Beach). Also included in this report as a separate analysis, due to the limited scope of the survey, is the immediate post-construction survey dated December 2019 for the 2019 Park Shore nourishment project. The beach profiles provided in **Appendix D-2** compare the surveys listed in **Table 3**, and are shown in **Figure 1**, a plan view of the monitoring area depicting DEP reference monument locations and azimuths overlaid on an aerial image of Collier County.

Table 3. Survey Dates and Description for the Collier Beach Nourishment Project

Survey Date	Survey Description	Surveyor
***2005-November**	Pre Construction	CP&E
2006-June	Post Construction	CP&E
2014-December (South Naples Shown)	Post-Construction Monitoring	HSS
2019-December (Park Shore Shown)	Post-Construction	Oceanside Solutions
2020-March (Park Shore Shown)	Post-Construction Monitoring	SDI
2022-January	Post-Construction Monitoring	SDI and HSS
2022-November	Post-Ian Monitoring	APTIM
2023-May	Post-Berm Construction	APTIM

*Survey for monuments R-17 thru R-21 dated September 2005 by DEP used to complete survey scope.
Surveys were conducted and reported annually from 2007 to 2019 but not all presented as part of this report.
The December 2019 survey was used to document beach fill during construction and consequently has a limited scope.

[4] Meteotsunamis have the characteristics similar to earthquake-generated tsunamis, but are caused by air pressure disturbances often associated with fast moving weather systems, such as squall lines. These disturbances can generate waves in the ocean that travel at the same speed as the overhead weather system. Development of a meteotsunami depends on several factors such as the intensity, direction, and speed of the disturbance as it travels over a water body with a depth that enhances wave magnification. NOAA 2015

Surveys used for the determination of as-built quantities for the 2006 nourishment project were conducted immediately pre and post-construction, and at intermediate stations along the beach extending to the limits of fill while monitoring surveys analyzed in this report were conducted according to the scope outlined in the monitoring plan. The 2005/2006 nourishment project was interrupted by Hurricane Wilma in October 2005, consequently, there are two pre-construction surveys following the scope outlined in the monitoring plan to document changes by Wilma: one conducted in September by DEP and another in November by CPE, both are referenced in this report. Reviewing the post-construction report it was noted the September survey more accurately represents as-built information for shoreline change while the November survey more accurately represents as-built information for volume change. The majority of the analysis in this report utilizes the November survey with the exception of monuments R-17 to R-21 not surveyed in November, and a portion of the shoreline change summary at the end of the report. The information from the October 2006 Collier County Beach Nourishment Post-Construction Engineering Report is included in **Appendix E**.

V. ANALYSIS DESCRIPTION

The volume and shoreline change for Vanderbilt, Park Shore, and Naples Beaches are presented in four analyses summarized as follows (A, B, C, and D) and further described below.

- **A.** Shoreline Change.
- **B.** Volume Change over the active portion of the beach profile.
- **C.** Volume Change over the upland portion of the beach profile.
- **D.** Advance Nourishment losses.

The analysis was conducted utilizing the surveys listed in this report. It is important to note, there may have been sand placed on individual parcels between surveys analyzed in this report under the emergency post-Ian permits in accordance with the State issued Emergency Final Order.

A & B. Shoreline & Volume Change (Active Beach Profile)

Project limits for this report were based on the monument range information provided in **Table 4** and are illustrated in **Figures 3a through 3c,** comparing the horizontal limits of the beach fill for the 2006, 2013, 2014, 2016, 2019, 2020, 2021 and 2023 projects. Vanderbilt Beach/Pelican Bay and Park Shore Beaches were each nourished by one continuous fill operation in 2006. The fill was "segmented" in 2013 so the truck haul program could incrementally address the area(s) in most need of fill. The same was done in 2016, and no fill was placed from 2014-2015 or 2017-2019 on Vanderbilt and Pelican Bay Beaches. Park Shore Beach was nourished from October to December 2019 with one continuous fill template. Naples Beach was nourished with a segmented fill in 2013 and 2014 to address hot spots, while no fill was placed from 2015-2019. Erosion control structures were constructed along the south side of Doctors Pass in 2018 to address an area of chronic erosion, and this northern portion of Naples Beach was nourished with a continuous template spanning from the Doctors Pass south jetty to R-60 in late 2020. Again in November 2021 to January 2022 Vanderbilt, Pelican Bay and Naples Beach were nourished, one fill segment[5] for each beach. Most recently the 2023 emergency berm project placed sand on the upland in all sections of the project area: Vanderbilt, Pelican Bay, Park Shore and Naples Beach. South Naples Beach portion of the emergency berm project is scheduled for late 2023. In addition to the nourishment projects, inlet dredging and disposal projects at Wiggins, Clam, and Doctors Pass were conducted as referenced in **Table 2b**; all three passes were dredged in 2022.

[5] Although considered continuous for report purposes, the 2021 Vanderbilt Beach project fill template has a break at R-24. See **Figure 3a**.

A *Design Standard* beach width (shown in the last column of **Table 4**) and a corresponding fixed *Baseline* (shown in **Figures 3a through 3c**) were established in 2003. The *Baseline* was set at the seawall, edge of vegetation, building line or equivalent, at each monument, and the beach width was determined by the distance from the *Baseline* to the mean high water elevation of +0.33 NAVD (+1.61 NGVD) at each DEP reference monument. The May 2023 mean high water line (MHWL) and 2003 *Baseline* are shown in **Figures 3a-3c**. This dry sandy beach width, including the dunes and vegetation, was then compared to the *Design Standard* for each project area. (The distance from the monuments to the *Baseline* is shown in **Table 5**.) Although the 2003 *Baseline* runs throughout the entire monitoring area from monument R-17 south to R-84 the *Design Standard* only applies to those critically eroded beaches within the 2005/2006 original permitted project area as shown in **Table 4**.

Table 4. Project Monument Range

Project Area Beach	**North Limit of Project** (Monument)	**South Limit of Project** (Monument)	**Design Standard** (Ft)
Vanderbilt	R-22	R-32	100
Pelican Bay	R-32	R-37	100
Clam Pass Park*	R-42	R-43.3	85
North Park Shore	R-44	R-48	85
Park Shore	R-48	R-54	85
Naples	R-58A	R-79	100

*The beach in Clam Pass Park from R-42 south to R-43.5 was added in 2017 and was not part of the original project design.

Appendix F presents information for the beach width measured from the *Baseline* to the MHW for each year from 2005 (pre-construction) to the most recent survey conducted in May 2023. A tabular summary is shown at the beginning of the appendix followed by information for each monument located within the monitoring area. Monuments not included in the project monument range shown in **Table 4** will not include the 2003 *Baseline* on the associated graph.


South Naples Beach
August 7, 2023

FIGURE 3a: FILL LIMITS FOR VANDERBILT & PELICAN BAY BEACH (NO FILL PLACED IN 2014, 2015, 2017–2020, 2022)

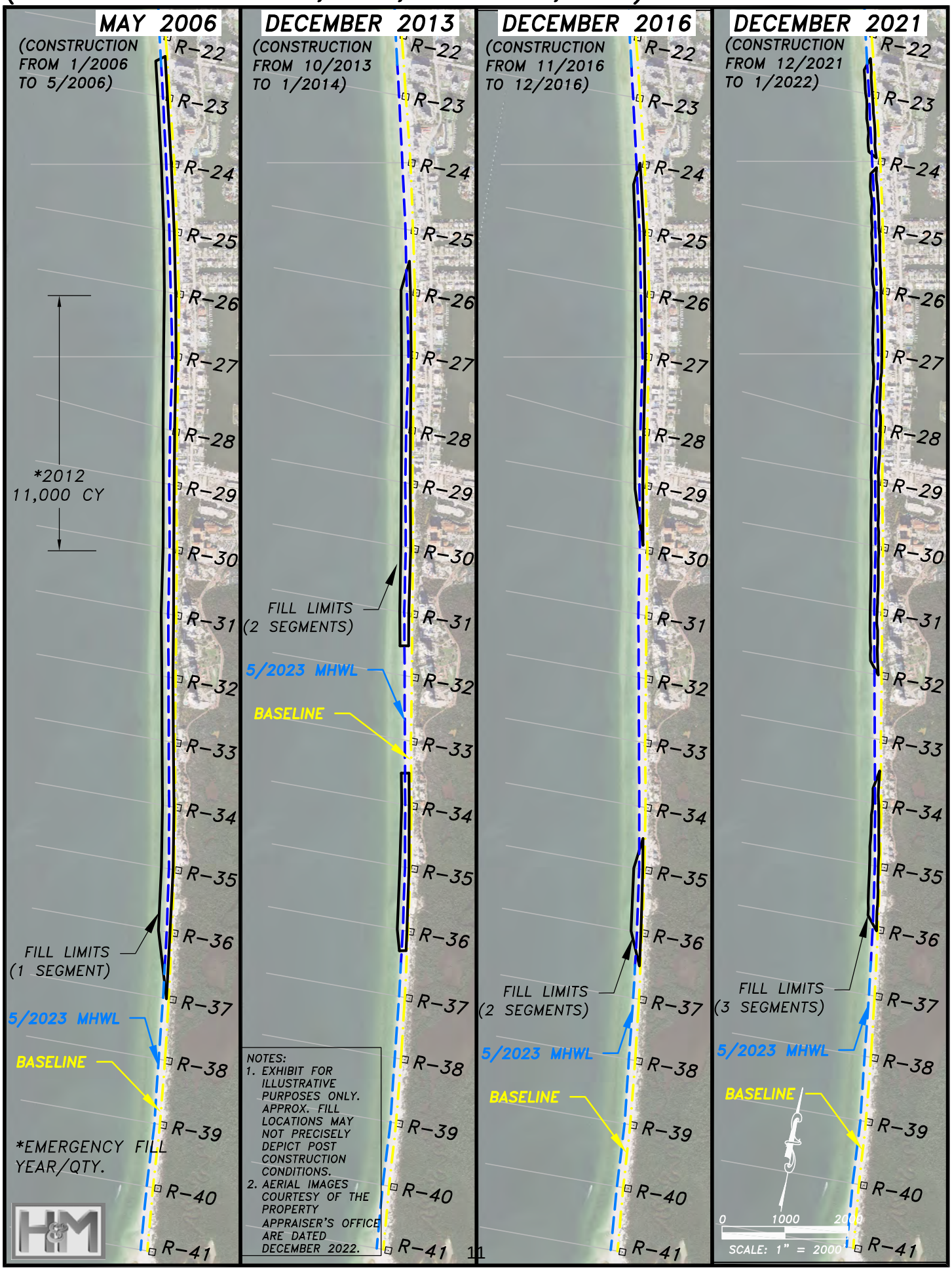


FIGURE 3a: FILL LIMITS FOR VANDERBILT & PELICAN BAY BEACH (NO FILL PLACED IN 2014, 2015, 2017–2020, 2022)

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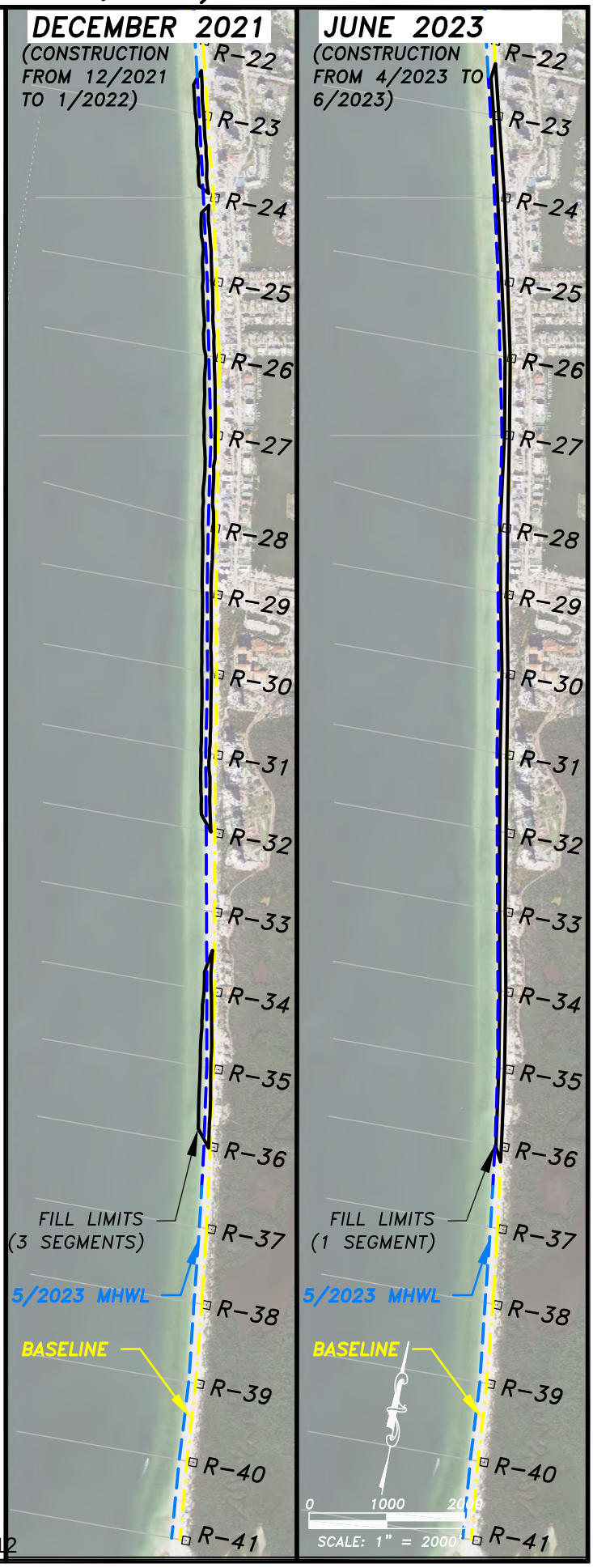
SPACE FOR FUTURE PROJECTS



NOTES:
1. EXHIBIT FOR ILLUSTRATIVE PURPOSES ONLY. APPROX. FILL LOCATIONS MAY NOT PRECISELY DEPICT POST CONSTRUCTION CONDITIONS.
2. AERIAL IMAGES COURTESY OF THE PROPERTY APPRAISER'S OFFICE ARE DATED DECEMBER 2022.

FIGURE 3b: FILL LIMITS FOR PARK SHORE BEACH
(NO FILL PLACED IN 2014–2015 OR 2017–2018 OR 2020–2022)

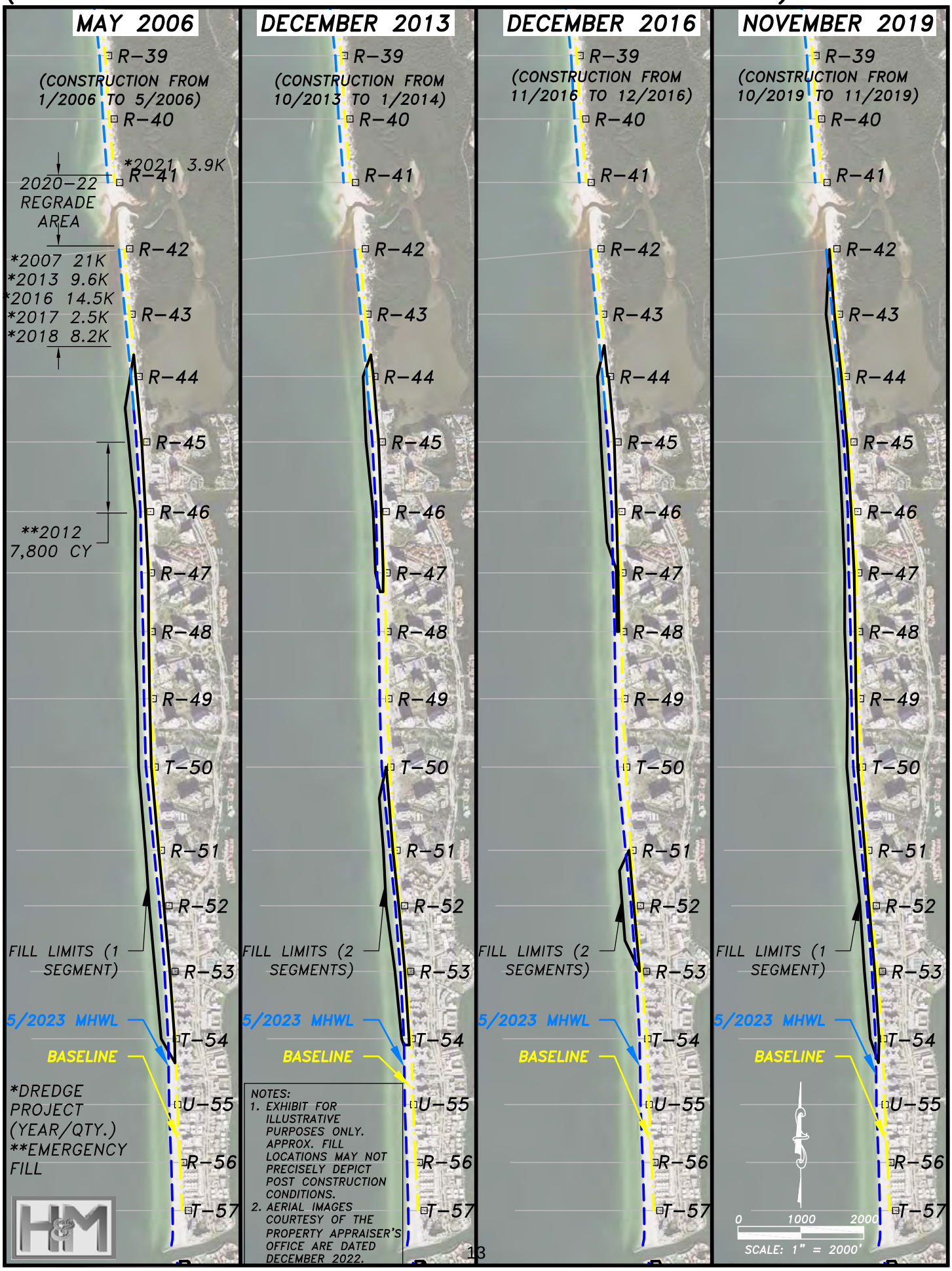


FIGURE 3b: FILL LIMITS FOR PARK SHORE BEACH (NO FILL PLACED IN 2014–2015 OR 2017–2018 OR 2020–2022)

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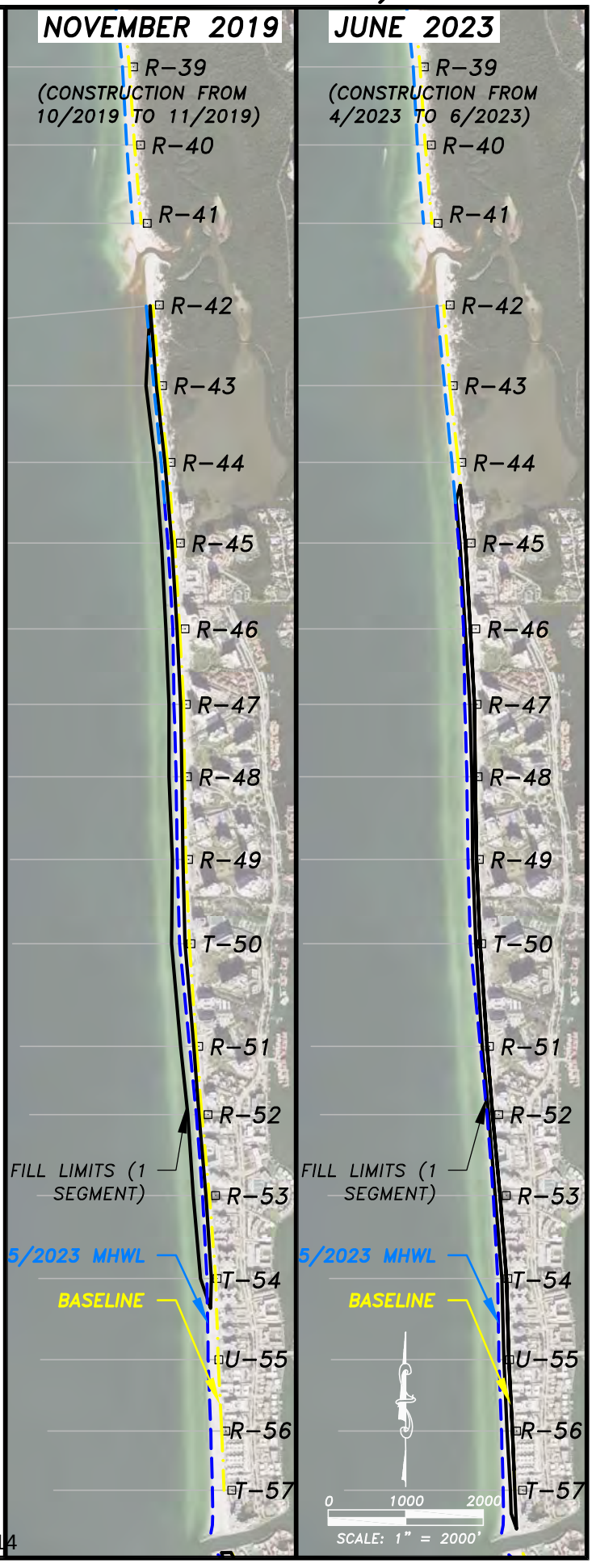

NOTES:
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2. AERIAL IMAGES COURTESY OF THE PROPERTY APPRAISER'S OFFICE ARE DATED DECEMBER 2022.

FIGURE 3c: FILL LIMITS FOR NAPLES BEACH (NO FILL PLACED ON THE BEACH FROM 2015 TO 2019)

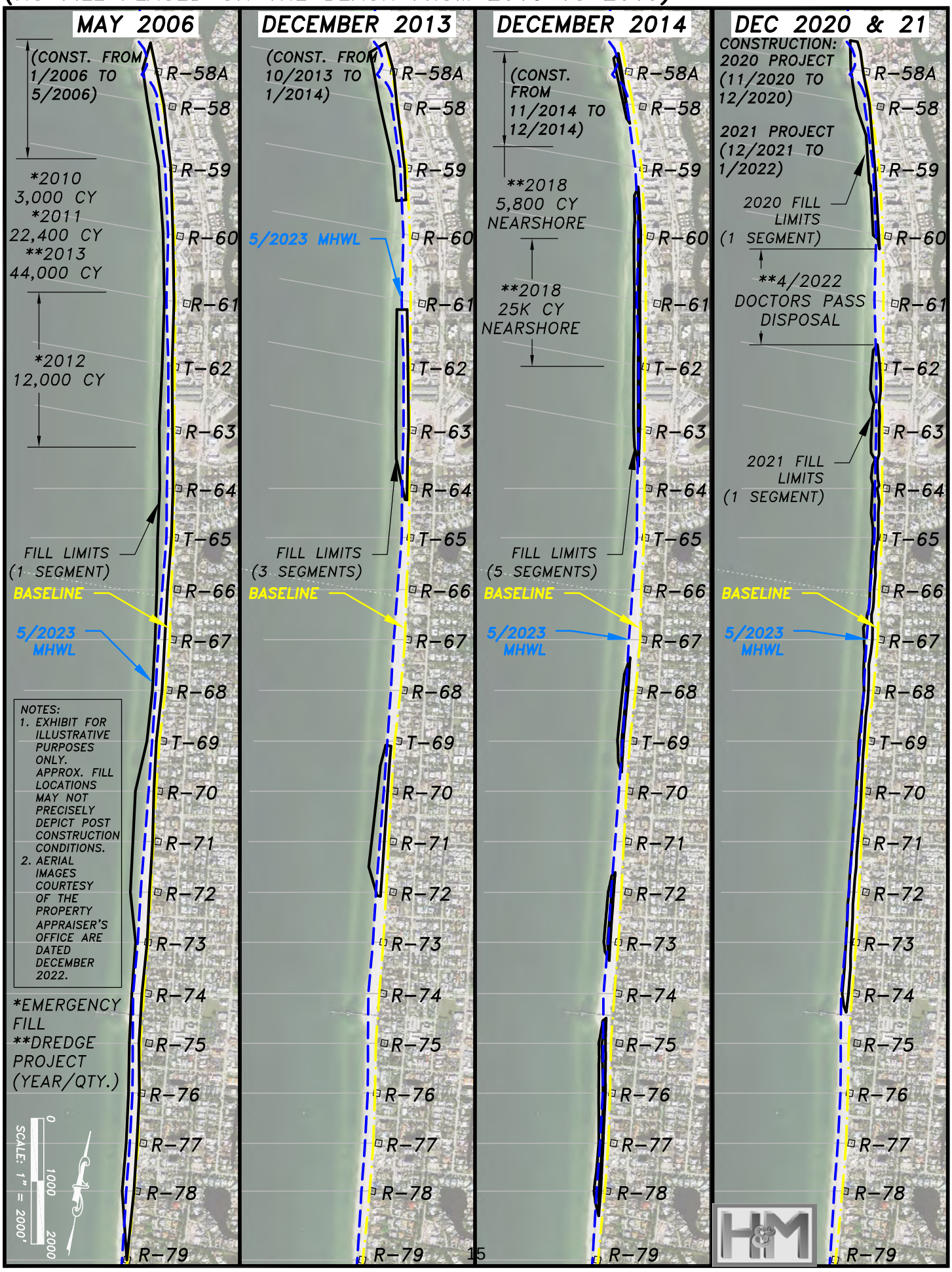

FIGURE 3c: FILL LIMITS FOR NAPLES BEACH (NO FILL PLACED ON THE BEACH FROM 2015 TO 2019)

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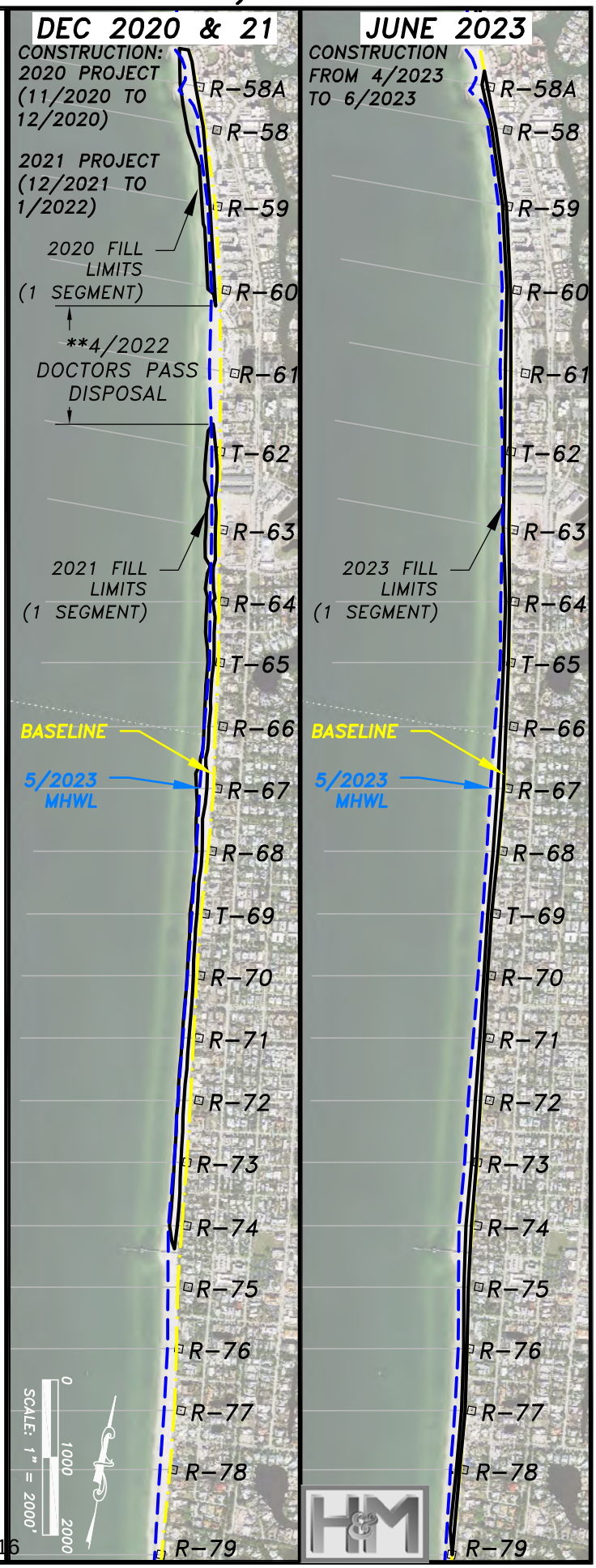

NOTES:
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2. AERIAL IMAGES COURTESY OF THE PROPERTY APPRAISER'S OFFICE ARE DATED DECEMBER 2022.

*EMERGENCY FILL
**DREDGE PROJECT (YEAR/QTY.)

Relative shoreline and volumetric change were determined for the surveys conducted in 2005, 2006, 2014 (South Naples), 2020 (Park Shore), January 2022, and the most recent surveys in November 2022 and May 2023 for this analysis.[6] Shoreline change is the distance between the mean high water elevation for different surveys while volumetric change compares the change in the volume of sand between surveys (by convention positive values indicate accretion and/or beach fill and negative values indicate erosion). The nearshore limit used for the determination of the volume of sand was the *Baseline* while the offshore limit was the -11.3 NAVD (-10.0 NGVD) approximate depth of closure[7] (DOC) used in previous monitoring reports. Alterations in the DOC were made as appropriate to account for unusual volumetric changes occurring such as movement of the nearshore bar causing significant change beyond the previously used DOC. The effective distance used to compute volume is the distance along the beach between beach profiles, and is consistent with those used in the October 2006 CP&E Post-Construction Engineering Report shown in **Appendix E**.[8] The volumetric change was computed utilizing the average end area method. **Table 5** shows the distance from the DEP reference monument to the shore-normal limits used for the volumetric analysis determined by the *Baseline* and the estimated DOC. These volumetric limits are also shown graphically on the beach profiles provided in **Appendix D-2**.

Shoreline change is shown in **Tables 6a, 7a and 8a**. The volumetric changes discussed in this report (and shown in **Tables 6b, 6c, 7b, 7c, 8b, 8c, and 9b)** are not representative of design quantities for future beach renourishment projects; they are rather an indication of erosion or accretion occurring since the previous renourishment within the monitoring area. Design quantities for fill projects consider other factors as well as erosion or accretion, including but not limited to the existing beach width, advance nourishment requirements, consider sea level rise, predicted erosion prior to construction, storm losses, tapers, gaps, berm height, and design life.

The November 2005 pre-construction survey and June 2006 post-construction survey document changes to the beach profiles before and after construction. Consequently, there can be significant differences between the as-built quantities and the quantity computed from the 2005 and 2006 monitoring surveys. As-built volumes are based on interim surveys conducted during construction usually for the determination of acceptance sections and related payment on nourishment projects. Payment for truck-haul projects is typically based on truckloads of sand or truck tickets.

[6] The beach widths and volumes for the December 2014 survey are only shown for the portion of Naples Beach excluded from the 2021 project. The December 2019 survey was excluded from the volume change analysis and associated shoreline change shown in Tables 7a and 7b due to the limited scope of the post fill survey data.
[7] Depth of closure (DOC) in coastal engineering terminology typically means the depth beyond which no change in bottom elevation is seen from normal coastal processes measured by monitoring surveys. The depth of -11.3 feet NAVD was established early as part of the monitoring of Collier County beaches. There are cases of sand accumulation or loss beyond -11.3 feet NAVD and in those cases the analysis is extended further offshore to ensure analysis of data within profile closure.
[8] Exceptions include fill template taper locations at the ends of fill segments.

Table 5. Shore Normal Limits for the Volumetric Analysis

DEP Ref. Mon. ID	Distance from Monument to Basline (Ft)	Distance from Monument to Closure Depth (Ft)	DEP Ref. Mon. ID	Distance from Monument to Basline (Ft)	Distance from Monument to Closure Depth (Ft)
Wiggins Pass			**R-51**	30	600
R-17	187*	600	**R-52**	80	700
R-18	100*	600	**R-53**	79	700
R-19	50	600	**T-54**	18	700
R-20	44	600	**U-55**	10	600
R-21	50	600	**R-56**	55	700
R-22	30	600	**T-57**	100	800
R-23	-6	600	Doctors Pass		
R-24	20	600	**R-58A**	40 *	800
R-25	23	600	**R-58**	159	800
R-26	20	600	**R-59**	25	500
R-27	0	600	**R-60**	85	700
R-28	-15	600	**R-61**	185	800
R-29	29	600	**T-62**	8	800
R-30	33	600	**R-63**	54	700
R-31	35	600	**R-64**	68	700
R-32	55	600	**T-65**	20	700
R-33	45	600	**R-66**	100	800
R-34	40	600	**R-67**	50	800
R-35	66	600	**R-68**	52	900
R-36	46	600	**T-69**	57	900
R-37	65	700	**R-70**	50	900
R-38	62	700	**R-71**	70	800
R-39	53	700	**R-72**	110	800
R-40	78	700	**R-73**	0	800
R-41	80	800	**R-74**	65	800
Clam Pass			**R-75**	135	1,000
R-42	84	700	**R-76**	30	900
R-43	46	700	**R-77**	84	900
R-44	49	700	**R-78**	40	900
R-45	73	700	**R-79**	-10	900
R-46	72	600	**R-80**	0	900
R-47	34	600	**R-81**	-20	800
R-48	36	600	**R-82**	10	800
R-49	35	600	**R-83**	70	800
T-50	19	600	**R-84**	0	700

- Light and dark shaded portions of chart represent 2005/2006 project area.
- Dark shaded portion of chart represents the 2023 emergency berm project area.
- * Monuments R-17 and R-18, adjacent to Wiggins Pass, are in a highly dynamic area and the landward limits were adjusted accordingly to measure changes along the active beach profile to 20 and 80 feet respectively; similarly, with R-58A adjacent to Doctors Pass the distance was adjusted to 0 feet for the analysis.

Figure 4a shows a typical beach profile comparison for surveys conducted in 2005, 2006, January 2022, and most recently in November 2022 and May 2023 with the elevation (referencing the NAVD vertical datum) on the vertical axis and the distance from monument (in feet) on the horizontal axis. The bounds of the shore-normal limits for the volume analysis described in **Table 5** along with the corresponding beach widths and *Design Standard* width are depicted. The area of change at this monument from the January 2022 to November 2022 survey, denoting accretion, and erosion, averaged with the area of change at each adjacent monument is multiplied by the distance between the monuments to obtain the net volume change between adjacent monuments. Although the beach width is an indicator considered for nourishment requirements, changes in bathymetry such as a temporary shift in the nearshore bar due to weather conditions possibly combined with elevated water levels, or other factors such as seasonal changes as shown in **Figure 4a** are quantified as volumetric change and analyzed in conjunction with shoreline change.

Figure 4a. Typical Beach Profile Comparison

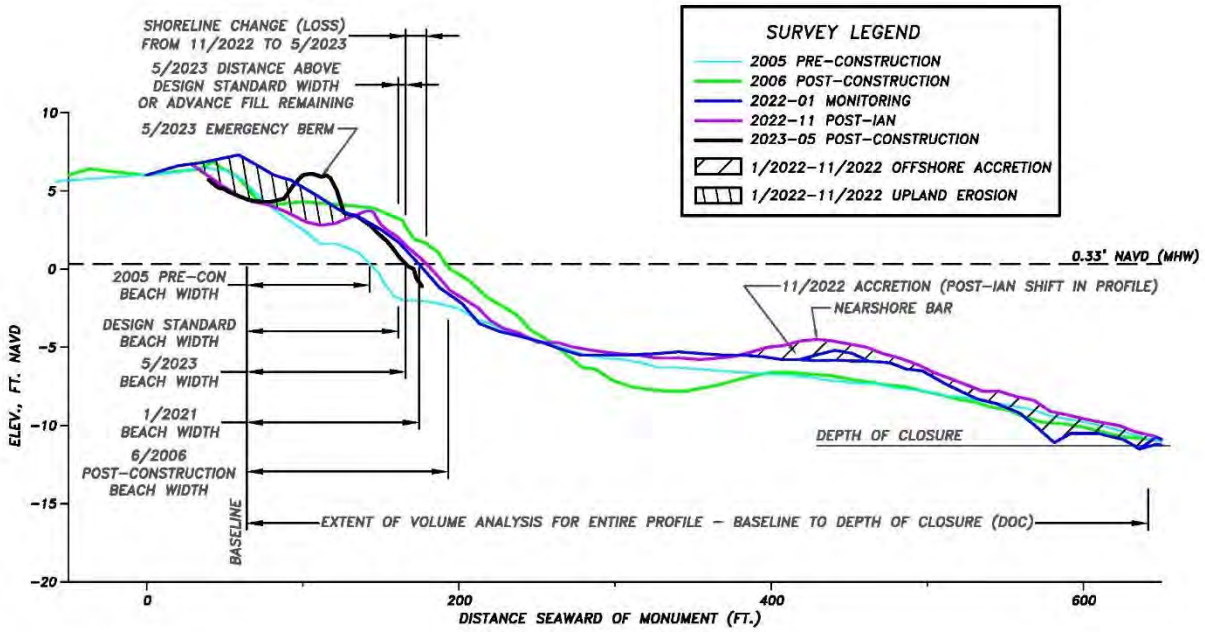
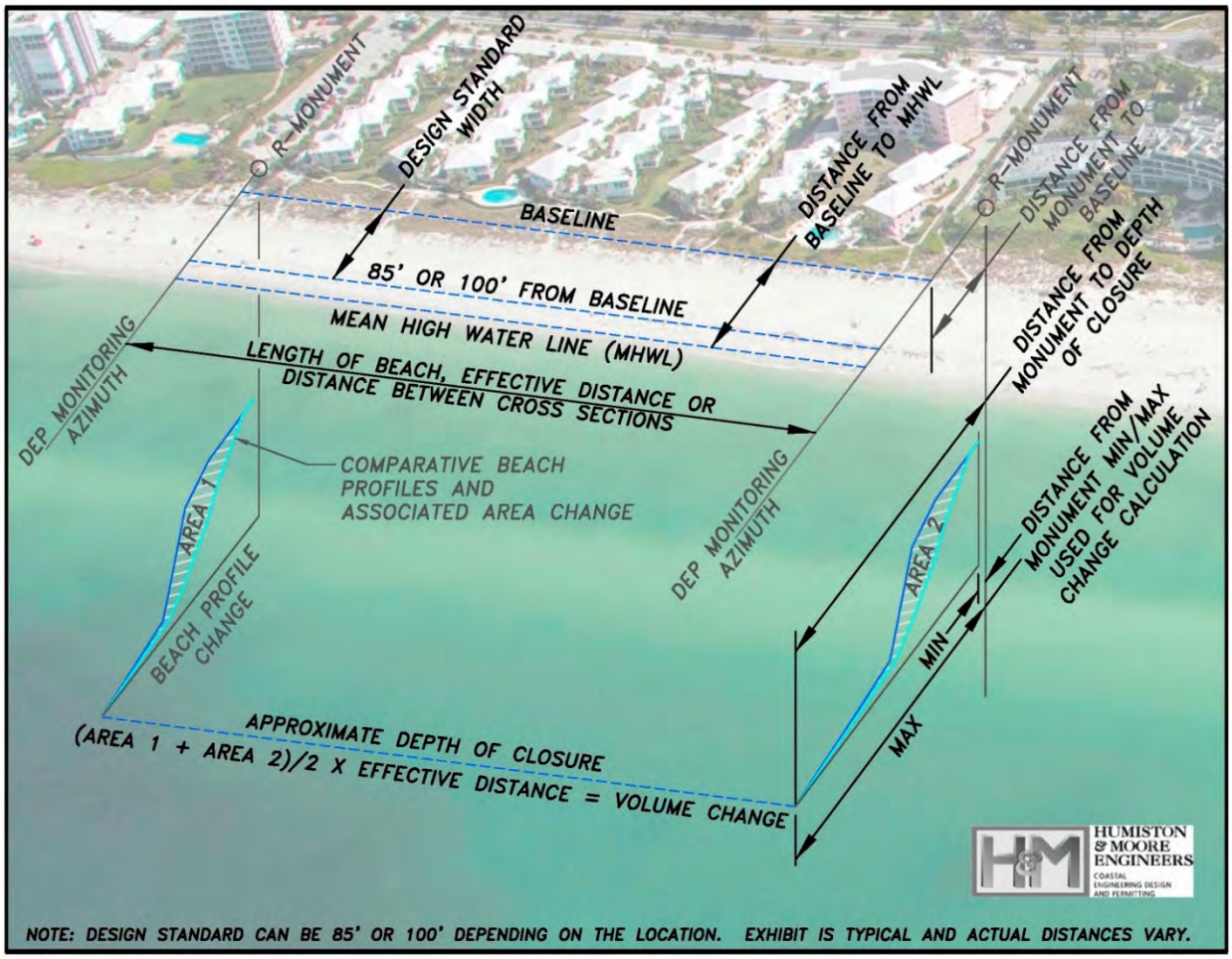


Figure 4b is a schematic depiction of the elements involved in the analysis of shoreline and volume change in this report. (This particular case shows a beach width greater than the *Design Standard*.) Two adjacent DEP reference monuments and associated monitoring azimuths are shown along with the *Baseline*, *Design Standard* width (85 or 100 feet), mean high water line, and approximate DOC. Also shown are comparative beach profiles at the adjacent monuments and the associated area change between the monitoring surveys to be compared. Shoreline change is the difference in the "Distance from the *Baseline* to MHWL" for different monitoring surveys. Volumetric change, determined by the formula shown (at the bottom of the figure) for the average end area method, utilizes the cross sectional area change for different monitoring surveys at adjacent monuments and the length of beach between those monuments. The comparative profiles are analyzed at a minimum offset from the *Baseline* to the approximate DOC as shown in the figure and **Table 5**.

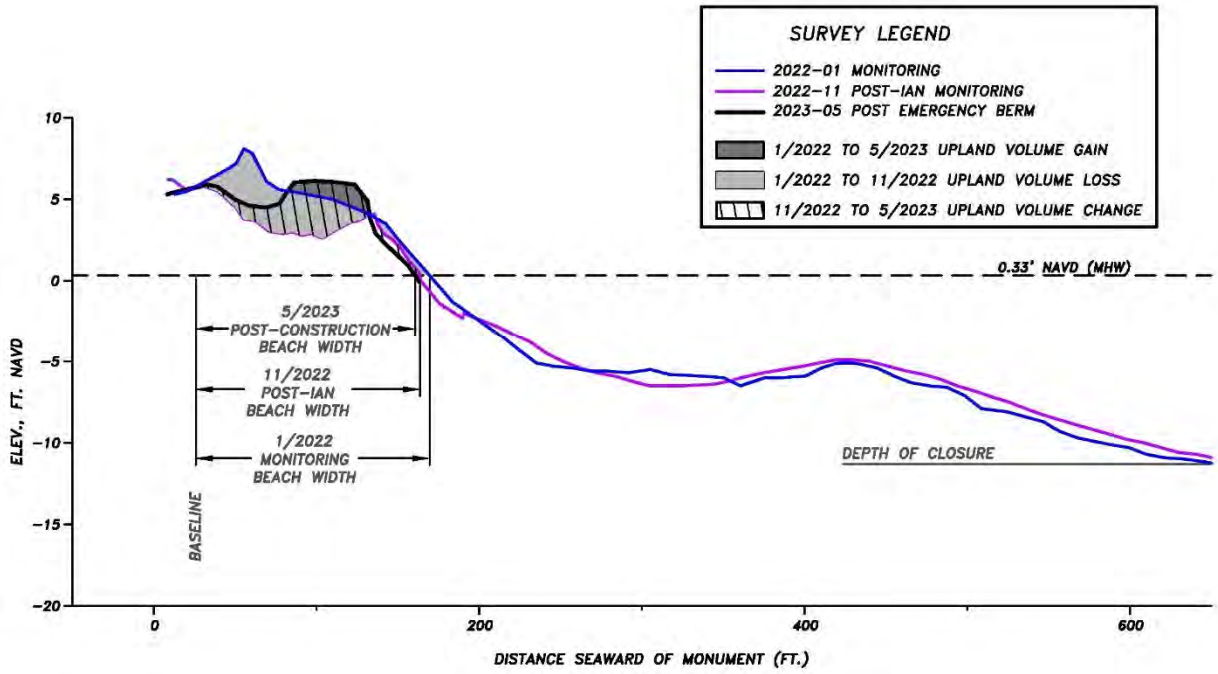
Figure 4b. Schematic Diagram for Typical Shoreline and Volumetric Analysis



C. Volume Change (Upland Beach Profile)

The *Design Standard* used for the Collier Beach Project pertains to the upland portion of the beach without consideration to changes in the nearshore as shown in **Tables 6b, 7b, and 8b** containing volumetric changes offshore to the DOC. In order to isolate upland volumetric changes to complement the information provided by changes in beach width, the limits of the volumetric analysis were computed between the 2003 *Baseline* and the MHWL for the area above the MHW elevation. **Figure 4c** shows a typical cross section containing three beach profiles: The January 2022 pre-Ian monitoring, November 2022 post-Ian monitoring, and May 2023 post emergency berm surveys. The upland volume change for the period from the January 2022 to the November 2022, representing the impact of Hurricane Ian, is shaded in light gray. The upland volume change from January 2022 to May 2023, comparing the pre-Ian to the post emergency berm construction survey, is shaded in dark gray, while the line hatching shows the changes from the post-Ian 11/2022 survey to May 2023 post emergency berm construction. Similarly, upland volume change was calculated for surveys from 2005 through 2023, analyzed for the monitoring area, and shown in **Tables 6c, 7c, and 8c**. Negative values indicate volumetric losses or erosion.

Figure 4c. Beach Profile Showing Shoreline and Volumetric Accretion

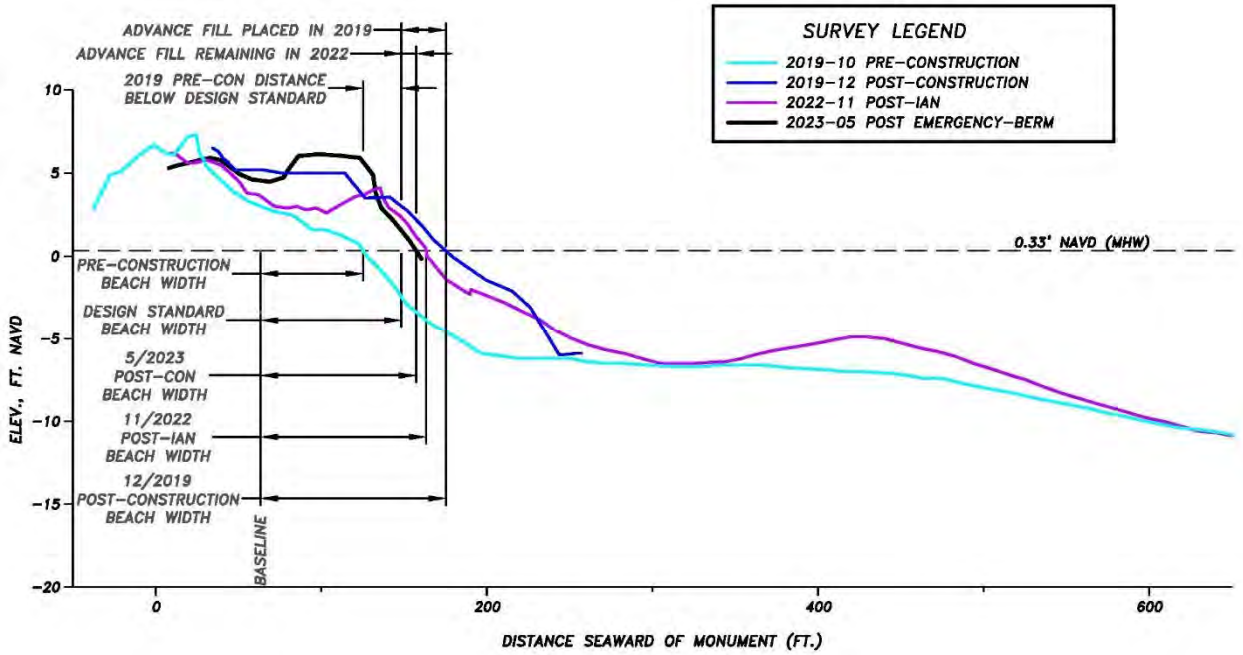


D. Advance Nourishment Losses

Advance nourishment is the amount of fill placed seaward of the *Design Standard* width. This sand is placed to maintain the *Design Standard* width as sand erodes from the beach over time in 'advance' of the Design Template. **Figure 4d** shows the October 2019, December 2019, November 2022 surveys as well the May 2023 post emergency berm survey for a typical cross section located within the Park Shore fill template. The fill placed seaward of the *Design Standard* width, as shown by the December 2019 profile, represents the advance fill, while the November 2022 and May 2023 show the advance fill remining after Hurricane Ian and the subsequent emergency berm project.

Tables 6d, 7d, and 8d show the post-construction width of the beach in June 2006, December 2014 or December 2019 (the last continuous fill template constructed south of the Naples Pier and Park Shore, respectively) and the January 2022 and May 2023 beach widths. Erosion into the fill template is noted along with the amount of beach width remaining above the *Design Standard* of 85 or 100 feet. Profiles within the tapered portion of the fill template, graded to transition with the existing adjacent beach, were not included in the analysis.

Figure 4d. Typical Beach Cross Section



Other than the recent 2023 emergency berm project, Vanderbilt, Pelican Bay and the majority of Naples Beach were nourished in December 2021, Park Shore was last nourished in December 2019, North Naples Beach (R-58A to 60)[9] in December 2020, and south Naples Beach in December 2014 (R-75 to R-79). **Tables 6d, 7d**, and **8d** compare post-construction beach widths for Vanderbilt, Pelican Bay and Naples Beaches. Beach widths less than the *Design Standard* are noted.

[9] During construction, Tropical Storm Eta impacted the project area, causing a stoppage of work on November 7th, 2020. Impacts from the storm included redistribution of some of the previously placed fill above the permitted template and corresponding tolerance limits along the north end of the project. Once construction activities resumed on November 16, 2020, the fill was graded and redistributed to meet the design template and additional fill was placed to address the storm impacts. Source: Completion and Certification by Taylor Engineering, January 13, 2021.

In the following sections of this report, corresponding values between those shown in the Tables and report text are highlighted in blue for ease of reference. The volumes in cubic yards (CY) shown in the tables were rounded to the nearest value of 10, distances are shown in feet rounded to the nearest whole number.

VI. ANALYSIS

Vanderbilt Beach & Pelican Bay Beaches

This portion of Collier County bounded on the north by Wiggins Pass (between R-16 and R-17) and to the south by Clam Pass (between R-41 and R-42) was renourished as part of the Collier Beach project in 2013, 2016, 2021 and 2023 as shown in **Figure 3a**. Nourishment history for the monitoring area from 2005 to the present is shown in **Table 2b**; recently the following projects were conducted within the reach:

- In March 2022 approximately 26,000 (of a total of 66,000) cubic yards of sand dredged from Wiggins Pass was placed south of the inlet on the beach between monuments R-18 to R-20.

- In March/April 2022 sand dredged from Clam Pass was placed north and south of the pass; approximately 15,000 cubic yards north of the inlet to R-40.

- Vanderbilt Beach was nourished with approximately 42,000 (42,100), and Pelican Bay Beach 27,500 cubic yards (27,500) of truck hauled sand from April to May 2023 to create an emergency berm.

Table 6a shows the beach width from the *Baseline* at each monument for the 2005 pre-construction, 2006 post-construction, January 2022 monitoring, and the most recent monitoring surveys conducted in November 2022 and May 2023. The table also shows the corresponding average beach width for the four different reaches between Wiggins and Clam Pass, denoted as; Delnor-Wiggins, Vanderbilt Beach, Pelican Bay Beach, and North of Clam Pass. **Table 6b** shows the as-built volumes for the 2006 through 2023 nourishment projects as well as the volume change along the entire profile from the *Baseline* to the DOC.[10] **Table 6c** shows the upland volume change or the volume change above the MHWL, while **Table 7d** shows the advance nourishment remaining for the monuments located within the 2006 project continuous fill template.

The reach south of Wiggins Pass in Delnor-Wiggins State Park from monument R-17 to R-21 was nourished in 2022 with 26,000 cubic yards (26,000) of sand dredged from Wiggins Pass and subsequently placed on the beach between R-18 to R-20. Dynamic beach widths near the inlet at R-17 and R-18 (-112, 77) are below the *Design Standard* to the south of 100' as well as the beach at monument R-21, 7 feet below the *Design Standard* (93). Considering the entire profile, from the baseline to the DOC, the only reach from Wiggins to Clam Pass losing volume since the 2006 project was the dynamic reach from R-17 to R-18 (-38,410). The majority of the volumetric gain, due to the effect of Hurricane Ian, was in the offshore portion of the profile. Upland losses, above the MHWL, since Hurricane Ian are throughout the reach totaling 4,600 cubic yards (-4,600). Excluding the losses at R-17, the reach has an average beach width of 108 feet.

[10] The May 2023 upland post-construction survey does not include the entire beach profile and was consequently excluded from this portion of the analysis.

Vanderbilt Beach represented by monuments R-22 south to R-32 was recently nourished with approximately 42,000 cubic yards (42,100) of sand as part of the emergency berm project placed upland of MHW. Beach widths are generally greater than the *Design Standard* of 100 feet with the exception of R-27, 5 feet below the standard (95), losing 28 feet (-28) after the November 2022 survey due to post-storm equilibration of the beach. Volumetric losses are also evident in the vicinity of R-27, considering changes along the entire profile from the *Baseline* to the DOC (-180) as well as above the MHWL (-5,740). In spite of the losses at R-27, the Vanderbilt Beach reach from R-22 to R-32 has an average width of 117 feet, 17 feet above the *Design Standard*, maintaining an average of 18 feet (18) in advance nourishment; volumetric gain over the entire profile in 2022 (32,080), notable on the profiles provided in **Appendix D-2**, and moderate volumetric losses in the upland since January 2022 survey (-3,420). Vanderbilt Beach retained over 248,000 cubic yards (248,250) of the fill placed from 2005 to 2023 totaling almost 365,000 cubic yards (130,460+234,280) or approximately 68%, although some of the sand may be attributed to beach adjustment and spreading of sand from Delnor-Wiggins State Park.

Pelican Bay Beach represented by monuments R-33 south to R-37 was recently nourished with approximately 27,500 cubic yards of sand as part of the emergency berm project. The average beach width for the reach (92) is below the *Design Standard* of 100 feet, particularly monuments R-35 south to R-37 (87,81,89) having eroded into the design template. There was an average loss of 4 feet (-4) in advance nourishment for the entire reach. Volumetric changes from R-35 to R-37, upland of the MHWL, shows moderate losses (-800, -10) while changes along the entire profile, from the *Baseline* to the DOC, since January 2022 show gain (1,930, 5,440). Considering the Pelican Bay reach from R-33 to R-37 volumetric gain is evident: Changes along the entire profile in 2022 from the *Baseline* to the DOC show a gain of almost 22,000 cubic yards (21,830), notable on the profiles provided in **Appendix D-2,** while the upland gained 200 cubic yards (210) since Hurricane Ian as a consequence of the emergency berm project. Pelican Bay Beach retained over 97,000 cubic yards (97,230) of the fill placed from 2005 to 2023 totaling almost 129,000 cubic yards (47,990+80,760) or approximately 76%.

The reach **North of Clam Pass** represented by monuments R-38 south to R-41 has beach widths ranging from 90 to 108 feet, and an average width of 100 feet meeting the *Design Standard* to the north of 100 feet. Upland volumes losses total almost 6,000 cubic yards (-5,970) in 2022 due to the effects of Hurricane Ian while changes along the entire profile for the same time period, from the *Baseline* to the DOC, show a gain of almost 38,000 cubic yards (37,810).

Table 6a. Shoreline Change R-17 thru R-41 (Vanderbilt, Pelican Bay, North Clam Pass)

DEP Mon.	Design Standard (Ft)	Beach Width from Baseline (Ft) 11/2005	6/2006	1/2022	11/2022	5/2023	Shoreline Change (Ft) 2005 to 5/2023	2006 to 5/2023	1/2022 to 5/2023	11/2022 to 5/2023
		Wiggins Pass								
R-17	-	51	77	-107	-112					
R-18	-	97	108	56	77					
R-19	-	111	99	104	143	No Data	No Data (2023)			
R-20	-	98	104	78	118					
R-21	-	88	103	74	93					
R-22	100	106	106	102	120	100	-6	-6	-2	-20
R-23	100	100	121	127	138	111	11	-10	-16	-27
R-24	100	114	130	136	150	130	16	0	-6	-20
R-25	100	94	135	130	138	122	28	-13	-8	-16
R-26	100	109	148	149	151	134	25	-14	-15	-17
R-27	100	79	121	128	123	95	16	-26	-33	-28
R-28	100	96	138	139	131	112	16	-26	-27	-19
R-29	100	86	144	135	143	113	27	-31	-22	-30
R-30	100	109	142	142	143	121	12	-21	-21	-22
R-31	100	109	132	140	148	129	20	-3	-11	-19
R-32	100	107	138	120	133	116	9	-22	-4	-17
R-33	100	90	103	103	112	100	10	-3	-3	-12
R-34	100	80	103	106	111	101	21	-2	-5	-10
R-35	100	79	103	104	98	87	8	-16	-17	-11
R-36	100	81	96	88	88	81	0	-15	-7	-7
R-37	100	99	92	89	94	89	-10	-3	0	-5
R-38	-	106	87	94	102					
R-39	-	97	93	86	90	No Data	No Data (2023)			
R-40	-	71	80	72	101					
R-41	-	104	108	110	108					
Reach		Clam Pass								
		Average Beach Width (Ft)					Average Shoreline Change (Ft)			
Delnor-Wiggins R-17 to R-21		89	98	41	64	-	No Data (2023)			
Vanderbilt Beach R-22 to R-32		101	132	132	138	117	16	-16	-15	-21
Pelican Bay Beach R-33 to R-37		86	99	98	101	92	6	-8	-6	-9
N. of Clam Pass R-38 to R-41		94	92	90	100	-	No Data (2023)			
Monitoring Area R-17 to R-41		94	112	100	110	109	13	-13	-12	-18

- Shaded portion of chart represents 2005/2006 project area; darker shading represents the 2023 project area.
- Beach widths shown in red are based on the March 2023 emergency berm pre-construction survey due to availability of post-construction survey information.

Table 6b. Volume Change R-17 through R-41 (Vanderbilt, Pelican Bay, North Clam Pass)

DEP Reference Monument			Effective Distance (Ft)	As-Built Volume (CY)						Volume Change (CY)		
				2005 to 2006	2010 to 2012	2013	2016	2021	2023	2005 to 11/2022	2006 to 11/2022	1/2022 to 11/2022
				Wiggins Pass								
R-17	to	R-18	1,003							-36,530	**-38,410**	8,660
R-18	to	R-19	1,048		48,400 (2007)		56,280 (2018)		**26,000** (2022)	12,940	15,920	16,230
R-19	to	R-20	1,029							29,490	31,560	18,900
R-20	to	R-21	1,030							20,160	18,280	17,700
R-21	to	R-22	1,040							16,320	14,890	10,640
R-22	to	R-23	968	4,520						11,250	10,060	2,560
R-23	to	R-24	1,058	8,340						27,970	21,800	4,350
R-24	to	R-25	1,083	13,700						31,230	19,770	6,870
R-25	to	R-26	984	15,890		3,810				28,140	12,750	3,020
R-26	to	R-27	994	18,430	11,000	18,240	35,470	77,340	**42,100**	28,930	12,240	**-180**
R-27	to	R-28	1,195	22,520		15,900				31,920	13,970	790
R-28	to	R-29	856	14,380		8,360				22,570	8,100	2,730
R-29	to	R-30	1,029	14,660		8,090				23,550	8,180	3,990
R-30	to	R-31	1,037	9,060		11,340				20,850	15,700	3,730
R-31	to	R-32	1,006	8,960		2,630				21,840	13,070	4,220
R-32	to	R-33	1,017	9,090						19,130	5,060	4,700
R-33	to	R-34	1,027	10,880		1,440			**27,500**	24,900	10,630	6,690
R-34	to	R-35	997	11,280		6,280		20,000		24,050	8,430	3,070
R-35	to	R-36	999	12,990		13,600	8,500			17,540	3,270	**1,930**
R-36	to	R-37	1,058	3,750		3,440				11,610	2,660	**5,440**
R-37	to	R-38	977							9,080	7,360	5,930
R-38	to	R-39	1,023							12,970	9,950	6,460
R-39	to	R-40	1,010				(2017 & 20)		**15,000** (2022)	19,010	10,820	11,160
R-40	to	R-41	1,012			10,400	6,900			26,770	17,340	14,260
Total Volume Change (CY)				Clam Pass								
Delnor-Wiggins R-17 to R-22				-			130,680			42,380	42,240	72,130
Vanderbilt Beach R-22 to R-32				**130,460**			**234,280**			**248,250**	135,640	**32,080**
Pelican Bay Beach R-32 to R-37				**47,990**			**80,760**			**97,230**	30,050	**21,830**
N. of Clam Pass R-37 to R-41				-			32,300			67,830	45,470	**37,810**
Monitoring Area R-17 to R-41				178,450			478,020			455,690	253,400	163,850

- Shaded portion of chart represents 2005/2006 project area; darker shading represents the 2023 project area.
- Volumetric change quantities are not representative of design quantities for future beach renourishment projects rather an indication of erosion (negative value) or accretion (positive value) in the monitoring area.

Table 6c. Upland Volume Change R-17 through R-41 (Vanderbilt, Pelican Bay, North Clam Pass)

DEP Reference Monument			Upland Volume Change (CY)			
			2005 to 5/2023	2006 to 5/2023	1/2022 to 5/2023	1/2022 to 11/2022
			Wiggins Pass			
R-17	to	R-18	No Data (2023)			-1,310
R-18	to	R-19				-180
R-19	to	R-20				240
R-20	to	R-21				-30
R-21	to	R-22				-3,320
R-22	to	R-23	1,590	610	-670	-3,250
R-23	to	R-24	6,590	3,140	-480	-5,420
R-24	to	R-25	8,710	3,710	1,450	-4,730
R-25	to	R-26	8,560	2,190	360	-5,600
R-26	to	R-27	8,340	1,150	-770	**-5,740**
R-27	to	R-28	11,730	2,240	1,340	-5,510
R-28	to	R-29	8,560	940	810	-4,450
R-29	to	R-30	7,810	480	-1,130	-5,660
R-30	to	R-31	5,450	1,700	-2,280	-6,210
R-31	to	R-32	4,700	860	-2,050	-6,020
R-32	to	R-33	5,190	450	310	-4,260
R-33	to	R-34	6,530	1,700	1,030	-3,630
R-34	to	R-35	6,490	830	-320	-4,570
R-35	to	R-36	4,080	-1,170	**-800**	-4,240
R-36	to	R-37	1,430	-830	**-10**	-2,940
R-37	to	R-38	No Data (2023)			-2,610
R-38	to	R-39				-2,770
R-39	to	R-40				-390
R-40	to	R-41				-200
Total Volume Change (CY)			Clam Pass			
Delnor-Wiggins R-17 to R-22			No Data (2023)			**-4,600**
Vanderbilt Beach R-22 to R-30.8			72,040	17,020	**-3,420**	-52,590
Pelican Bay Beach R-30.8 to R-37			23,720	980	**210**	-19,640
N. of Clam Pass R-37 to R-41			No Data (2023)			**-5,970**
Monitoring Area R-17 to R-41			95,760	18,000	-3,210	-82,800

Shaded portion of chart represents 2005/2006 project area; darker shading represents the 2023 project area.

Table 6d. Advance Nourishment Remaining R-22 through R-37 (Vanderbilt, Pelican Bay)

Monument	Beach Width			Advance Nourishment Remaining			Eroded into Design Template
	2006 (Feet)	1/2022 (Feet)	5/2023 (Feet)	2006 (Feet)	1/2022 (Feet)	5/2023 (Feet)	
R-22	106	102	100		Taper		Taper
R-23	121	127	111	21	27	11	-
R-24	130	136	130	30	36	30	-
R-25	135	130	122	35	30	22	-
R-26	148	149	134	48	49	34	-
R-27	121	128	95	21	28	-5	Yes
R-28	138	139	112	38	39	12	-
R-29	144	135	113	44	35	13	-
R-30	142	142	121	42	42	21	-
R-31	132	140	129	32	40	29	-
R-32	138	120	116	38	20	16	-
R-33	103	103	100	3	3	0	-
R-34	103	106	101	3	6	1	-
R-35	103	104	87	3	4	-13	Yes
R-36	96	88	81	-4	-13	-19	Yes
R-37	92	89	89		Taper		Taper
Average Vanderbilt Beach R-22 to R-32:				35	34	**18**	
Average Pelican Bay Beach R-33 to R-37:				1	0	**-4**	

"Taper" indicates a monument located with the fill template taper to the existing beach. Gray shading shows the most recent nourishment of the reach or the 2023 emergency berm extents.

Park Shore and Clam Pass Beaches

This portion of Collier County is bounded on the north by Clam Pass (located between R-41 and R-42) and to the south by Doctors Pass (located between R-57 and R-58A). It was renourished with sand as part of the Collier Beach project in 2013, 2016, 2019, and 2023 as shown in **Figure 3b**. Nourishment history for the monitoring area from 2005 to the present is shown in **Table 2b**; recently the following projects were conducted within the reach:

- In March/April 2022 sand dredged from Clam Pass was placed north and south of the pass; approximately 2,500 cubic yards was placed south of the inlet to R-43.

- In April to May 2023 approximately 46,000 cubic yards (15,000+30,900) of truck-hauled sand were placed from R-44 south to T-57+500 to create an emergency berm.

Table 7a shows the beach width from the *Baseline* at each monument for the 2005 pre-construction, 2006 post-construction, March 2020, January 2022, and most recent surveys conducted in November 2022 and May 2023; along with the corresponding average beach width for the four different reaches between Clam Pass and Doctors Pass denoted as; South of Clam Pass, North Park Shore, Park Shore, and North of Doctors Pass. **Table 7b** shows the as-built volumes for the 2006 through 2023 nourishment projects as well as the volume change along the entire profile from the *Baseline* to the DOC, while **Table 7c** shows the upland volume change or the volume change above the MHWL. **Table 7d** shows the advance nourishment remaining for the monuments located within the 2006 and 2023 project continuous fill templates.[11]

Clam Pass County Park Beach represented by monuments R-42 and R-43, was nourished as part of the March/April 2022 dredging of Clam Pass, and has an average width of 79 feet, 6 feet below the 85-foot *Design Standard*, and has an average 17 foot (-17) loss since January 2022. The reach shows a relatively moderate gain of 3,000 cubic yards (3,070) of sand over the entire profile from the *Baseline* to the DOC, and a loss of 5,500 cubic yards (-5,510) above the MHWL since 2022. In spite of the erosion, the reach shows an average of 2 feet (2) in advance nourishment remaining.

North Park Shore Beach represented by monuments R-44 south to R-48 was nourished as part of the 2023 emergency berm project with approximately 15,000 cubic yards of sand. The average width of the reach is 97 feet, a negligible change in width (-2) since January 2022, and all profiles in the reach have widths above the *Design Standard* width of 85 feet with the exception of R-44 having a width of 80 feet. Considering the changes along the entire profile, from the *Baseline* to the DOC, the volumetric change since January 2022 shows a gain of almost 18,000 cubic yards (17,700) due to changes along the nearshore bar, notable on the beach profiles provided in **Appendix D-2**. The volumetric change above the MHWL since January 2022 shows a gain of 2,200 cubic yards (2,180) due to the 2023 nourishment project. Although R-44 (80) at the north end of the project area eroded into the design template, the reach has an average advance nourishment remaining of 13 feet (13), no change in comparison to the January 2022 survey. The North Park Shore Beach was nourished with almost 202,000 cubic yards (27,710+174,200) of sand from 2005 to 2023 retaining over 114,000 cubic yards (114,060), or approximately 56%.

Park Shore Beach represented by monuments R-49 south to R-54 was nourished as part of the 2023 emergency berm project with approximately 31,000 cubic yards (30,900) of sand. The average width of the reach is 99 feet, with a negligible average decrease of 1 foot (-1) since January 2022. All profiles in the reach have a widths above the *Design Standard* width of 85 feet with the exception of R-52 having a width of 69 feet (69). Considering the changes along the entire profile, from the *Baseline* to the DOC, the volumetric change in 2022 shows a gain of over 19,000 cubic yards (19,390) mainly due to changes along the nearshore bar, notable on the beach profiles provided in **Appendix D-2**. In spite of the 2023 nourishment, the volumetric change above the MHWL shows a loss of 7,000 cubic yards (-7,000) since January 2022 due to the significant upland losses as a result of Hurricane Ian. Although R-52, located near Horizon Way, eroded into the design template, the Park Shore Beach reach has an average advance nourishment remaining of 17 feet (17), one foot below the average for January 2022. This segment of beach was nourished with over 230,000 cubic yards (114,040+117,120) of sand from 2005 to 2023, retaining 195,000 cubic yards (194,680), or approximately 84%.

[11] Monuments R-42 and R-43 were added to the permitted project scope in 2017. The December 2019 survey represents the immediate post-construction survey for the 2019 project and was used for this analysis in lieu of the March 2020 monitoring survey.

The beach north of Doctors Pass represented by monuments U-55 south to T-57 (adjacent to Doctors Pass) has an average beach width of 140 feet, a gain of 20 feet (20) since January 2022, and shows a net total volumetric gain of approximately 1,700 cubic yards (1,700) since January 2022 along the entire profile, from the *Baseline* to the DOC, likely due to changes in the nearshore bar in the shadow of the north jetty. In spite of the significant upland losses due to Hurricane Ian (-5,460) in 2022, the upland losses from January 2022 to May 2023 are relatively less significant (-550) due to the nourishment provided by the 2023 emergency berm project.

Table 7a. Shoreline Change R-42 through R-57 (Clam Pass to Doctors Pass)

DEP Mon.	Design Standard	Beach Width from Baseline (Ft)						Shoreline Change (Ft)				
		11/2005	6/2006	3/2020	1/2022	11/2022	5/2023	2005 to 5/2023	2006 to 5/2023	3/2020 to 5/2023	1/2022 to 5/2023	11/2022 to 5/2023
	(Ft)	Clam Pass										
R-42	85	103	96	108	101	73	89	-14	-7	-19	-12	16
R-43	85	66	52	66	90	93	68	2	16	2	-22	-25
R-44	85	72	84	91	95	95	**80**	8	-4	-11	-15	-15
R-45	85	76	66	132	97	90	88	12	22	-44	-9	-2
R-46	85	88	84	97	84	96	86	-2	2	-11	2	-10
R-47	85	104	115	116	121	127	124	20	9	8	3	-3
R-48	85	81	99	109	99	122	109	28	10	0	10	-13
R-49	85	98	96	104	92	115	112	14	16	8	20	-3
T-50	85	88	117	128	123	132	126	38	9	-2	3	-6
R-51	85	64	127	111	96	101	88	24	-39	-23	-8	-13
R-52	85	59	126	113	82	83	**69**	10	-57	-44	-13	-14
R-53	85	63	113	99	95	97	87	24	-26	-12	-8	-10
T-54	85	83	125	121	114	119	112	29	-13	-9	-2	-7
U-55	-	96	77	138	118	122	129	33	52	-9	11	7
R-56	-	102	91	145	119	131	141	39	50	-4	22	10
T-57	-	110	122	152	124	140	151	41	29	-1	27	11
Reach		Doctors Pass										
		Average Beach Width (Ft)						Average Shoreline Change (Ft)				
S. of Clam Pass R-42 to R-43		84	74	87	95	83	**79**	-6	5	-9	**-17**	-5
N. Park Shore Beach R-44 to R-48		84	90	109	99	106	**97**	13	8	-12	**-2**	-9
Park Shore Beach R-49 to R-54		76	117	113	100	108	**99**	23	-18	-14	**-1**	-9
N. of Doctors Pass R-55 to R-57		103	97	145	120	131	**140**	38	43	-5	**20**	9
Monitoring Area R-42 to R-57		85	99	114	103	109	104	19	4	-11	1	-5

- Light gray shading indicates permitted fill extents.
- Dark gray shading shows the most recent nourishment of the reach or the 2023 nourishment extents.
- R-42 and R-43 added to the project area as part of a 2017 permit modification.
- Beach widths shown in red are based on the March 2023 emergency berm pre-construction survey due to availability of post-construction survey information.

Table 7b: Volume Change R-42 to R-57 (Clam Pass to Doctors Pass)

DEP Reference Monument Range			Effective Distance (FT)	As-Built Volume (CY)						Volume Change (CY)			
				2005 to 2006	2010 to 2012	2013	2014 to 2016	2019	2023	2005 to 11/2022	2006 to 11/2022	3/2020 to 11/2022	1/2022 to 11/2022
				Clam Pass									
R-42	to	R-43	1,039		* 55,400			20,000	2,500	17,100	24,210	9,680	3,070
R-43	to	R-44	997			1,210			(2022)	26,030	26,110	13,010	2,710
R-44	to	R-45	1,048			9,710				23,280	24,030	2,690	1,580
R-45	to	R-46	1,107	8,480	7,800	10,180	20,430	68,000		20,380	25,380	2,460	3,840
R-46	to	R-47	974	10,040	(2011)	11,290			15,000	19,830	21,390	10,190	5,000
R-47	to	R-48	933	9,190		1,240	1,630			24,540	20,180	10,490	4,570
R-48	to	R-49	1,067	11,600						27,430	22,280	10,010	7,940
R-49	to	T-50	1,086	11,610						32,160	22,920	6,820	5,450
T-50	to	R-51	1,330	26,750		8,510				43,600	16,490	-330	40
R-51	to	R-52	886	23,960		4,790	9,760	44,000	30,900	22,420	1,340	-3,790	390
R-52	to	R-53	1,048	24,720		12,520				22,960	5,540	-1,550	4,130
R-53	to	T-54	1,071	13,410		6,590				23,280	13,750	2,220	3,150
T-54	to	U-55	1,047	1,990		50				22,830	19,090	-2,930	-1,710
U-55	to	R-56	924	No Fill Placement (2005-Present)						19,590	22,030	-9,270	-2,280
R-56	to	T-57	768							17,380	15,070	-4,480	3,980
Total Volume Change (CY)				Doctors Pass									
South of Clam Pass Pass to R-43					* 77,900					17,100	24,210	9,680	3,070
North Park Shore Beach R-43 to R-48				27,710	174,200					114,060	117,090	38,840	17,700
Park Shore Beach R-48 to R-55				114,040	117,120					194,680	101,410	10,450	19,390
North of Doctors Pass U-55 to T-57				0	No Fill Placement (2005-2022)					36,970	37,100	-13,750	1,700
Monitoring Area R-42 to T-57				141,750	369,220					362,810	279,810	45,220	41,860

- Light gray shading indicates permitted fill extents.
- Dark gray shading shows the most recent nourishment of the reach or the 2023 nourishment extents.
- R-42 and R-43 added to the project area as part of a 2017 permit modification.
- *20,600 cy, 2007; 9,600 cy, 2013; 14,300 cy 2016; 2,400 cy, 2017; 8,500 cy from R-42 to R-43.5. The 14,300 cubic yards placed from R-42 to R-43 was part of the 2016 Clam Pass project and not part of the 2016 truck haul project as-built volume.
- Volumetric change quantities are not representative of design quantities for future beach renourishment projects rather an indication of erosion (negative value) or accretion (positive value) in the monitoring area.

Table 7c: Upland Volume Change R-42 to R-57 (Clam Pass to Doctors Pass)

DEP Reference Monument Range			Upland Volume Change (CY)				
			2005 to 5/2023	2006 to 5/2023	3/2020 to 5/2023	1/2022 to 5/2023	1/2022 11/2022
			Clam Pass				
R-42	to	R-43	No Data (5/2023)				-5,510
R-43	to	R-44	No Data (5/2023)				-3,940
R-44	to	R-45	3,860	4,350	7,110	-1,340	-4,390
R-45	to	R-46	7,540	6,740	15,030	-240	-3,550
R-46	to	R-47	7,320	4,990	15,750	2,230	-2,710
R-47	to	R-48	7,690	5,070	15,680	1,530	-2,460
R-48	to	R-49	8,230	5,340	16,700	1,930	-810
R-49	to	T-50	9,570	4,350	18,370	610	-3,400
T-50	to	R-51	13,700	160	20,520	-1,690	-7,200
R-51	to	R-52	7,960	-3,000	10,320	-2,200	-3,330
R-52	to	R-53	7,770	-3,170	11,250	-2,400	-2,880
R-53	to	T-54	8,700	1,010	14,800	-1,580	-4,180
T-54	to	U-55	10,450	7,770	18,200	-1,670	-5,140
U-55	to	R-56	11,390	11,470	18,450	-440	-3,400
R-56	to	T-57	10,400	8,820	15,960	-110	-2,060
Total Volume Change (CY)			Doctors Pass				
South of Clam Pass Pass to R-43			No Data (5/2023)				**-5,510**
North Park Shore Beach R-43 to R-48			26,410	21,150	53,570	**2,180**	-17,050
Park Shore Beach R-48 to R-55			66,380	12,460	110,160	**-7,000**	-26,940
North of Doctors Pass U-55 to T-57			21,790	20,290	34,410	**-550**	**-5,460**
Monitoring Area R-42 to T-57			114,580	53,900	198,140	-5,370	-54,960

- Light gray shading indicates permitted fill extents.
- Dark gray shading shows the most recent nourishment of the reach or the 2023 nourishment extents.
- R-42 and R-43 added to the project area as part of a 2017 permit modification.

Table 7d. Advance Nourishment Remaining R-42 through R-54 (Clam Pass and Park Shore)

Monument	Beach Width				Advance Nourishment Remaining				Eroded into Design Template
	2006 (Feet)	2019 (Feet)	1/2022 (Feet)	5/2023 (Feet)	2006 (Feet)	2019 (Feet)	1/2022 (Feet)	5/2023 (Feet)	
R-42	96	111	101	89	11	26	16	4	-
R-43	52	107	106	68	-33	22	21	0	Yes
R-44	84	93	85	80	-1	8	0	0	Yes
R-45	66	144	103	88	-19	59	18	3	-
R-46	84	106	89	86	-1	21	4	1	-
R-47	115	110	116	124	30	25	31	39	-
R-48	99	104	98	109	14	19	13	24	-
R-49	96	95	98	112	11	10	13	27	-
T-50	117	129	113	126	32	44	28	41	-
R-51	127	106	103	88	42	21	18	3	-
R-52	126	99	93	69	41	14	8	0	Yes
R-53	113	128	95	87	28	43	10	2	-
T-54	125	117	118	112	40	32	33	27	-
U-55	77	0	126	129	-8	-85	41	44	-
R-56	91	0	134	141	6	-85	49	56	-
T-57	122	0	111	151	37	-85	26	66	-
Average S. of Clam Pass Beach R-42 to R-43:					-11	24	18	**2**	
Average Park Shore Beach R-44 to R-48:					5	26	13	**13**	
Average Park Shore Beach R-49 to T-54:					32	27	18	**17**	
Average Park Shore Beach R-55 to T-57:					12	-85	39	55	

- Light gray shading indicates permitted fill extents.
- Dark gray shading shows the most recent nourishment of the reach or the 2023 nourishment extents.

Naples Beaches

Portions of Collier County *Naples Beaches* bounded on the north by Doctors Pass (located between R-57 and R-58A) and to the south by DEP reference monument R-84 located approximately one mile north of Gordon Pass (located between R-89 and R-90) were renourished as part of the Collier Beach project with sand in 2013, 2014, 2020, 2021 and 2023 as shown in **Figure 3c**. Nourishment history for the monitoring area from 2005 to the present is shown in **Table 2b**; recently the following projects were conducted within the reach:

- Doctors Pass was dredged in October 2013, and approximately 44,000 cubic yards of sand were placed on the beach from the jetty south to R-58.

- The existing jetty and groin south of the pass were rehabilitated along with the construction of a breakwater and detached groin between the two existing structures as part of the Doctors Pass Erosion Control Structures Project (DEP Permit 0338231-001) completed in July 2018. The final annual monitoring report will be submitted later this year and will address this segment of the Collier Beach Project in more detail.

- Doctors Pass was dredged in August/September 2018, and sand was placed in the nearshore immediately south of the pass to R-58.5 (north disposal), and near Lowdermilk Park from R-60 to R-61.8 (south disposal). Volume change calculations based on the pre and post-construction surveys indicate an approximate 5,800 and 25,000 cubic yard gain in the two disposal areas, north and south respectively[12].

[12] Doctors Pass Maintenance Dredging 2018 Post-Construction Monitoring Summary, H&M Engineers, December 2018.

- The reach from the jetty south of Doctors Pass south to R-60 was nourished with approximately 37,500 cubic yards (37,440) of truck hauled sand in late 2020.

- The reach from T-62 south to R-74 was nourished with over 57,000 cubic yards of truck hauled sand (57,330) in late 2021.

- In March/April 2022 Doctors Pass was dredged and approximately 12,500 cubic yards (12,540) sand was placed on the beach from R-60 to R-62 in the vicinity of Lowdermilk Park located near R-61.

- In March/April 2022 approximately 12,500 cubic yards (12,540) of sand was dredged from Doctors Pass and placed on the beach south of the inlet between monument R-60 and R-62.

- An emergency berm was constructed in April to May 2023 placing approximately 73,200 cubic yards (11,400+61,800) of sand from Doctors Pass south to R-79. The continuation of the berm construction from R-80 south to R-89 is anticipated to commence later this year.

Table 8a shows the beach width from the *Baseline* at each monument for the 2005 pre-construction, 2006 post-construction, December 2014 post-construction (R-75 to R-84 only), January 2022 monitoring survey and most recent surveys conducted in November 2022 and May 2023; and the corresponding average beach widths for the three different reaches denoted as Naples Beach R-58A to R-60, Naples Beach R-60 to R-79 and North of Gordon Pass R-79 to R-84. **Table 8b** shows the volume change from the pre to post-construction surveys for the 2006 nourishment project as well as the volume change along the entire profile from the *Baseline* to the DOC. **Table 8c** shows the upland volume change or the volume change above the MHWL, while **Table 8d** shows the advance nourishment remaining for the monuments located within the 2006 project continuous fill template.

Naples Beach represented by monuments R-58A south to R-79 is broken into two areas: The beach immediately south of Doctors Pass, influenced by the effects of the jettied inlet from monument R-58A to R-60, and the beach beyond the immediate inlet impacts from monument R-61 south to R-79. The segment form R-58A to R-60 was one of the highest eroding areas within the Collier Beach Project requiring frequent fill placement. Erosion control structures were constructed immediately south of Doctors Pass in 2018 prior to maintenance dredging later in the year.

The reach immediately south of the inlet, **Naples Beach (north)**, is represented by four beach profiles: R-58A south to R-60, all have beach widths above the *Design Standard* of 100 feet. The average width of the reach is 122 feet, an average loss of 5 feet (-5) from January 2022. Considering the changes along the entire profile, from the *Baseline* to the DOC, the volumetric change since January 2022 shows a gain of almost 12,500 cubic yards (12,490) due to the effects of Hurricane Ian, while the volumetric change above the MHWL from January 2022 to May 2023 shows a loss of almost 5,400 cubic yards (-5,397) after the construction of the emergency berm. There has been no erosion into the design template. This segment of beach was nourished with over 221,000 cubic yards (61,200+160,050) of sand from 2005 to 2023, retaining 87,000 cubic yards (87,080), or approximately 39%. This includes approximately 50,000 cubic yards of sand placed on the beach and nearshore between 2013 and 2018 as part of the maintenance dredging of Doctors Pass.

The beach profiles in the reach from R-61 south to R-79, **Naples Beach (south)**, have beach widths larger than the *Design Standard* for Naples Beach of 100 feet with the exception of monument R-63 at 96 feet (96) and monument R-79 located at the southernmost terminus of the project taper having a width of 89 feet (89). The reach shows an average width of 133 feet, and an average shoreline loss of 7 feet (-7) since the January 2022 survey. Considering the changes along the entire profile,

from the *Baseline* to the DOC, the volumetric gain in the most recent monitoring period was over 14,500 cubic yards (14,560) due to changes along the nearshore bar, noted on the beach profiles provided in **Appendix D-2.** In spite of the construction of the emergency berm project, the volumetric change above the MHWL shows a loss of over 48,600 cubic yards (-48,640) from January 2022 to May 2023 due to the effects of Hurricane Ian. Considering the storm losses and newly constructed berm, the reach has an average advance nourishment remaining of 35 feet. Naples Beach from R-60 south to R-79 has a net gain over 105,000 cubic yards (105,130) of sand since the 2006 project was completed while retaining over 369,000 cubic yards (369,130) of the over 623,000 cubic yards (286,220 + 336,960) placed on the beach or in the nearshore since 2005 or approximately 59%.

The beach North of Gordon Pass is partially represented by monuments R-80 south to R-84 located outside of the project area. Beach widths vary from 49 feet at R-83 to 74 feet at R-81 with an average width of 59 feet, over 40 feet lower than the *Design Standard* to the north. In spite of gaining almost 30,000 cubic yards (29,800) from the entire profile from the baseline to DOC the upland losses totaled almost 14,000 cubic yards (-13,909) due to the effects of Hurricane Ian. This reach, as well as the reach to the south from R-85 to R-89, is scheduled to be nourished upland of MHW later this year as part of the 2023 emergency berm project.

Table 8a. Shoreline Change R-58A through R-84 (Naples Beaches)

DEP Mon.	Design Standard (Ft)	Beach Width from Baseline (Ft)						Shoreline Change (Ft)				
		11/2005	6/2006	12/2014	1/2022	11/2022	5/2023	2005 to 5/2023	2006 to 5/2023	2014 to 5/2023	1/2022 to 5/2023	11/2022 to 5/2023
R-58A	100	12	78	-	178	182	177					
R-58	100	70	134	-	90	94	100	30	-34	-	10	6
R-59	100	70	146	-	124	117	104	34	-42	-	-20	-13
R-60	100	65	108	-	115	114	108	43	0	-	-7	-6
R-61	100	83	129	-	153	156	145	62	16	-	-8	-11
T-62	100	57	122	-	125	108	105	48	-17	-	-20	-3
R-63	100	87	120	-	124	105	**96**	9	-24	-	-28	-9
R-64	100	102	119	-	121	118	115	13	-4	-	-6	-3
T-65	100	106	136	-	124	128	116	10	-20	-	-8	-12
R-66	100	112	148	-	149	143	141	29	-7	-	-8	-2
R-67	100	154	184	-	187	187	179	25	-5	-	-8	-8
R-68	100	144	145	-	161	166	155	11	10	-	-6	-11
T-69	100	107	140	-	134	138	118	11	-22	-	-16	-20
R-70	100	68	167	-	123	118	120	52	-47	-	-3	2
R-71	100	62	178	-	147	133	139	77	-39	-	-8	6
R-72	100	73	196	-	167	156	163	90	-33	-	-4	7
R-73	100	82	129	-	157	155	164	82	35	-	7	9
R-74	100	67	157	-	182	183	174	107	17	-	-8	-9
R-75	100	84	135	100	140	118	125	41	-10	25	-15	7
R-76	100	60	137	116	132	110	115	55	-22	-1	-17	5
R-77	100	78	137	120	123	127	132	54	-5	12	9	5
R-78	100	86	124	97	110	105	130	44	6	33	20	25
R-79	100	80	80	97	88	67	**89**	9	9	-8	1	22
R-80	-	86	100	107	87	60	57	-29	-43	-50	-30	-3
R-81	-	92	98	111	100	82	**74**	-18	-24	-37	-26	-8
R-82	-	63	57	87	75	60	62	-1	5	-25	-13	2
R-83	-	41	43	45	67	55	**49**	8	6	4	-18	-6
R-84	-	23	34	49	55	47	52	29	18	3	-3	5
Reach		**Average Beach Width (Ft)**						**Average Shoreline Change (Ft)**				
Naples Beach R-58A to R-60		55	117	-	127	127	**122**	35	-25	-	**-6**	-4
Naples Beach R-61 to R-79		89	141	106	139	133	**133**	44	-9	12	**-7**	0
N. of Gordon Pass R-80 to R-84		61	66	80	77	61	**59**	-2	-8	-21	-18	-2
Monitoring Area R-58A to R-84		79	124	93	126	119	118	34	-10	-4	-9	-1

Shaded portion of chart represents 2005/2006 project area; darker shading represents the 2023 project area.

Table 8b. Volumetric Change R-58A through R-84 (Naples Beaches)

DEP Reference Monument			Effective Distance (Ft)	As-Built Volume (CY) 2005 to 2006	2010 to 2012	2013	2014 to 2016	2018-21	2023	Volume Change (CY) 2005 to 11/2022	2006 to 11/2022	12/2014 to 11/2022	1/2022 to 11/2022
Pass	to	R-58A	473	21,740	25,400	6,480	**5,800** (2018)	**37,440** (2018)	**11,400**	31,240	31,100	-	3,980
R-58A	to	R-58	540			6,540				20,280	15,880	-	4,870
R-58	to	R-59	985	22,220	**44,000**	10,380				15,730	-3,310	-	3,810
R-59	to	R-60	1,085	17,240	58A-R60)	3,920	8,690			19,830	2,570	-	-170
R-60	to	R-61	1,077	8,360	* 86,100		**25,000** (2018)		**12,540** (2022) R60-62	30,650	12,480	-	2,630
R-61	to	T-62	1,020	7,040	12,000	4,080				31,680	5,130	-	-2,370
T-62	to	R-63	1,008	18,620		11,860	20,330			19,170	-3,590	-	-5,930
R-63	to	R-64	926	18,920		9,410				15,890	4,140	-	-1,930
R-64	to	T-65	782	8,690		60				13,210	6,720	-	1,140
T-65	to	R-66	825	10,420						19,610	6,950	-	-460
R-66	to	R-67	800	12,850						22,120	5,750	-	-5,090
R-67	to	R-68	809	8,880				**57,330** (2021)		19,550	8,900	-	-660
R-68	to	T-69	811	9,550			4,540		**61,800**	11,630	3,590	-	5,290
T-69	to	R-70	798	16,950		2,630				1,850	-9,590	-	2,420
R-70	to	R-71	802	32,220		6,350				10,720	-7,500	-	-2,140
R-71	to	R-72	803	33,310		3,930				26,640	1,230	-	-3,790
R-72	to	R-73	811	22,800		210	8,710			27,880	9,350	-	-950
R-73	to	R-74	815	14,980						34,460	19,160	-	5,320
R-74	to	R-75	789	13,120						19,650	10,540	6,710	3,980
R-75	to	R-76	800	15,110						7,260	-1,110	20	660
R-76	to	R-77	798	18,150			10,080			20,940	5,770	2,780	-820
R-77	to	R-78	765	12,200						19,500	11,740	8,310	2,770
R-78	to	R-79	1,105	4,050						16,720	15,470	14,580	14,490
R-79	to	R-80	1,150	No Fill Placement (2005-Present)						-4,470	-3,620	-2,510	11,240
R-80	to	R-81	1,077							-5,770	-11,570	-2,460	2,670
R-81	to	R-82	874							9,150	4,210	9,290	2,660
R-82	to	R-83	1,047							16,830	16,040	13,900	7,800
R-83	to	R-84	960							18,990	18,950	10,710	5,430
Total Volume Change (CY)				South End of Monitoring Area									
Naples Beach Pass to R-60				**61,200**	**160,050**					**87,080**	46,240	-	**12,490**
Naples Beach R-60 to R-79				**286,220**	**336,960**					**369,130**	**105,130**	32,400	**14,560**
North of Gordon Pass R-79 to R-84				0	No Fill Placement (2005-Present)					34,730	24,010	28,930	**29,800**
Monitoring Area Pass to R-84				347,420	497,010					490,940	175,380	61,330	56,850

- Shaded portion of chart represents 2005/2006 project area; darker shading represents the 2023 project area.
- The 44,000 cubic yards (R58A-R60) project date was October 2013.
- *Doctors Pass dredge volume placed in the nearshore from R-60 to R-62: 53,600 in 2006 and 32,500 in 2009.
- Volumetric change quantities are not representative of design quantities for future beach renourishment projects rather an indication of erosion (negative value) or accretion (positive value) in the monitoring area.

Table 8c. Upland Volumetric Change R-58A through R-84 (Naples Beaches)

DEP Reference Monument			Upland Volume Change (CY)				
			2005 to 5/2023	2006 to 5/2023	1/2014 to 5/2023	1/2022 to 5/2023	1/2022 11/2022
			Doctors Pass				
Pass	to	R-58A	11,102	7,210	-	634	4,054
R-58A	to	R-58	8,602	3,339	-	305	568
R-58	to	R-59	9,568	-1,943	-	-1,812	-7,818
R-59	to	R-60	11,170	1,401	-	-4,523	-9,279
R-60	to	R-61	13,444	7,480	-	-3,965	-7,104
R-61	to	T-62	13,152	6,777	-	-3,416	-7,347
T-62	to	R-63	6,786	132	-	-5,961	-8,192
R-63	to	R-64	4,756	-212	-	-4,201	-5,964
R-64	to	T-65	4,742	1,002	-	-1,405	-3,938
T-65	to	R-66	6,769	1,339	-	-1,567	-4,252
R-66	to	R-67	9,137	1,825	-	-2,981	-6,022
R-67	to	R-68	8,694	2,107	-	-3,301	-6,133
R-68	to	T-69	6,166	545	-	-2,587	-4,865
T-69	to	R-70	5,602	-2,265	-	-2,264	-5,801
R-70	to	R-71	9,137	-1,954	-	-1,054	-7,160
R-71	to	R-72	12,136	33	-	-1,514	-7,126
R-72	to	R-73	13,046	4,045	-	-1,551	-5,978
R-73	to	R-74	13,478	5,363	-	-2,097	-4,611
R-74	to	R-75	10,469	1,330	3,872	-2,211	-4,032
R-75	to	R-76	8,070	-1,237	1,526	-1,347	-4,999
R-76	to	R-77	7,753	-1,470	-294	-3,456	-7,183
R-77	to	R-78	5,775	-634	2,739	-2,630	-6,202
R-78	to	R-79	4,498	682	3,283	-1,134	-5,679
R-79	to	R-80	-2,314	-3,735	-6,574	-4,617	-5,813
R-80	to	R-81	-4,578	-6,203	-5,838	-5,736	-4,859
R-81	to	R-82	-916	-1,449	-2,514	-2,471	-2,088
R-82	to	R-83	1,168	843	-2,669	-898	-210
R-83	to	R-84	1,927	1,164	-642	-187	339
Total Volume Change (CY)			South End of Monitoring Area				
Naples Beach Doctors Pass to R-60			40,442	10,007	-	**-5,397**	-12,474
Naples Beach R-60 to R-79			163,611	24,889	11,125	**-48,640**	-112,590
North of Gordon Pass R-79 to R-84			-4,714	-9,381	-18,238	**-13,909**	-12,631
Monitoring Area Pass to R-84			199,338	25,515	-7,113	-67,946	-137,695

Shaded portion of chart represents 2005/2006 project area; darker shading represents the 2023 project area.

Table 8d. Advance Nourishment Remaining R-58A through R-79 (Naples Beach)

Monument	Beach Width				Advance Nourishment Remaining				Eroded into Design Template
	2006 (Feet)	2014 (Feet)	1/2022 (Feet)	5/2023 (Feet)	2006 (Feet)	2014 (Feet)	1/2022 (Feet)	5/2023 (Feet)	
R-58A	78	-	178	177	0	-	78	77	-
R-58	134	-	90	100	34	-	0	0	-
R-59	146	-	124	104	46	-	24	4	-
R-60	108	-	115	108	8	-	15	8	-
R-61	129	-	153	145	29	-	53	45	-
T-62	122	-	125	105	22	-	25	5	-
R-63	120	-	124	96	20	-	24	0	Yes
R-64	119	-	121	115	19	-	21	15	-
T-65	136	-	124	116	36	-	24	16	-
R-66	148	-	149	141	48	-	49	41	-
R-67	184	-	187	179	84	-	87	79	-
R-68	145	-	161	155	45	-	61	55	-
T-69	140	-	134	118	40	-	34	18	-
R-70	167	-	123	120	67	-	23	20	-
R-71	178	-	147	139	78	-	47	39	-
R-72	196	-	167	163	96	-	67	63	-
R-73	129	-	157	164	29	-	57	64	-
R-74	157	-	182	174	57	-	82	74	-
R-75	135	100	140	125	35	0	40	25	-
R-76	137	116	132	115	37	16	32	15	-
R-77	137	120	123	132	37	20	23	32	-
R-78	124	97	110	130	24	-3	10	30	-
R-79	80	97	88	89	-20	-3	-12	Taper	Taper
Average Naples Beach (North) R-58A to R-60:					22	-	29	**22**	
Average Naples Beach R-61 to R-79:					41	6	39	**35**	

"Taper" indicates a monument located with the fill template taper to the existing beach. Gray shading shows the most recent nourishment of the reach or the 2023 project extents.

VII. SUMMARY

The emergency berm placement in 2023, post Hurricane Ian, placed sand with a berm crest elevation of +6 feet NAVD. In many cases the berm merged well with the eroded profile and dune. In some cases there was a gap in the restored profile based on conditions upland of the fill template. Most of the sand was placed along the active part of the profile subject to overwash from high frequency storms and fronts.

A minimum beach width standard established in 2003 was applied to design the 2006 project. This standard distance represented the minimum total beach design width at each reference monument, and was measured from a fixed *Baseline* set at the seawall, edge of vegetation, building line or an equivalent feature representing the landward limit of sandy beach in 2003. The distance varied throughout the project from 85 feet at Park Shore and Clam Pass Beach to 100 feet at Vanderbilt, Pelican Bay, and Naples Beaches. **Figures 5a through 5c** plot the beach width at each reference monument for the five segments of the project area (Vanderbilt, Pelican Bay, Clam Pass Park, Park Shore, and Naples) with the corresponding *Design Standard* beach width. The graph also shows the project area, associated average beach width, and highlights the portions of the beach below the *Design Standard* during the May 2023 post-construction survey in a darker shade of gray.

In addition to **Figures 5a through 5c**, **Appendix F** provides an accounting of beach width by DEP monuments relative to the *Design Standard* on an annual basis. The relative width over time provides an illustration of the trend in beach width over time. These trends are also considered when evaluating areas for recommended nourishment.

Figures 5a through 5c also show, as a black dashed line, the average beach width within each segment of the project area for comparison to the *Design Standard*. It is important to consider this localized variability in erosional areas in planning beach management strategies because localized erosional areas may simply be temporary features tending to migrate along the coast as sand waves (or sand-deficit waves), and the performance of the beach fill should not be expected to be uniform throughout the project area from one survey to the next. Additionally, erosion may appear concerning following weather events and should be monitored to evaluate recovery or determine if there is a sand deficit. Erosional areas persisting for long periods of time or covering a majority of the project area, may become problematic and should be investigated to determine the cause and addressed accordingly.

Nourished in 2021 and 2023, all the monuments in **Vanderbilt Beach** have widths above the *Design Standard* with the exception of R-27, as well as the northern monuments within **Pelican Bay Beach** as shown in **Figure 5a**. The reach from R-36 to R-37 should benefit from the north to south net sediment transport as the fill placed from R-33 to R-36 equilibrates.

The **dynamic reach located on either side of Clam Pass**, from monuments R-38 south to R-43, have widths varying from 68 to 108 feet (Tables 6a,7a). The beach south of the inlet was nourished in late 2019, and both sides of the inlet were regraded in 2020. In March/April 2022 the pass was dredged and sand was placed to the north and south of the inlet. This portion of the beach adjacent to Clam Pass will be monitored and addressed along with the management of the inlet.

Figure 5a. Shoreline Analysis R-17 to R-41

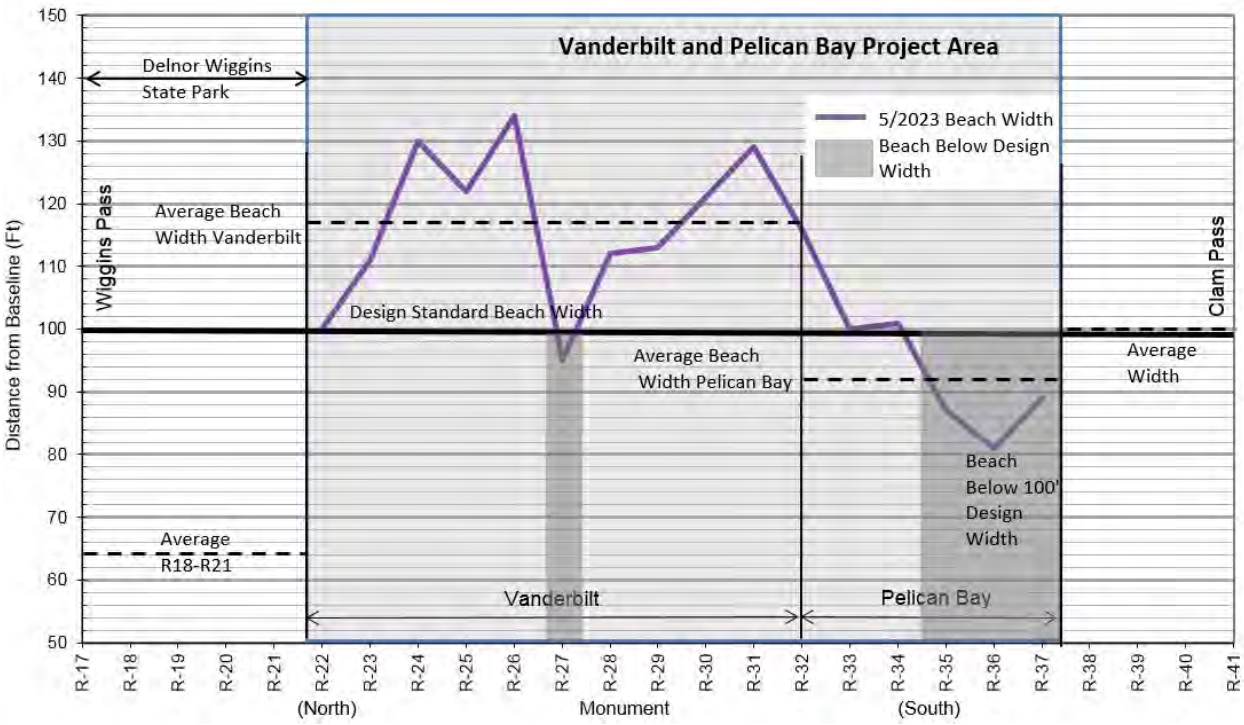
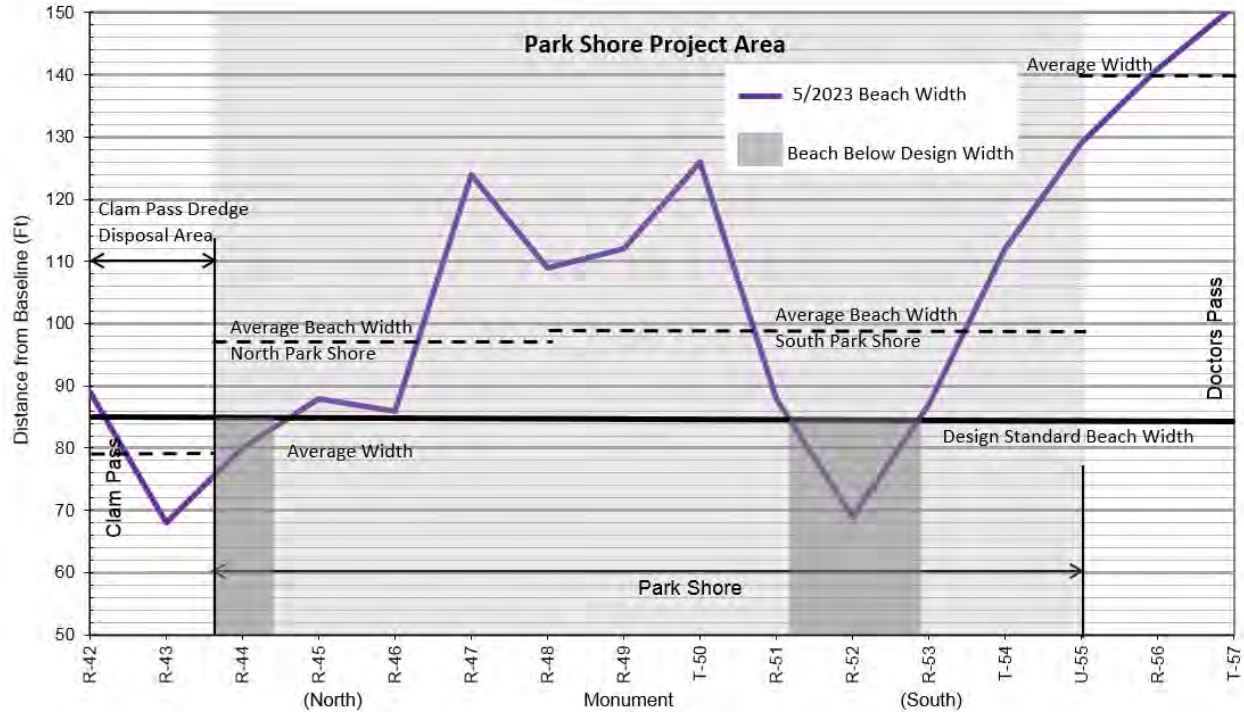


Figure 5b. Shoreline Analysis R-42 to R-57

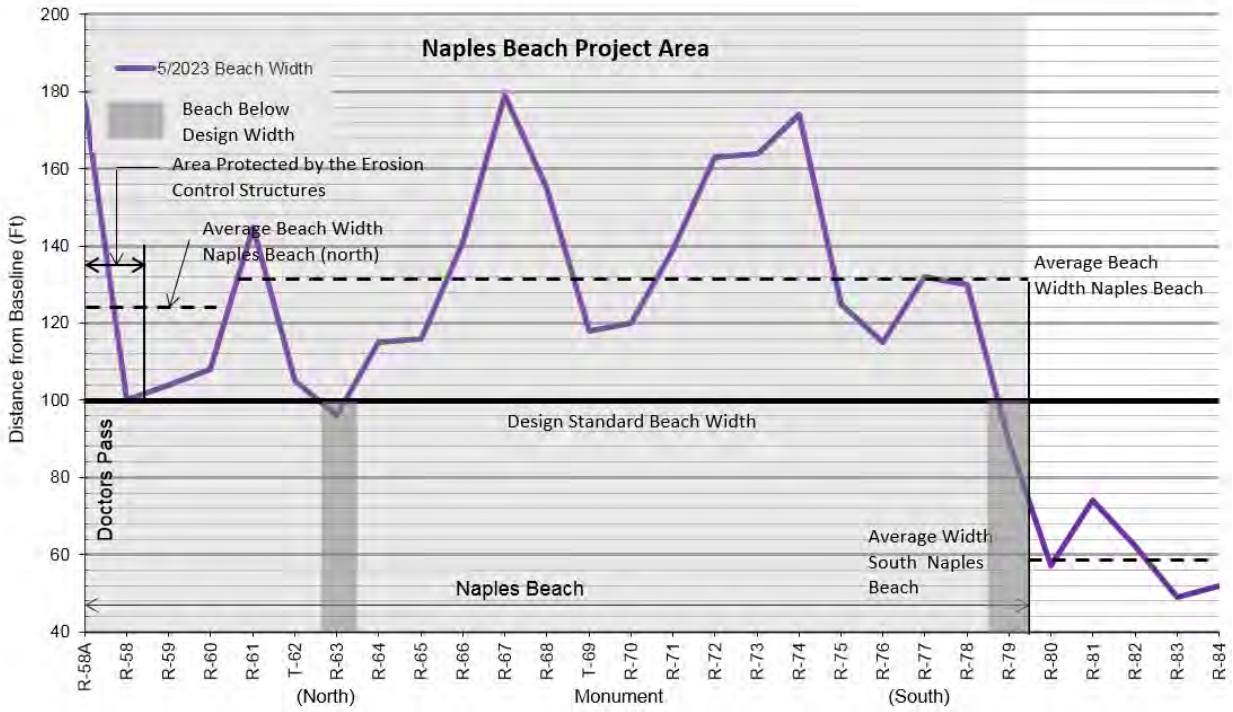


Park Shore Beach, shown in **Figure 5b**, was nourished in late 2019, and as part of the emergency berm project in 2023, has an average width of approximately 14 feet above the *Design Standard* width of 85 feet with two monuments below the *Design Standard*. Although the reach lost upland volume due to Hurricane Ian, there was volumetric gain in the nearshore. The reach adjacent to Doctors Pass, south of Park Shore, has an average width of almost 55 feet above the *Design Standard* for Park Shore Beach.

Shoreline analysis for **Naples Beach** is shown in **Figure 5c**. The north end of Naples Beach was nourished in late 2020 and as part of the 2023 emergency berm project. The reach has an average width approximately 22 feet (122;Table 8a) above the *Design Standard;* retaining on average 75% (22 vs. 29;Table 8d) of the advance fill. This area includes erosion control structures designed to gradually release sand to the south, and will be reviewed under a separate, more detailed monitoring survey to be collected in October 2023. Naples Beach from R-61 south to R-79, partially nourished in 2021 and again in 2023, has an average width 33 feet (133:Table 8a) above the *Design Standard* with two monuments (R-63 and R-79) below the *Design Standard*. In March/April, the reach from R-60 to R-62 was nourished with sand dredged from Doctors Pass.

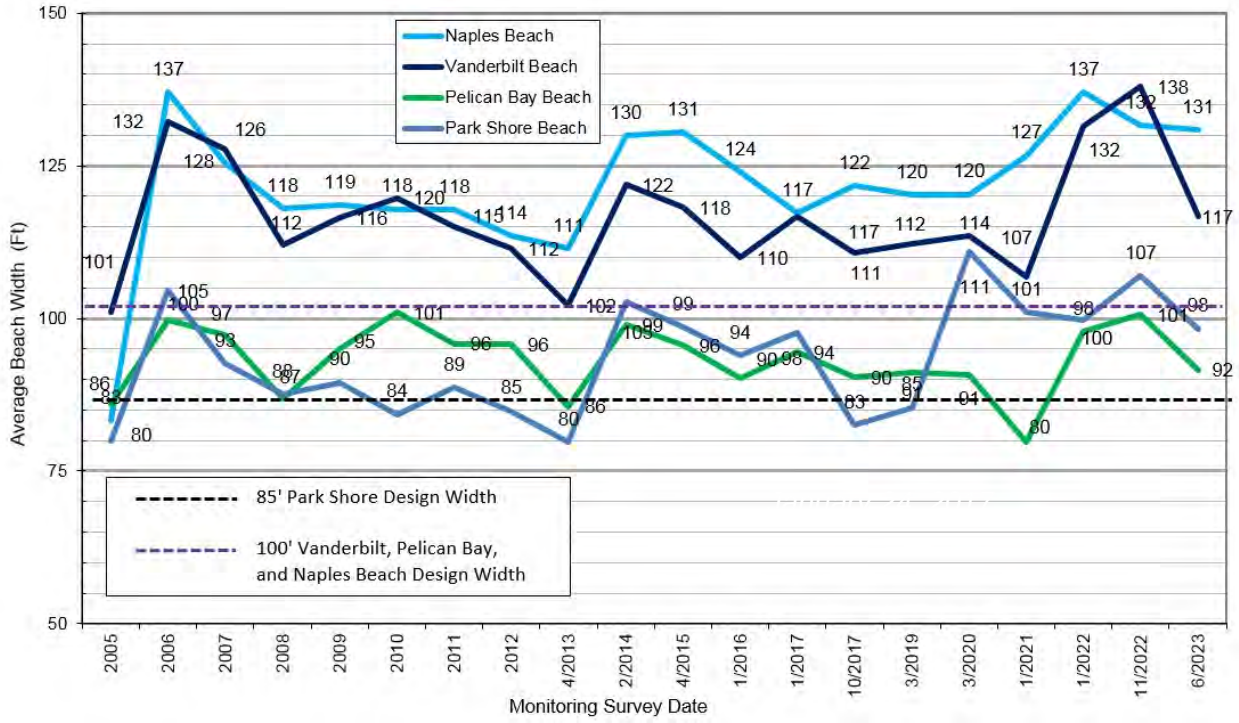
Although the **reach south of the Naples Beach project area**, from R-80 to R-84 shows a negligible change in beach width in the most recent monitoring period, the average width is 40 feet below (59;Table 8a) the 100-foot *Design Standard* to the north. Although the reach gained volume over the entire profile in 2022, due to changes in the nearshore bar, upland losses totaled almost 14,000 cubic yards (-13,909;Table 8c).

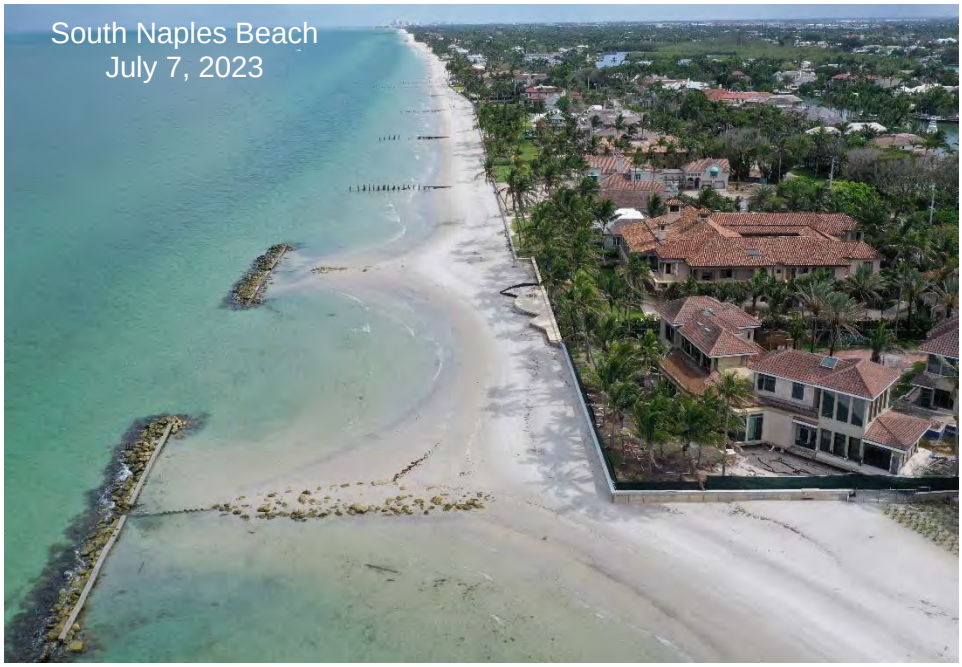
Figure 5c. Shoreline Analysis R-58A to R-84



The average beach width for each project area was plotted vs. time in **Figure 6**. The rise and subsequent fall in beach width during the post-construction period is evident over the 18 years from 2005 to 2023. Generally both Naples and Vanderbilt Beaches have average widths well above the 100-foot *Design Standard* while Pelican Bay Beach has average widths hovering closer to Park Shore with a *Design Standard* of 85 feet, 15 feet lower than Pelican Bay. The average width for Pelican Bay is currently 98 feet, 2 feet below the 100-foot standard, while Park Shore has an average width of 92 feet, or 7 feet above the 85 foot standard.

Figure 6. Average Beach Width & *Design Standard* vs. Time





Volume change and volumetric as-built information are summarized in **Table 9.** Column C4, *Total Volume Added*, is the addition of Columns C2 and C3 showing the as-built volume for projects constructed from 2005 to 2023. Column C5 shows the volume change from pre-construction in 2005 to November 2022[13] based on the monitoring surveys. (Important: the November 2022 survey does not include the fill placed in 2023; percentages should be considered an indication of current volumetric changes in the project area.) Column C6 shows Column C5 vs. Column C4 to show the percent of volume remaining over the entire beach profile from the *Baseline* to DOC. Approximately 60% (63%) of the fill placed since 2005 remains in the active beach profile. In areas such as Park Shore much of the volume change is due to the shifting of the nearshore bar and seasonal changes as evidenced on the beach profiles shown in **Appendix D**. These quantities do not include many of the individual parcels placing sand under emergency post-Ian permits in accordance with the State issued Emergency Final Order.

Table 9. Volume Change Summary 2005-2023

C1	C2	C3	C4	C5	C6
Project Area	**Volume (CY)**				**Total Volume Remianing from All Nourishment Projects 2005-2023 (%)**
	Volume As-Built 2005 to 2006	**Volume As-Built 2006 to 11/2022**	**Tot. Vol. Added 2005 to 11/2022**	**Tot. Vol. Change 2005 to 11/2022**	
Vanderbilt	130,460	234,280	364,740	248,250	**68%**
Pelican Bay	47,990	80,760	128,750	97,230	**76%**
North Park Shore	27,710	174,200	201,910	114,060	**56%**
Park Shore	114,040	117,120	231,160	194,680	**84%**
Naples (R58A-R60)	61,200	160,050	221,250	87,080	**39%**
Naples (R60-R79)	286,220	336,960	623,180	369,130	**59%**
Totals:	667,620	1,103,370	1,770,990	1,110,430	**63%**

- Volumetric change quantities are not representative of design quantities for future beach renourishment projects rather an indication of erosion (negative value) or accretion (positive value) in the monitoring area.
- As-Built Volume for the 2006 project based on Tables by CPE shown in **Appendix E** and **Tables 6b, 7b, and 8b**.
- The highly dynamic Clam Pass Park beaches, added to the project in 2017, are not considered in this Table.

It should be noted North Naples Beach is located immediately south of the Doctors Pass and sand bypasses this area and attaches to the shoreline further south. The erosion control structures placed in 2018 south of Doctors Pass helps to manage release of sand from this area to the south. This is worth considering in management strategy because sand placed in the northernmost reach will tend to feed the beaches in the more southern project reaches. This area should be considered for beach fill in future maintenance dredging of Doctors Pass. The north to south net sediment transport is evident in Vanderbilt Beach and Pelican Bay Beaches: 68% retained to the north in Vanderbilt while relatively more (76%) is retained to the south in Pelican Bay. The same trend is notable for North Park Shore (56%) to Park Shore (84%), and North Naples (39%) to Naples (59%).

VIII. AERIAL IMAGES

The 2023 rectified aerial image files required under the monitoring plan and provided by the Collier County Property Appraiser's Office, in Mr. Sid format referenced to the NAD83 datum in feet Florida East Zone, were submitted to the Department on March 31, 2023.

[13] The November 2022 survey was used because the May 2023 survey scope was limited to the upland.

IX. ENVIRONMENTAL

The permittee has reviewed the specific Reasonable and Prudent Measures (RPMs) and Terms and Conditions in the Revised Statewide Programmatic Biological Opinion (SPBO) dated 13 March 2015 and the Piping Plover Programmatic Biological Opinion (P3BO) dated 22 May 2013, and agreed to follow the measures included to minimize impacts to nesting sea turtles and the piping plover. Collier County (permittee) is currently conducting the sea turtle nesting monitoring program headed by Maura Kraus (MauraKraus@colliergov.net) and the shorebird monitoring program headed by Christopher D'Arco (ChristopherDarco@colliergov.net). The programs include the following:

- Sea turtle nesting monitoring is an ongoing program with the County including escarpment surveys.
- Shorebird monitoring will be conducted by the County including breeding and non-breeding birds, piping plovers and red knots. Annual shorebird data reports for the County are anticipated to be submitted by fall of 2021.
- Compaction testing and subsequent tilling is conducted by the County.
- Results of the surveys are submitted to the appropriate agencies.
- Educational material including signage, flyers, kiosks, etc. are continually reviewed and improved in part by County staff.
- Pre-construction meetings are held prior to the start of any project. Shorebird and sea turtle monitoring procedures during construction are discussed and implemented accordingly.
- In 2013 the County adopted and implemented a hardbottom biological monitoring plan (modified in 2018) including annual reporting and agency submittal.
- The County continues to make every effort to maintain compliance with the conditions of the SPBO and the P3BO, and the conditions of the associated Corps and DEP permits.

Sea turtle monitoring reports, lighting guidelines, and Fish and Wildlife Conservation Commission Codes and Technical Reports are posted on the County website:

http://www.colliergov.net/your-government/divisions-f-r/parks-and-recreation/sea-turtle-protection/publications-reports

The Collier County Coastal Zone Management provides information to the public on a wide variety of coastal programs and projects:

http://www.colliergov.net/your-government/divisions-a-e/coastal-zone-management

And information on protected species:

http://www.colliergov.net/your-government/divisions-a-e/environmental-services/protected-species

Although the protection measures for the eastern indigo snake will be incorporated into the project during the pre-construction phase, there is no vegetation removal or clearing involved in this beach nourishment project.

The 2023 Collier Beach Nourishment project was constructed from April to May 2023 from the upland, with truck hauled sand. There were no impacts to seagrass, hardbottom reef habitat, historical/archeological/cultural materials, shorebirds or manatees. All work during mid-April through May was conducted closely with Collier County sea turtle monitoring under the direction of Maura Kraus.

X. CONCLUSIONS

The following conclusions are presented for the Collier County beach segment from Wiggins Pass south to north of Gordon Pass.

The reach south of Wiggins Pass in Delnor-Wiggins State Park from monument R-17 to R-21 was nourished in 2022 with sand dredged from Wiggins Pass. Dynamic beach widths near the inlet are below the *Design Standard* and have lost volume in 2022. There were upland losses in the reach due to Hurricane Ian, while the majority of the volumetric gain within the reach was also due to the effect of Hurricane Ian, located in the offshore portion of the profile. Excluding the losses at R-17, the reach has an average beach width above the 100-foot *Design Standard* to the south.

Vanderbilt Beach represented by monuments R-22 south to R-32 was recently nourished upland of MHW with sand as part of the 2023 emergency berm project. Beach widths are generally greater than the *Design Standard* of 100 feet, while there are upland losses due to Hurricane Ian, there is volumetric gain in the nearshore portion of the beach profiles. Vanderbilt Beach retained over two-thirds of the sand placed since 2005, although some of the sand may be attributed to beach adjustment and spreading of sand from Delnor-Wiggins State Park. **Based on the November 2022 post-Ian, and May 2023 post emergency berm construction monitoring data (and associated nourishment), Vanderbilt Beach is not recommended for nourishment this year.**

Pelican Bay Beach represented by monuments R-33 south to R-37 was recently nourished with sand as part of the 2023 emergency berm project. The average beach width for the reach is below the *Design Standard* of 100 feet, and has eroded into the design template. There were upland volumetric losses due to Hurricane Ian, offset in part by the 2023 nourishment, while the nearshore portion of the reach shows volumetric gain. Pelican Bay Beach retained over three-quarters of the fill placed since 2005, although some of the sand may be attributed to beach adjustment and spreading of sand from Vanderbilt Beach. **Based on the November 2022 post-Ian and May 2023 post emergency berm construction monitoring data (and associated nourishment), Pelican Bay Beach is not recommended for nourishment this year.**

Clam Pass Beach represented by monuments R-38 south to R-43 was regraded on both the north and south side of the inlet, and more recently the pass was dredged with sand placed to the north and south in 2022. There was upland volumetric loss and nearshore volumetric gain due to the effects of Hurricane Ian while beach widths vary in this dynamic area. **Although nourishment is not recommended, the dynamic beaches north and south of Clam Pass are monitored as part of the Clam Pass maintenance dredging permit (0296087-001-JC) under the purview of the Pelican Bay Service Division of Collier County.**

Park Shore Beach from R-44 to T-54 was nourished as part of the 2023 emergency berm project. The majority of the monuments in the reach are above the *Design Standard* of 85 feet. Although there were upland volumetric losses due to Hurricane Ian, offset in part by the 2023 nourishment, there were corresponding gains in the nearshore. Park Shore Beach retained over two-thirds of the fill placed since 2005. **Based on the November 2022 post-Ian and May 2023 post emergency berm construction monitoring data (and associated nourishment), Park Shore Beach is not recommended for nourishment this year.**

Naples Beach represented by monuments R-58A south to R-79 was recently nourished with sand upland of MHW as part of the 2023 emergency berm project. Beach widths are generally greater than the *Design Standard* of 100 feet, while there are upland losses due to Hurricane Ian, there is volumetric gain in the nearshore portion of the beach profiles. Naples Beach retained over half of the sand placed since 2005. **Based on the November 2022 post-Ian and May 2023 post emergency berm construction monitoring data (and associated nourishment), Naples Beach is not recommended for nourishment this year.**

The reach south of the project within the monitoring area represented by **monuments R-80 south to R-84** is below the *100-foot Design Standard* at all five monuments, losing upland volume while gaining nearshore volume due to the effects of Hurricane Ian. **The 2023 emergency berm project is scheduled to continue after turtle nesting season later this year, placing sand from R-79 south to R-89 near Gordon Pass.**

Including the inlet dredging projects, almost 2.0 million cubic yards (1,982,220;Table 1) of sand were placed in the monitoring area since 2005 with over 1.8 million (1,851,540;Table 1) in the project area. In November 2022 approximately 1.3 million[14] cubic yards of sand remain in the monitoring area or approximately 66%.

[14] Volume Change 2005 to 11/2022: 1,309,440=455,690+362,810+490,940;Tables 6b,7b,8b

XI. REFERENCES

APTIM, Post-Ian Impact Survey, November 2022

APTIM, Post Emergency Berm Survey, May 2023

Atkins, 2005 to 2014 Historical Beach Analysis, July 2014

Atkins, Collier County Beach Renourishment Project 2010 Four Year Post Construction Monitoring Report, March 2011

Atkins, Collier County 2014 Truck Haul Renourishment QA.QC Report, February 2015

CB&I CP&E, Collier County, Florida 2013-2014 Hot spot & Tropical Storm Fay Beach Renourishment Project, May 2014

CP&E, Collier County Beach Nourishment Post-Construction Engineering Report, October 2006

CP&E, Collier County Beach Nourishment from an Upland Sand Source, and Doctors Pass North Jetty Rehabilitation 2011 Post construction Report, June 2011

Collier County Parks and Recreation Department, Collier County Sea Turtle Protection Plan Annual Report – 2014, February 2015

Collier County Property Appraiser's Office, December 2019 Rectified Aerial Images

Florida Department of Environmental Protection, JCP Collier County Beach Renourishment Project, Permit 0222355-001-JC, January 12, 2005

Humiston & Moore Engineers, Collier County Beach Nourishment Project 2015 Four Month Post Construction Monitoring Summary, June 2015

Humiston & Moore Engineers, Wiggins Pass Navigation Channel Expansion and Maintenance Dredging Project 2021 Post Construction Monitoring Summary, March 2021

Humiston & Moore Engineers, Doctors Pass Erosion Control Structures Project 2018 Post-Construction Monitoring Summary, December 2018

Humiston & Moore Engineers, Collier County Beach Nourishment Project 2022 Post Construction Monitoring Summary, April 2022

Appendix A

Monitoring Plan – August 2017

APPROVED
Physical Monitoring Plan
Permit#: 0331817-004-JM
Approved: August 25, 2017
Beaches Inlets and Ports Program

Attachment No. 37-1
Physical Monitoring Plan
August 2017

Physical monitoring of the Collier County Beach Renourishment Project requires the acquisition of project-specific data to include, at a minimum, topographic/bathymetric surveys of the beach, offshore, and borrow site areas. The monitoring data is necessary in order for both the project sponsor(s) and the Department to regularly observe and assess, with quantitative measurements, the performance of the project, any adverse effects which have occurred (e.g. to adjacent shorelines), and the need for any adjustments, modifications, or mitigative response to the project. The scientific monitoring process also provides the project sponsor(s) and the Department, information necessary to plan, design, and optimize subsequent follow-up projects; potentially reducing the need for and costs of unnecessary work, as well as potentially reducing any environmental impacts that may have occurred or be expected.

This plan is a detailed Monitoring Plan required by FDEP (Permit No. 0331817-004-JM). Dredging of Doctors Pass is anticipated to occur every 4 years. Specific requirements are as follows:

a. Pre-construction topographic and bathymetric profile surveys of the beach and offshore shall be conducted within 90 days prior to commencement of construction. Surveys conducted for purposes of construction bidding and contracting may be used to provide pre-construction conditions. When only a partial project is constructed, pre-construction surveys can be limited to the construction area plus 5,000 feet north and south or to the edge of the nearest inlet.

Post-construction topographic and bathymetric profile surveys of the beach and offshore shall be conducted within 60 days following completion of construction of the project. Surveys conducted for purposes of construction contracting and payment may be used to provide immediate post-construction conditions. When only a partial project is constructed, post-construction surveys can be limited to the construction area plus 5,000 feet north and south or to the edge of the nearest inlet.

Thereafter, topographic and bathymetric monitoring surveys shall be conducted biennially until the next beach nourishment event or the expiration of the project design life, whichever occurs first. The monitoring surveys shall be conducted during a winter or spring month and repeated as close as practicable during that same month of the year. If the time period between the immediate post-construction survey and the first annual monitoring survey is less than six months, then Collier County may request a postponement of the first monitoring survey until the following winter or spring. If the monitoring survey falls within 6 months of construction, it may substitute for the pre-construction survey. In the event that a post-storm survey of the project monitoring area is conducted, this post-storm survey may serve as a biennial monitoring survey.

The monitoring area shall include profile surveys at each of the Department of Environmental Protection's reference monuments within the bounds of the beach fill area

and along up to 5,000 feet on the adjacent shoreline on both sides of the beach fill area. For this project, this will include DEP reference monuments in Collier County from R-17 to R-84 inclusive. An intermediate profile is established south of Doctors Pass, and labeled R-58A.

FDEP profile lines R-58A, R-58, R-59, R-60, R-60+518, R-61, R-61+408, R-61+816, and R-62 shall be surveyed within 90 days prior to commencement of a Doctors Pass dredging operation and within 60 days following the completion of a dredging operation. Only the profiles associated with the disposal area used and one profile to the south needs to be surveyed. These profiles shall be integrated with annual monitoring where practical.

Additional lines are to be surveyed within 90 days prior to commencement of a renourishment project in the Park Shore extension area (near Clam Pass between R-42 to R-43+500) and within 60 days following the completion of placement. Bathymetric and topographic surveys in the vicinity of Clam Pass in support of nourishment of the extended Park Shore placement area (near Clam Pass) will take place in Segments A and B at approximately 100 foot intervals and at intermediate points between existing R-monuments. Special survey lines shall be surveyed in the vicinity of Clam Pass Park to document the potential impact to inlet stability by beach nourishment in the extended Park Shore reach, inlet dredging disposal within the south Clam Pass disposal area, or natural forces. Additional beach profile surveys will be taken at R-41+470, R-42-250 and R-42+500. The cross sections in Segment A (inlet throat) include station 0+00, 1+00, 2+00 and 3+00. Segment B consists of Stations 4+10, 5+10 and 6+10. These segments should be the first to show instability in the inlet due to various causes. The survey will occur pre- and post-construction and 1-year and 2- year post construction of the Nourishment Project in Clam Pass Park north of R-44+500, or until the next maintenance dredging of Clam Pass, whichever occurs first.

Profile surveys shall extend landward to the seawalls or 50 feet landward of the 5.0' contour line. Profile surveys will extend seaward to the –14.3' NAVD contour or 2,000 feet from the shoreline, whichever is the greater distance. All work activities and deliverables shall be conducted in accordance with the Department's May 2014 *Monitoring Standards for Beach Erosion Control Projects, Sections 01000 - Beach Profile Topographic Surveying* and *01100 - Offshore Profile Surveying.*

b. Bathymetric surveys of borrow area T1 are not required. Borrow Area T1 is located approximately thirty-three (33) miles to the northwest and offshore of the placement area, outside of State waters, and is not covered under the State permit requirements. No post-construction survey of Borrow Area T1 is planned, other than the survey performed by the dredger using a registered Florida surveyor.

c. Bathymetric surveys of Doctors Pass are required pre- and post-construction as well as annually for monitoring purposes. A pre-construction bathymetric profile survey of Doctors Pass and Moorings Bay shall be conducted within 90 days prior to

commencement of a dredging operation. A post-construction bathymetric profile survey shall be conducted within 60 days following the completion of a dredging operation. If the Contractor's pay survey of the inlet meets the requirements of post-construction survey as stated below, Contractor's pay survey(s) will be submitted as the post-dredge survey. These surveys can be integrated with annual monitoring where required. Between dredging operations, monitoring surveys shall be conducted biennially until the permit expires. The monitoring surveys shall be conducted during the same month that the previous post-construction survey was taken. The monitoring area shall include channel profile surveys at the lines appearing in Figure 1 and on Tables 1-5. As a minimum, profile surveys shall extend to the limits indicated in Figure 1 and on Tables 1-5. All work activities and deliverables shall be conducted in accordance with the Department's May 2014 *Monitoring Standards for Beach Erosion Control Projects, Sections 01000 – Beach Profile Topographic Surveying* and *01100 – Offshore Profile Surveying.*

d. The Permittee shall submit electronically an engineering report and the monitoring data to the Division of Water Resource Management within 90 days following completion of the post-construction survey or biennial monitoring survey. The survey data and control information shall be submitted electronically in accordance with the Department's paperless initiative, in an ASCII format stored as specified in the Department's May 2014 *Monitoring Standards for Beach Erosion Control Projects, Sections 01000 - Beach Profile Topographic Surveying* and *01100 - Offshore Profile Surveying.*

The report will summarize and discuss the data, the performance of the beach fill project, and identify erosion and accretion patterns within the monitored area. Results should be analyzed for patterns, trends, or changes between surveys and cumulatively since project construction. In addition, the report shall include a comparative review of project performance to performance expectations and identification of adverse impacts attributable to the project. The report shall specifically include:

- The record of volume and location of beach nourishment and beach placement of inlet sand bypassing material.
- The volume and percentage of advance nourishment lost since the last beach nourishment project as measured landward of the MHW line of the most recent survey;
- The most recent MHW shoreline positions (feet) in comparison with the design beach width at each individual monument location;
- The MHW shoreline position changes (feet) relative to the pre-construction survey at each individual monument location for all the monitoring periods;
- The total measured remaining volume (cy) in comparison with the total predicted remaining volume (cy) above the MHW line and above the Depth of Closure for the entire project area over the successive monitoring periods; and,
- Other shoreline position and volumetric analysis the Permittee or engineer deem useful in assessing, with quantitative measurements, the performance of the project.

The report shall include computations, tables and graphic illustrations of volumetric and shoreline position changes for the monitoring area. An appendix shall include superimposed plots of the two most recent beach profile surveys, the design profile and pre- and post-construction beach profile at each individual monument location.

The approved Monitoring Plan can be revised at any later time by written request of Collier County and with the written approval of the Department. If the project is constructed in separable reaches or if one or more reach is eliminated, the monitoring limits shall be modified, accordingly.

When evaluating the performance of beach renourishment in the extended Park Shore Placement Area (near Clam Pass) the following should be taken into consideration: The purpose of nourishment in Clam Pass Park is to restore erosion losses since 1999 by maintaining a beach width from the baseline of 80 feet, while the purpose of Clam Pass dredging is to restore the alignment of Clam Pass to the previously approved location and to conduct periodic maintenance dredging of a portion of the Clam Pass Channel in order to maintain tidal exchange between Clam Bay and the Gulf of Mexico. A number of parameters are provided in the NRPA Management Plan (2014) for consideration for determining whether to consider maintenance dredging. These include tidal range data, cross sectional areas in Sections A, B and C of the inlet and flood shoal, volume of shoaled material, inlet length and ebb shoal location. The amount of sand to be dredged during each maintenance dredge event will be based on a pre-construction survey conducted prior to each maintenance event. The inlet throat (Segment A) will be graded as necessary to shape the inlet so that it closely mimics the natural inlet cross section at stable inlet conditions. The beach-compatible sand will be placed north of the Pass, along Pelican Bay Beach, and south of the Pass, along Clam Pass Park Beaches. Analysis of post-nourishment physical monitoring data will evaluate shoaling rates within the Clam Pass dredging template including Sections A, B and C. The shoaling rates and inlet stability parameters will be compared to critical conditions as identified in the Clam Pass NRPA Management Plan.

f. Monitoring reports and data will be submitted to the FDEP, Division of Water Resources Management, JCP Compliance Officer, in Tallahassee. The report and individual submittals will be labeled at the top of each page: "This monitoring information is submitted in accordance the approved Monitoring Plan for Permit No. [XXXXX-XXX-JC] for the monitoring period [XX]."

Physical Monitoring Summary

Monitoring Task	Pre-Project	Post-Project	1st Year	2nd Year	3rd Year	4th Year
Beach Profile Surveys[1,2] R-17 to R-84	X	X[4]		X		X
Bathymetric Surveys[3] Borrow Area T1		X				
Bathymetric Surveys Doctors Pass	X	X				
Bathymetric Surveys [5] Clam Pass	X	X	X	X		
Monitoring Report		X		X		X

[1]Surveys from R-17 to R-21 may be conducted as part of the Wiggins Pass Maintenance Dredging Project during years when surveys are required by both projects.
[2]Intermediate profile R-58A included.
[3]Borrow Area T1 resides in Federal Waters, and the County requires the Contractor to conduct a post-construction survey by a Florida registered surveyor.
[4]When only a partial project is constructed, pre- and post-construction surveys can be limited to the construction area plus 5,000 feet north and south or to the edge of the nearest inlet.
[5]Clam Pass is surveyed when sand is placed by nourishment activities north of R-44+500

Reference

Bureau of Beaches and Coastal Systems (BBCS), *Monitoring Standards for Beach Erosion Control Projects,* May 2014.

Turrell, Hall & Associates, Inc., 2014. Clam Bay NRPA Management Plan, Version 6.5, November 2014.

Appendix B

2023 Nourishment

Completion Statement

APTIM ENVIRONMENTAL & INFRASTRUCTURE, LLC
6401 CONGRESS AVE, SUITE 140
BOCA RATON, FL 33499
561.441.5499
STEPHEN.KEEHN@APTIM.COM

July 10, 2023

Andy Miller, Collier County
Transportation Management Services Department
Coastal Zone Management Section
2685 South Horseshoe Drive, Unit 103
Naples, FL 34104

Re: Completion Statement for Collier County 2023 Emergency Berm Renourishments: Barefoot Beach, Vanderbilt Beach, Pelican Bay, Park Shore, Naples, and Marco Island

Dear Andy:

This letter is to provide notice of substantial completion of the Collier County Emergency Berm (Project) which was performed in response to Hurricane Ian under the Emergency Final Order (EFO) permit number 2022-047-DAO. In addition to the EFO, portions of the project have active State of Florida Department of Environment Protection (DEP) permit numbers 0331817-004-JM and 0235209-008-JC. The Project was designed to address the loss of storm protection caused by Hurricane Ian on September 28, 2022. This completion statement is based upon weekly site visits by the engineer, construction observations by Collier County (County) inspectors, Contractor's construction reports, and surveys by APTIM. This is the first phase of construction, with construction of south Naples to occur after sea turtle nesting season is complete.

All locations and elevations specified by the Engineer of Record (EOR) have been verified and are detailed herein. The activities authorized by the permit have been performed in compliance with the specifications approved by the County. The original plans and specifications were signed and sealed by the EOR, and Appendix A shows the bid construction plans. The alignment varied during construction to avoid major storm damages and natural and physical obstacles.

The Project was divided into Reach A and Reach B, respectively to separate truck access locations and work areas for the contractors. Reach A included the placement of fill alongshore at Naples and Park Shore. Phillips and Jordan (P&J) was contracted to conduct this work covering a total of approximately 32,624 linear feet. They began mobilization on April 5, 2023 and concluded work on May 26, 2023. To place the required fill at Naples from R-58A to R-79 (19,145 linear feet), P&J utilized access locations at Haul Road (vicinity of R-63) and 17th Avenue South. Similarly, to place fill at Park Shore, P&J utilized Horizon Way as an access location to place sand from R-44 to TR-57+500 (13,479 linear feet). The original design called for continuous fill to be placed from R-58A to R-89, but the narrowing beach towards the south of the Project area and the need for easements led to the transition to place fill only up to R-79. This portion of beach in

Naples from R-79 to R-89 may be constructed in Fall 2023. P&J concluded construction at Park Shore utilizing the Horizon Way access point. Construction began to the north at R-44 and worked south towards the access location. The contractor then shifted south to TR-57+500 near Doctor's Pass and worked back north. P&J truck hauled sand from the Stewart Materials sand mine in Immokalee, Florida for the duration of the construction of the berm.

Reach B required sand to be placed at Barefoot Beach, Vanderbilt Beach, Pelican Bay, and Marco Island. Earth Tech Enterprises (Earth Tech) was selected for the Reach B work covering approximately 28,736 linear feet that was north and south of the Reach A Project area. The placement of sand occurred at R-1-80 to R-9+200 for Barefoot Beach (8,412 linear feet), R-22 +300 to R-30 for Vanderbilt Beach (8,376 linear feet), R-30+512 to R-36+10 for Pelican Bay (5,769 linear feet), and R-142+292 to G-2 for Marco Island (6,179 linear feet), respectively. Three access points were utilized by Earth Teach including Barefoot Beach, Vanderbilt Beach to place fill at both Vanderbilt and Pelican Bay, and Marco Island. Sand was truck hauled from Vulcan Materials Company in Moore Haven, Florida for the Barefoot Beach, Vanderbilt Beach, and Pelican Bay fill Projects. Sand for Marco Island was hauled from Stewart Materials sand mine similar to the Reach A scope of work.

Mobilization to Vanderbilt Beach began on April 17, 2023. Following construction at Vanderbilt Beach and Pelican Bay, Earth Tech remobilized to Barefoot Beach for construction at R-1 to R-9. Fill was placed within the template and avoided turtle nesting locations. Additionally, troughs perpendicular to the beach caused by Hurricane Ian were also infilled. The location and volume placed alongshore varied to accommodate changes in the profiles and obstacles to the original alignment caused by the storm with additional fill placed at apparent voids along the 8,412 linear feet. The final portion of Reach B constructed was Marco Island. Due to changes in beach condition prior to construction, the initial design template was modified to stay within bid volumes. The portion of work at Marco Island was finished on June 19, 2023.

The fill areas were covered under the FDEP permit, and access to the areas were either via County easements or the placement of sand seaward of the erosion control line. Hauling and grading activities were conducted during daylight hours, six days per week apart from a few weather days and Memorial Day. All sea turtle nests within the project area were monitored daily in the morning before construction began.

As-built surveys were conducted as illustrated in Appendix B for profiles comparing pre-construction and post-construction berm elevations. During construction, a storm on April 29, 2023 impacted the project area and caused losses of sand at the berm.

Table 1 presents the project tonnage by reach and volume between pre-construction and post-construction surveys. Approximately 393,500 tons or 262,300 cubic yards of sand were placed at the Project based on truck weight tickets. Pre-placement and post-placement survey at the R-monuments measured approximately 434,000 tons or 289,300 cubic yards of volume change

within the project area between March and May due to sand placement activities. The difference was expected and may be explained by bulking during sand placement, which can be approximately 10%.

Table 1. Project Tonnage Summary

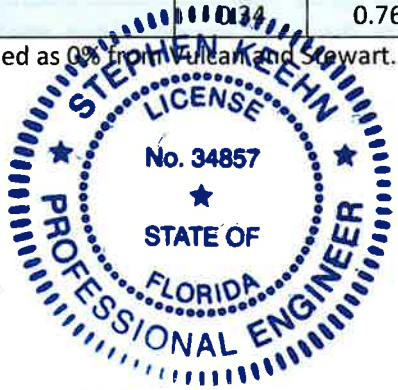
Project Reach	Reach Extents	Distance (ft)	Design Volume (T)	Tonnage Placed	Volume Pre-Con to Post-Con Surveys (T)
Barefoot	R-1-80 to R-9+200	8,412	74,007	73,989	82,334
Vanderbilt	R-22+300 to R-30	8,376	66,141	63,196	69,806
Pelican	R-30+512 to R-36+10	5,769	43,244	41,319	37,194
Park Shore	R-44 to TR-57+500	13,479	67,272	68,879	77,474
Naples	R-58A to R-79	19,145	108,899	109,753	129,887
Marco Island	R-142+292 to G-2	6,179	36,392	36,367	37,145
2023 Renourishment	**R-1-80 to R-79 and R-142+292 to G-2**	**55,181**	**395,955**	**393,503**	**433,843**

Sediment samples were collected by APTIM and Collier County during construction and post-construction from the beaches or the sand mines. Sieve analysis testing was performed by Vulcan, Stewart, and APTIM. All sand placed during the project meets FDEP specifications. Detailed results are provided in Appendix C and summarized in Table 2.

Table 2. Post-Construction Sediment Testing Results Summary

Sample Location	Testing Company	Date	Mean Grain Size (mm)	Sorting Value (phi)	Silt Content (%)	Munsell Color Value
R-2 (Barefoot)	Vulcan	5/17/23	0.40	0.86	0.12	7
R-8 (Barefoot)	Vulcan	5/31/23	0.45	0.82	0.06	7
R-22+500 (Vanderbilt)	Vulcan	4/17/23	0.46	0.74	0.03	8
R-24+400 (Vanderbilt)	Vulcan	4/19/23	0.44	0.97	0.14	8
R-31 (Pelican Bay)	Vulcan	5/6/23	0.50	0.76	0.10	7
R-33 (Pelican Bay)	Vulcan	5/2/23	0.44	0.92	0.20	7
Average			0.45	0.85	0.11	7.3
R-45 (Park Shore)	Stewart	5/5/23	0.34	0.73	0.44	8
R-51 (Park Shore)	Stewart	5/15/23	0.33	0.76	0.15	8
R-58A (Naples)	Stewart	4/25/23	0.32	0.70	0.47	8
R-72 (Naples)	Stewart	4/13/23	0.36	0.83	0.20	8
R-143 (Marco)	Stewart	6/8/23	0.34	0.78	0.31	8
R-147 (Marco)	Stewart	6/16/23	0.33	0.78	0.40	8
Average			0.34	0.76	0.33	8

*All shell content percent is assumed as 0% from Vulcan and Stewart.



Sincerely,

July 13, 2023

Stephen Keehn, PE
Senior Coastal Engineer
Aptim Environmental & Infrastructure, LLC

cc: Chris D'Arco, Collier County
Larry Humphries, Collier County
Nicole Sharp, PE, APTIM
James Austin, EI, APTIM
Sean Ryan, APTIM

Appendix A – Collier County Emergency Berm Construction Plans
Appendix B – Collier County Profiles
Appendix C – Stewart and Vulcan Sand Testing Results

Appendix C

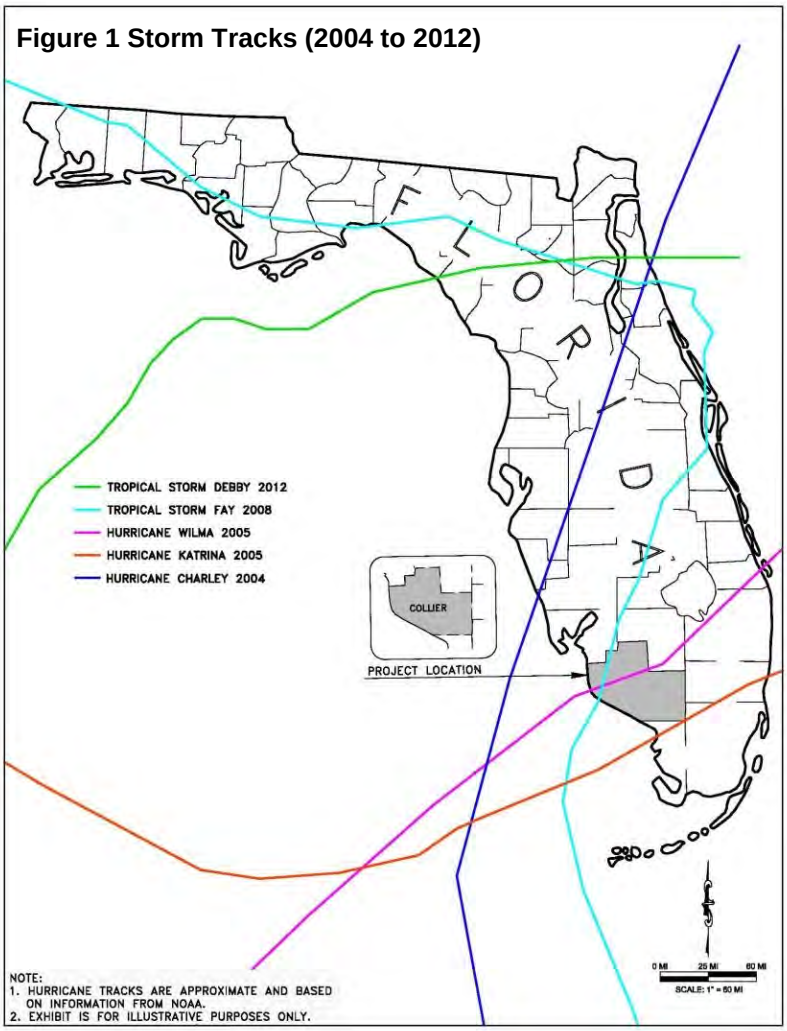
Major Storm Information

Major Storm Events near Collier County

From 2004 to 2015, five major storms have made landfall near Collier County having the potential to disrupt coastal processes and change the beach topography in the project vicinity. Each storm's track can be seen in **Figure 1**.

[1]**Hurricane Charlie** (9-15 August 2004) Charley was the strongest hurricane to hit Florida since Hurricane Andrew in 1992. Before Charley made landfall on August 13 near Cayo Costa, which is just north of Captiva, it had made landfall in Cuba as a category 2. The storm decreased to a category 1 while making landfall in Cuba but then increased steadily as it made its way to Florida's southwest coast. Charley hit Florida as a category 4 hurricane with maximum sustainable winds of 150 mph. Hurricane Charley was a small storm in size but caused great damage to Florida's southwest coast.

Figure 1 Storm Tracks (2004 to 2012)



[2]**Hurricane Katrina** (23-30 August 2005) Hurricane Katrina is one of the most devastating hurricanes making landfall in the United States. Katrina was the making of three storms in the Atlantic Ocean and made landfall over the Bahamas as a Tropical Strom. While heading to Florida's east coast the storm strengthened to a category 1 hurricane just before making landfall near Miami-Dade County. The storm weakened to a tropical storm while passing over the peninsula. After spending six hours on land with winds estimated up to 70 mph, the storm entered the Gulf of Mexico just north of Cape Sable on August 26. Not soon after entering the Gulf, Hurricane Katrina grew in size and ultimately hitting the United States again in Louisiana as a category 5.

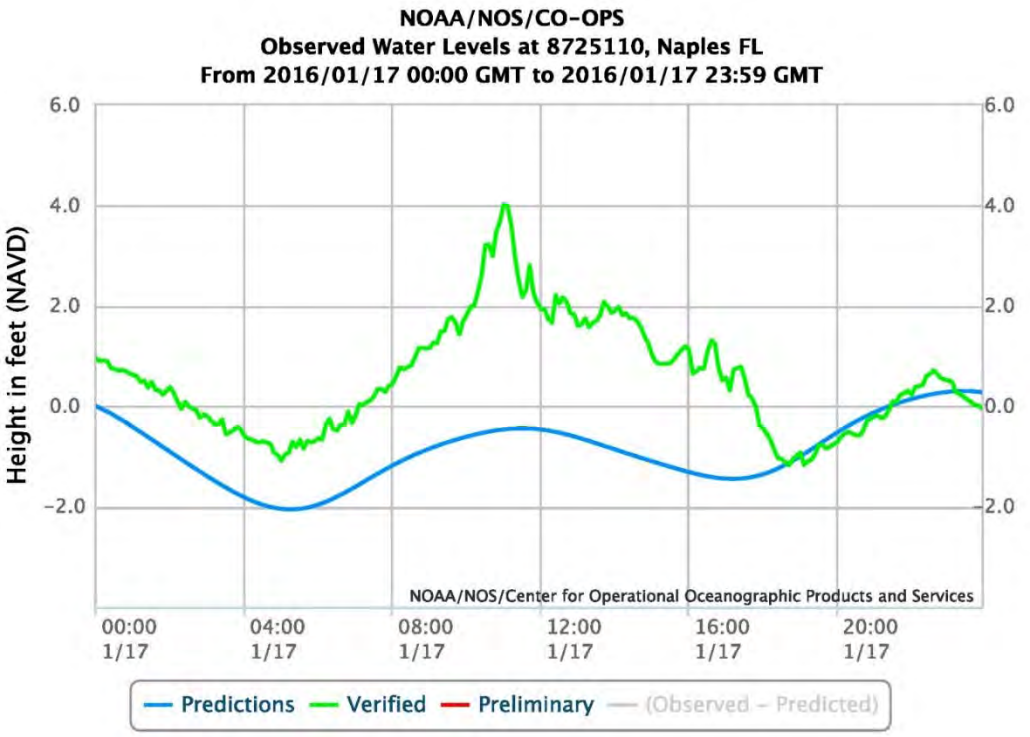
[3]**Hurricane Wilma** (15-25 October 2005) Hurricane Wilma was the strongest hurricane recorded for 2005 with winds up to 185 mph. Forming in the Caribbean Sea, Hurricane Wilma reached a category 5 hurricane over open waters. Wilma then decreased to a category 4 just before hitting the Yucatan Peninsula of Mexico. After passing over land, the winds decreased to 100 mph. After a brief increase over the Gulf of Mexico, Wilma entered the U.S. near Cape Romano (just south of the project area) as a category 3 hurricane on October 24. Wilma caused ten tornadoes while making landfall in the U.S. and caused damage to the surrounding coastline.

[4]**Tropical Storm Fay** (15-26 August 2008) Tropical storm Fay made landfall in Florida a record setting four times. After passing over the Florida Keys with winds up to 50 mph the storm slightly increased to 65 mph winds before making landfall just south of Marco Island on August 19. Rainfall estimates in Florida reached over 27 inches causing severe flooding. Storm surge and prevailing winds by the slow moving storm caused moderate coastline erosion along southwest Florida.

[5]**Tropical Storm Debby** (23-27 June 2012) Tropical Storm Debby reached a peak wind speed of 65 mph while in the Gulf of Mexico. After forming in the middle of the Gulf of Mexico, the storm headed north. After influence from a low pressure, the storm then turned west and eventually made landfall in Florida near Steinhatchee on August 26. Winds were recorded at 40 mph when making landfall on Florida's west coast. Although the storm hit northern end of the peninsula, it is recorded that Pinellas and Charlotte Counties' beaches lost 10 to 15 feet of shoreline.

The City of Naples experienced a meteotsunami[1] in January 2016. A graph of the observed water levels at the Naples Tide Station on January 17, 2016 documenting the meteotsunami is shown in **Figure 2**.

Figure 2. Observed Water Level in Naples Florida on January 17, 2016.



[5] **Hurricane Irma** (August 30-Septmeber 11, 2017) Tropical Storm Irma formed in the far eastern Atlantic Ocean, just west of the Cape Verde Islands, on the morning of August 30th. Over the

[1] Meteotsunamis have the characteristics similar to earthquake-generated tsunamis, but are caused by air pressure disturbances often associated with fast moving weather systems, such as squall lines. These disturbances can generate waves in the ocean that travel at the same speed as the overhead weather system. Development of a meteotsunami depends on several factors such as the intensity, direction, and speed of the disturbance as it travels over a water body with a depth that enhances wave magnification. NOAA 2015

following 30 hours Irma intensified into a major hurricane with highest sustained winds of 115 MPH, a category-3 storm on the Saffir-Simpson Hurricane Wind Scale.

As Irma began to approach the northern Leeward Islands on September 4th and 5th, the hurricane rapidly intensified while moving over warmer water and into a more moist atmosphere. The storm became a rare category-5 hurricane on September 5th, with maximum sustained winds of 185 MPH. This made Irma the strongest hurricane ever observed in the open Atlantic Ocean, and one of only 5 hurricanes with measured winds of 185 MPH or higher in the entire Atlantic basin. Over the next few days Irma continued moving west, passing through the northeast Leeward Islands, Virgin Islands, and just north of the islands of Puerto Rico and Hispaniola, while maintaining its category-5 winds.

The storm finally "weakened" to a category-4 hurricane on September 8th, but still had devastating winds of 155 MPH while moving through the southern Bahamas. Irma intensified to a category-5 level once again that evening, with top winds of 160 MPH, as it approached the northern coast of Cuba. Irma moved west along or just inland from the northern coast of Cuba on September 9th. This interaction with land disrupted Irma's structure a bit, as a hurricane requires plenty of deep warm water beneath the storm's center to maintain the extremely low pressure and strong winds. Thus Irma weakened slightly to a category-3 hurricane with winds of 125 MPH.
Resilient Irma made a final attempt to re-intensify while crossing the open waters of the Florida Straits. The storm quickly reached category-4 intensity with 130 MPH winds early in the morning of September 10th, while approaching the vulnerable Florida Keys.

The major hurricane made landfall near Marco Island in southwest Florida around 3 pm EDT on September 10th, as a category-3 storm with 115 MPH. Naples, Florida reported a peak wind gust of 142 MPH. Irma moved quickly northward, just inland from the west coast of Florida on September 10th and 11th. When Irma first developed in the far eastern Atlantic, despite its strength, its wind field was quite small. As the storm approached Florida, however, its wind field expanded dramatically. As Irma hit Florida, tropical storm force winds extended outward up to 400 miles from the center, and hurricane force winds extended up to 80 miles. Hurricane force wind gusts (i.e. 74 MPH or more) were reported along much of the east coast of Florida, from Jacksonville to Miami. In addition to the long periods of heavy rain and strong winds, storm surge flooding also occurred well away from the storm center, including the Jacksonville area, where strong and persistent onshore winds had been occurring for days before Irma's center made its closest approach.

By the time the minimal hurricane reached northwest Florida (on the morning of September 11th), the wind gusts across south Georgia and northwest Florida were generally in the 45 to 60 MPH range (Fig. 8). Conditions improved rapidly once the storm center passed by as strong, dry southwest winds aloft made the system asymmetric, with nearly all of the rain and most of the strongest winds being along and north of the poorly-defined center. Irma weakened to a tropical storm in south Georgia in the afternoon, and further into a tropical depression while moving north across central Georgia in the evening. See the **Figure 3** in this section showing the 2017 storm tracks.

According to the National Weather Service, wind gusts over 50 mph and heavy rain impacted the Naples area on Thursday December 20, 2018. At approximately 1:30 pm another meteotsumami hit the Naples area with wave heights momentarily increasing by 3 feet over the projected level and decreasing rapidly over the next hour. **Figure 4** shows the predicted and actual water levels on December 20, 2018.

Figure 3. Hurricane Tracking Chart for 2017.

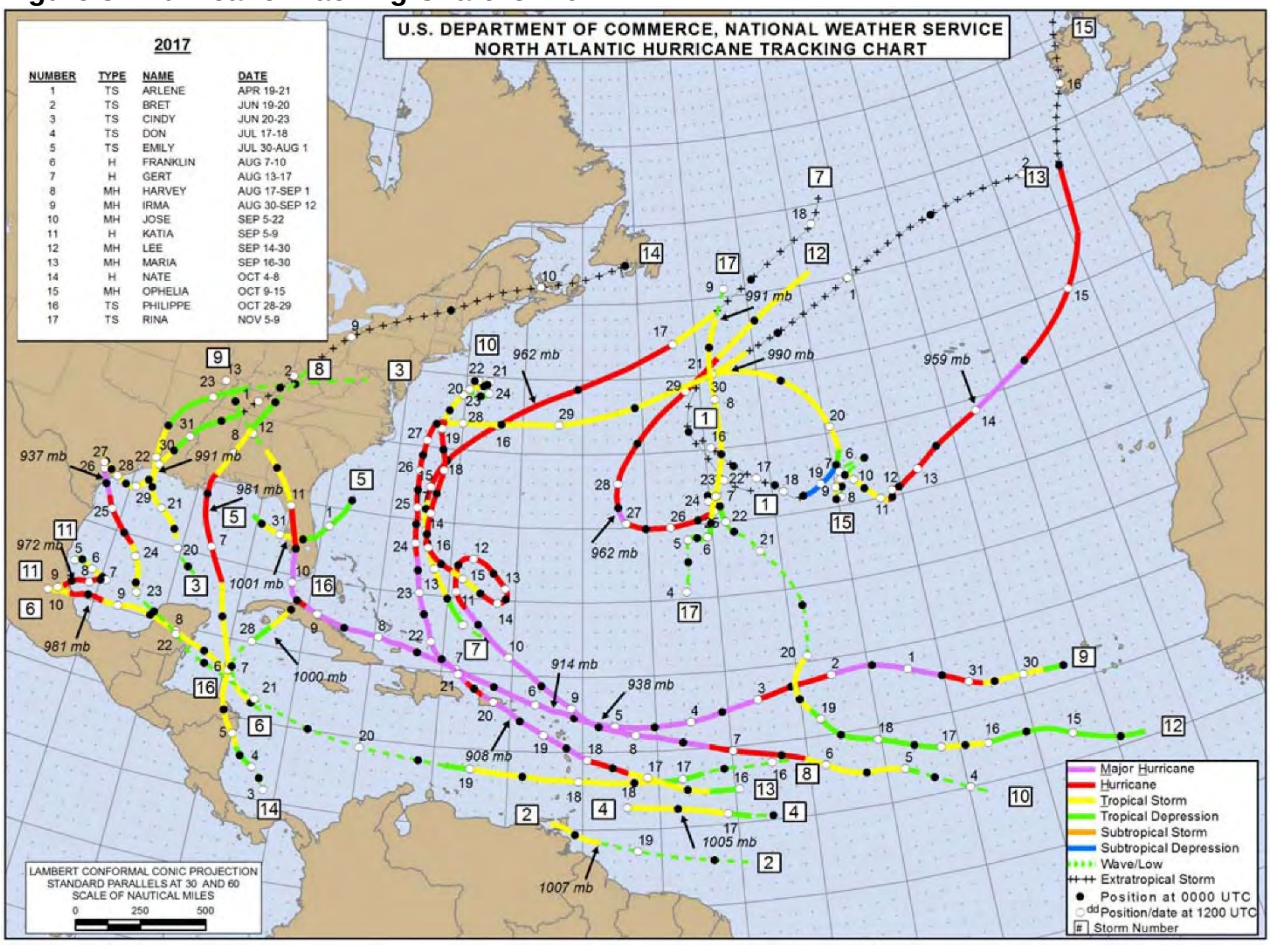
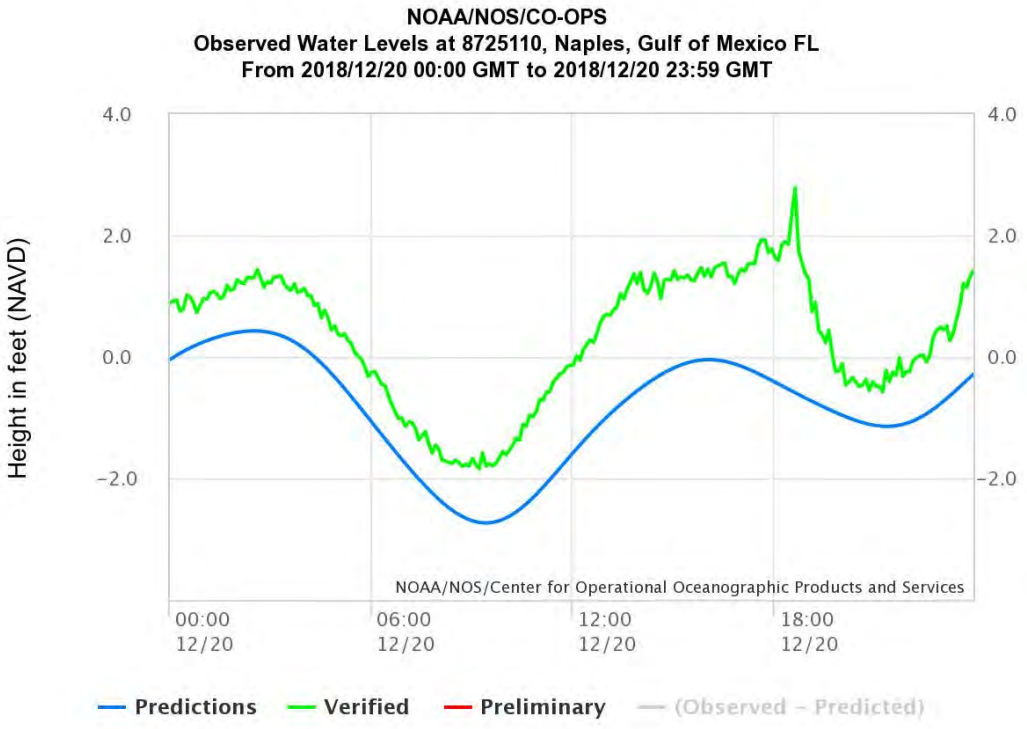


Figure 4. Observed Water Level in Naples Florida on December 20, 2018.



References

[1] Blake E.R., D.P. Brown, R.J. Pasch, "Tropical Cyclone Report Hurricane Charley," National Hurricane Center, September 2011, http://www.nhc.noaa.gov/.

[2] Brown D.P., R.D. Knabb, and J.R. Rhome, "Tropical Cyclone Report Hurricane Katrina," National Hurricane Center, December 2005, http://www.nhc.noaa.gov/.

[3] Blake E.R. and H.D Cobb III et. al, "Tropical Cyclone Report Hurricane Wilma," National Hurricane Center, January 2006, http://www.nhc.noaa.gov/.

[4]Beven, J.L. and S.R Stewart, "Tropical Cyclone Report Tropical Storm Fay," National Hurricane Center, February 2009, http://www.nhc.noaa.gov/.

[5]Kimberlain T.B., "Tropical Cyclone Report Tropical Storm Debby," National Hurricane Center, January 2013, http://www.nhc.noaa.gov/.

[6]National Oceanic and Atmospheric Administration, "Detailed Meteorological Summary on Hurricane Irma, Hurricane Irma Synopsis" National Weather Service, January 2018, https://www.weather.gov

Naples Daily News, Scientists: Waves that surprised SWFL beachgoers last week caused by rare meteotsunami, December 27, 2018

Appendix D-1

Survey Certification

Post-Ian

Survey Report Notes and Certification

Survey Title:	2022 Collier County Post Hurricane Ian Topographic and Hydrographic Survey Report
Prepared Date:	January 2023
Prepared For:	Collier County Coastal Zone Management
Prepared By:	APTIM Environmental & Infrastructure, LLC
Dates of Survey:	November 2nd, 2022 to December 9th, 2022
Survey Location:	FDEP monuments R-1 through R-89, H-1 through H-16, and R-128 through R-148 including required intermediate profiles.

Notes:

1. This survey report has been prepared to accompany Survey Maps entitled "2022 Collier County Post Hurricane Ian Topographic and Hydrographic Survey Report" prepared by APTIM Environmental & Infrastructure, LLC

2. The survey is neither valid nor complete without both the survey report and described survey maps. Digital data files encompassing the following have also been provided to FDEP in the following formats listed:

   - *Monument Information Report* ***(Appendix 1)***
   - *Federally Compliant Metadata* ***(Appendix 2)***
   - *ASCII file containing xyz profile data points. Data provided in NAVD 88* ***(Appendix 3)***
   - *ASCII files containing the profile data processed into the FDEP distance and depth format, (NAVD 88) including headers* ***(Appendix 4)***
   - *Profile Plots* ***(Appendix 5)***
   - *PDF copies of project field books with computations and reductions* ***(Appendix 6)***
   - *Digital Ground Photography* ***(Appendix 7)***

3. This map and report or the copies thereof are not valid without an original raised seal or a digital signature file by the certifying professional surveyor and mapper who shall retain and original hard copy of the signed and sealed map or report.

4. The information on this map represents the results of the survey on the dates indicated and can only be considered as indicating the general conditions existing at the time.

5. Additions or deletions to survey maps or reports by other than signing party or parties is prohibited without written consent of the signing party or parties.

6. The coordinates are in feet based on the vertical and horizontal data that was collected and presented relative to the North American Vertical Datum of 1988 (NAVD 88) and the Florida State Plane Coordinate System based on the Transverse Mercator Projection, East Zone, North American Datum of 1983 (NAD 83/2011).

7. Vertical measurements are based on FDEP second order monuments A05, A10, A11, A15, A25-2 1987 ADJ, A25 RM4-ADJ, and 872 4991 D TIDAL per published FDEP coordinates.

8. Bearings are based on a grid North bearing

9. Lands were not abstracted for rights-of-way, easements, ownership, or other instruments of record.

10. Underground and subaqueous improvements and/or utilities were not located as part of this survey and should be field verified prior to any dredging or construction activities.

11. Refer to APTIM field book #525 for the onshore portion and APTIM Navigational field book #49 for the offshore portion. (Provided Digital Copies Only)

12. Aids to navigation were not located during this survey.

13. Soundings were collected using a Teledyne Echotrac E20, Single Frequency, survey grade sounder. The sounder was calibrated prior to the start of the survey following manufacturers recommended procedures.

14. Survey plan views are intended to be viewed at a scale of 1”/400’ or smaller.

15. This survey was conducted for Collier County Coastal Zone Management for use as a Topographic and Hydrographic Beach Post Hurricane Monitoring Survey.

16. *Ref. Pt.* (Reference Point) is a term used in the monument information report referring to any location that can be defined by horizontal coordinates and is used as range point 0+00 for profile control. Reference Points may not necessarily be the location of a set control monument.

17. *NO RTK* is a term used in the monument information report referring to monuments that were not found and/or not located by GNSS due to overhead cover, deep burial, or impenetrable obstacle.

Certification:

I hereby certify that this hydrographic and topographic survey is true and correct to the best of my knowledge and belief as delineated under my direction. I further certify that it meets the minimum technical standards set forth in Chapter 5J-17, adopted by the Florida board of professional surveyors and mappers, pursuant to section 472.027 of the Florida Statutes.

Michael Lowiec, PSM LS6846

Digitally signed by Michael Lowiec, PSM LS6846
Date: 2023.01.30 11:58:37 -05'00'

Michael Lowiec, P.S.M. Date
Florida Professional Surveyor and Mapper
LS #6846
APTIM Coastal Planning & Engineering, LLC
C.O.A. LB# 4028
6401 Congress Ave. Suite #140 Boca Raton, Florida 33487

Appendix D-2

Beach Profiles R-17 through R-84

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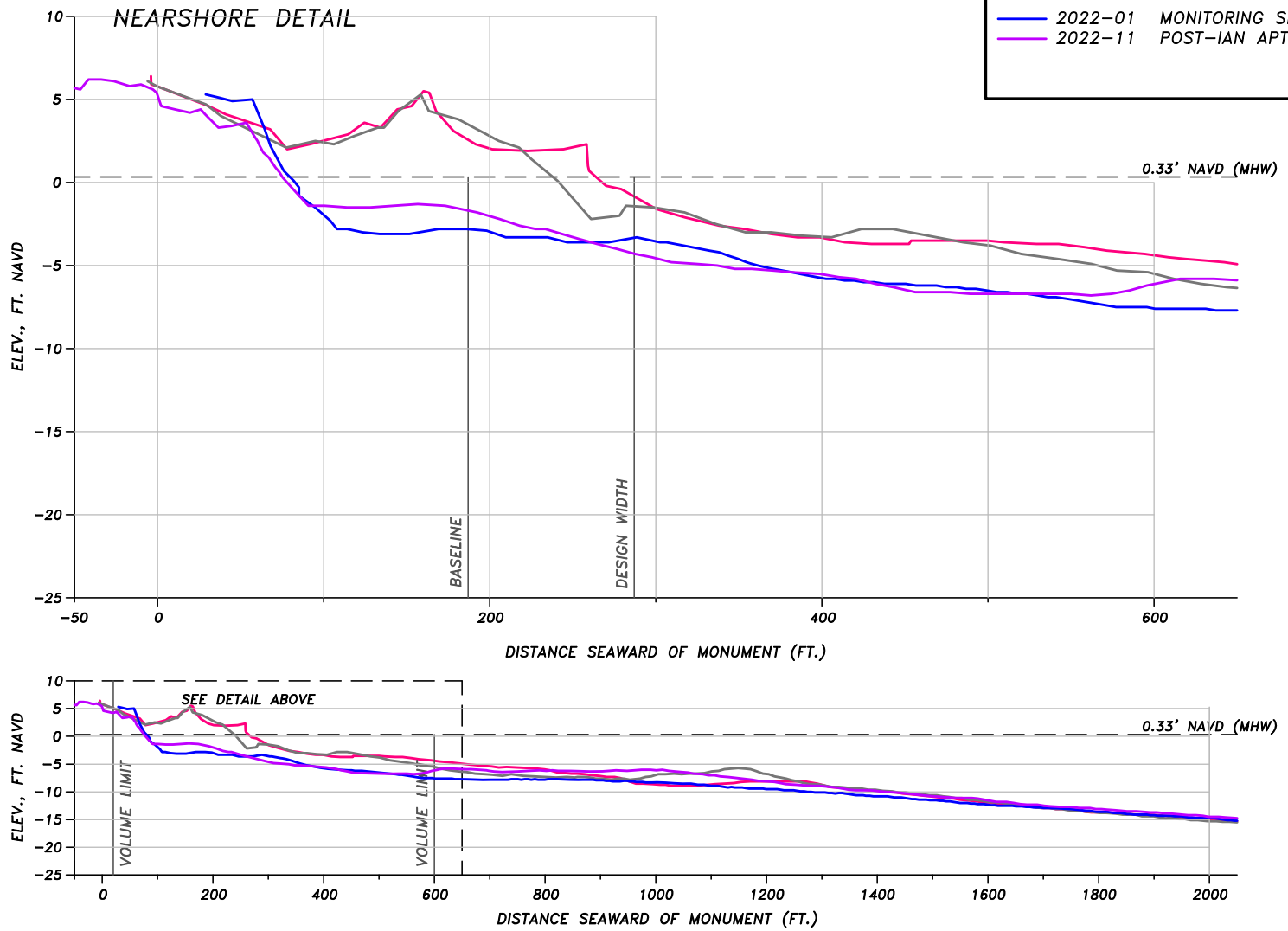

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	JOB: 18022	DATUM: NAVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
FAX: (239) 594-2025
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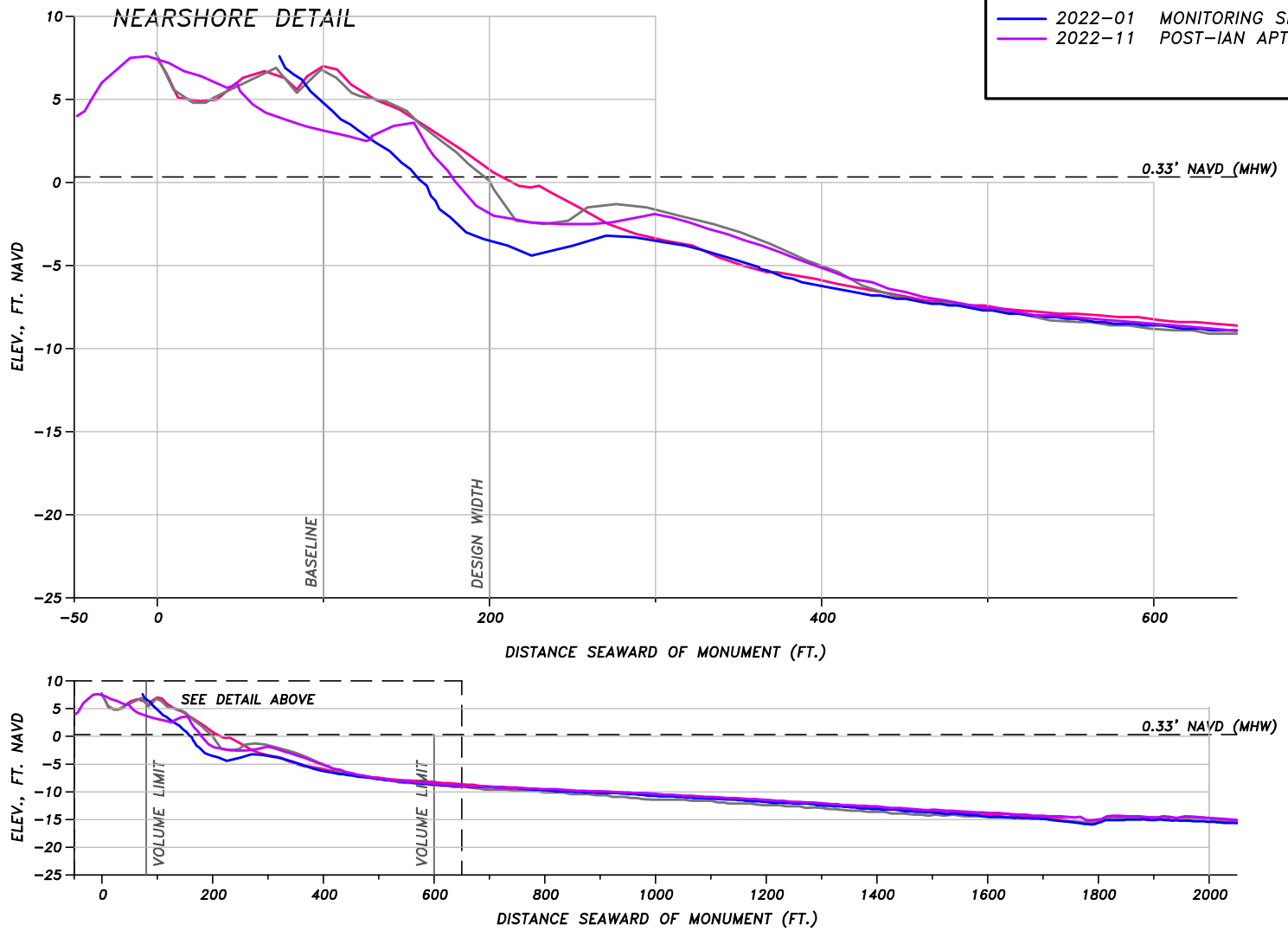

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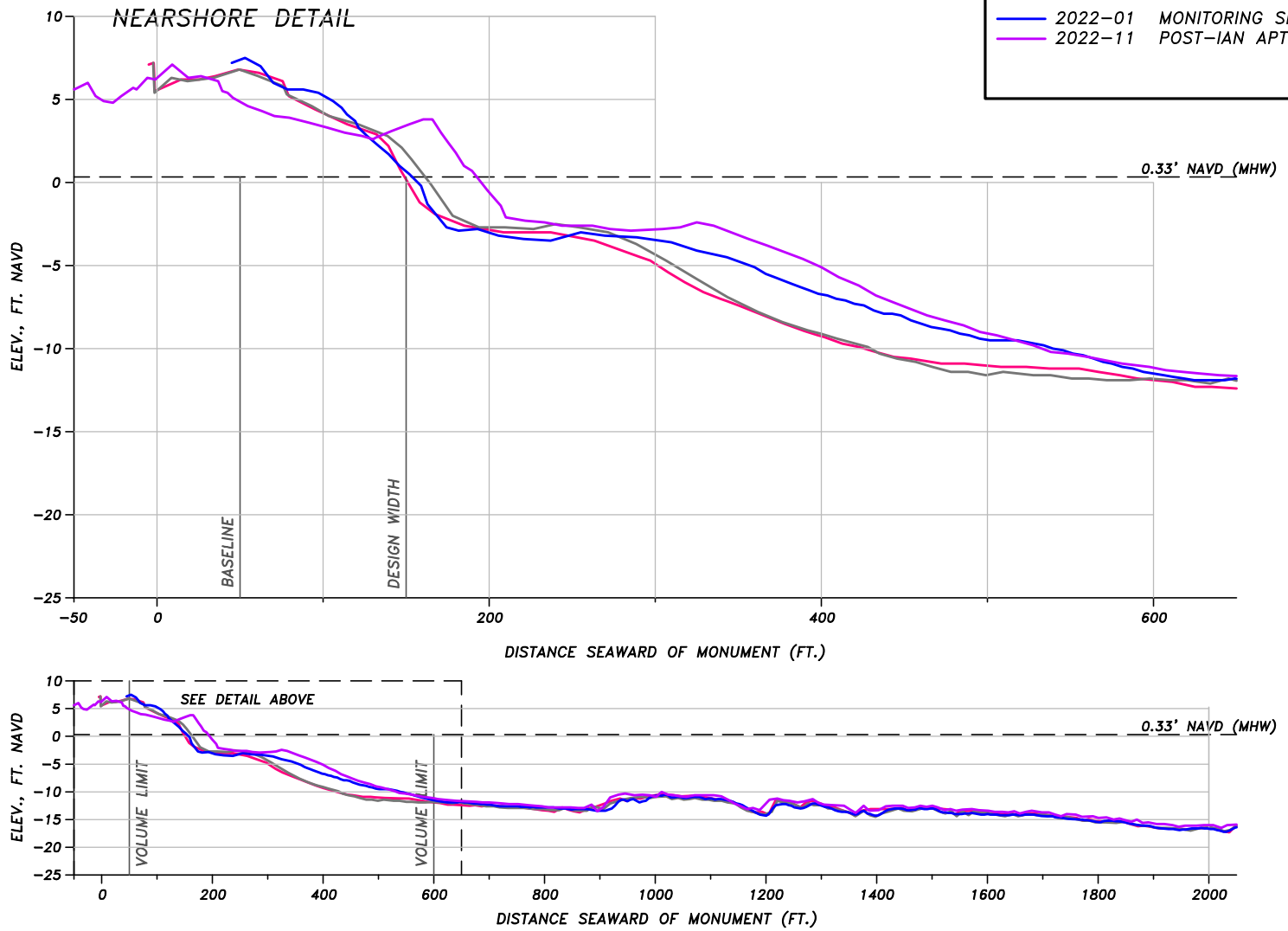

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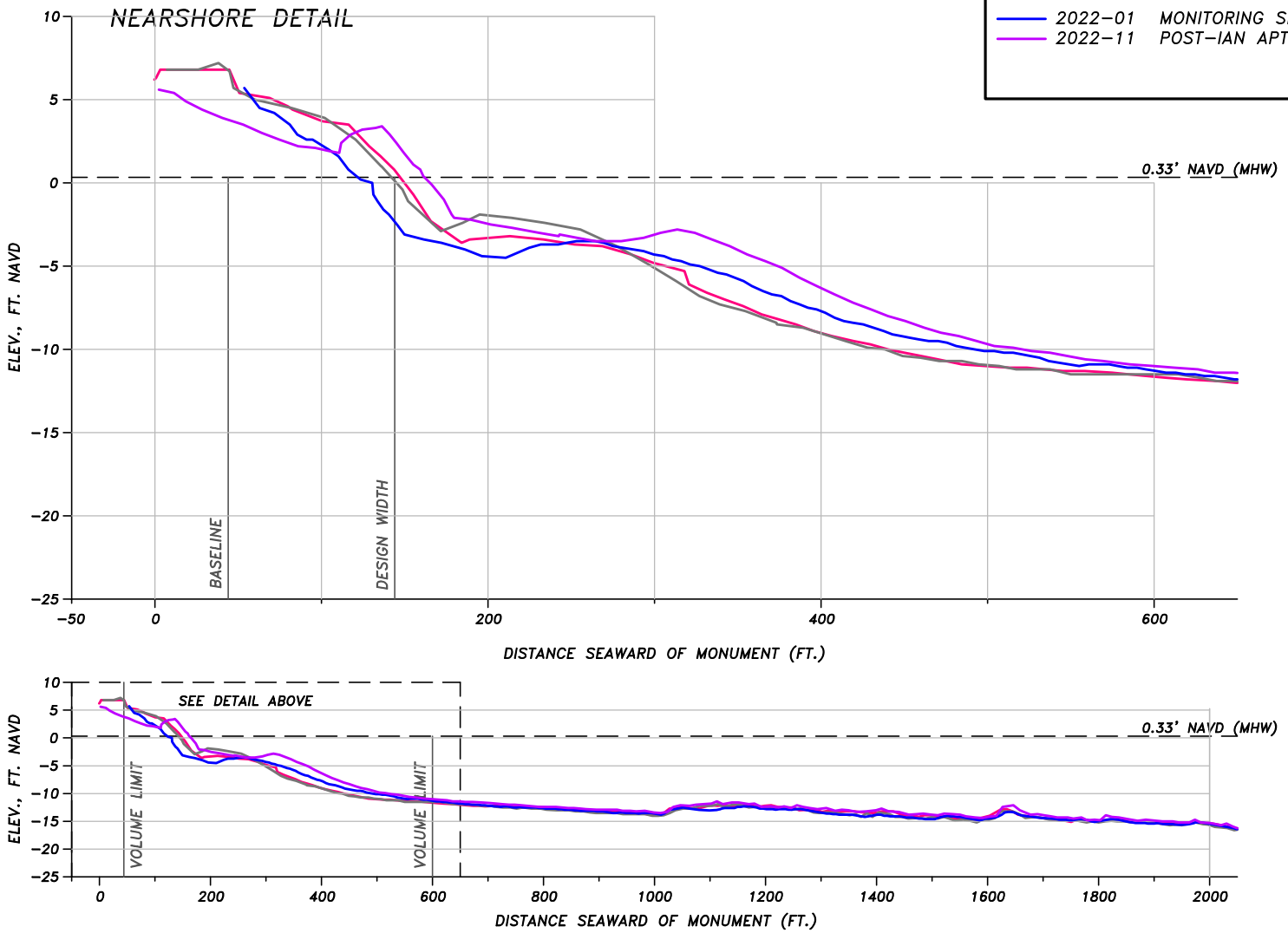

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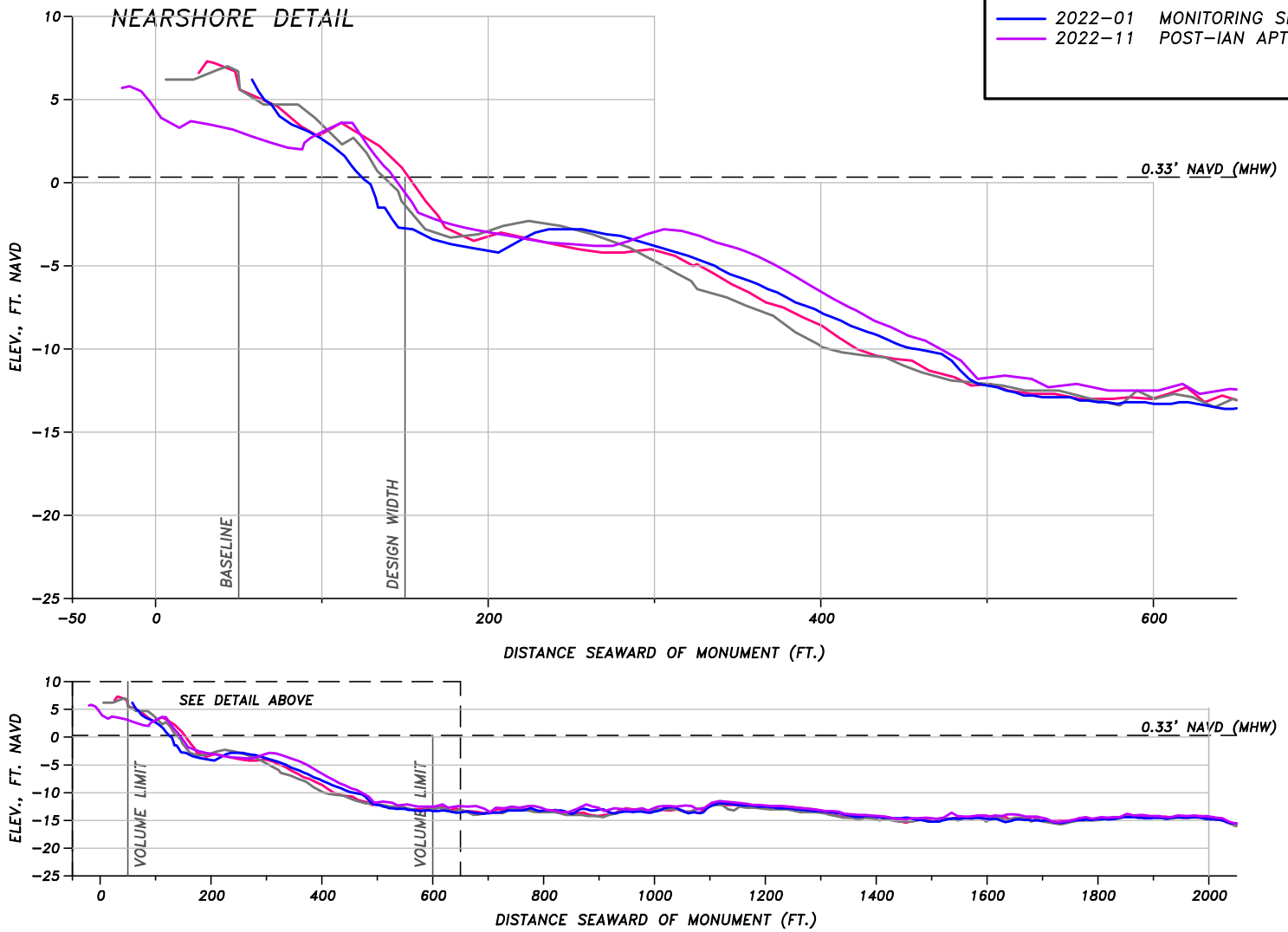

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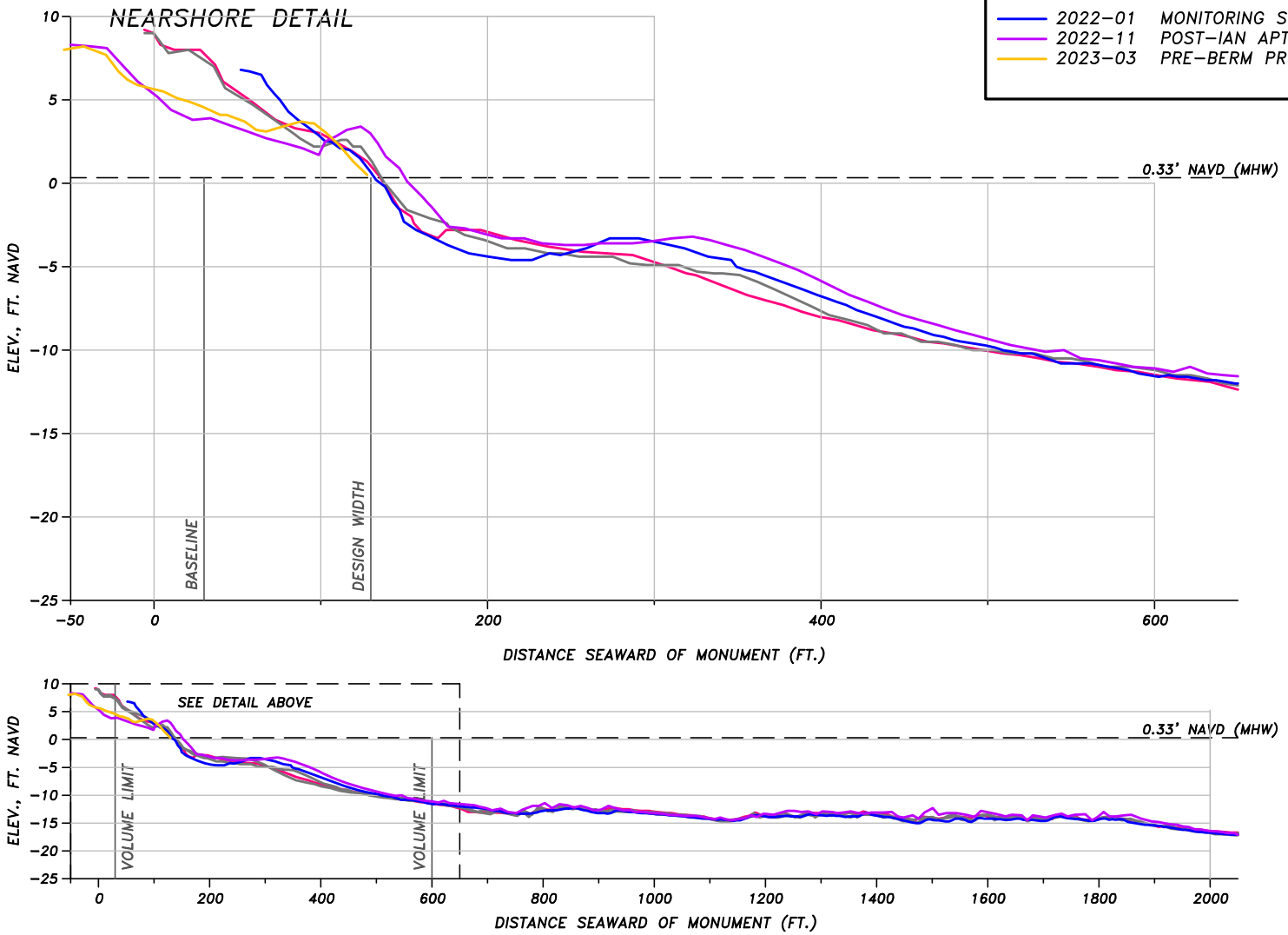

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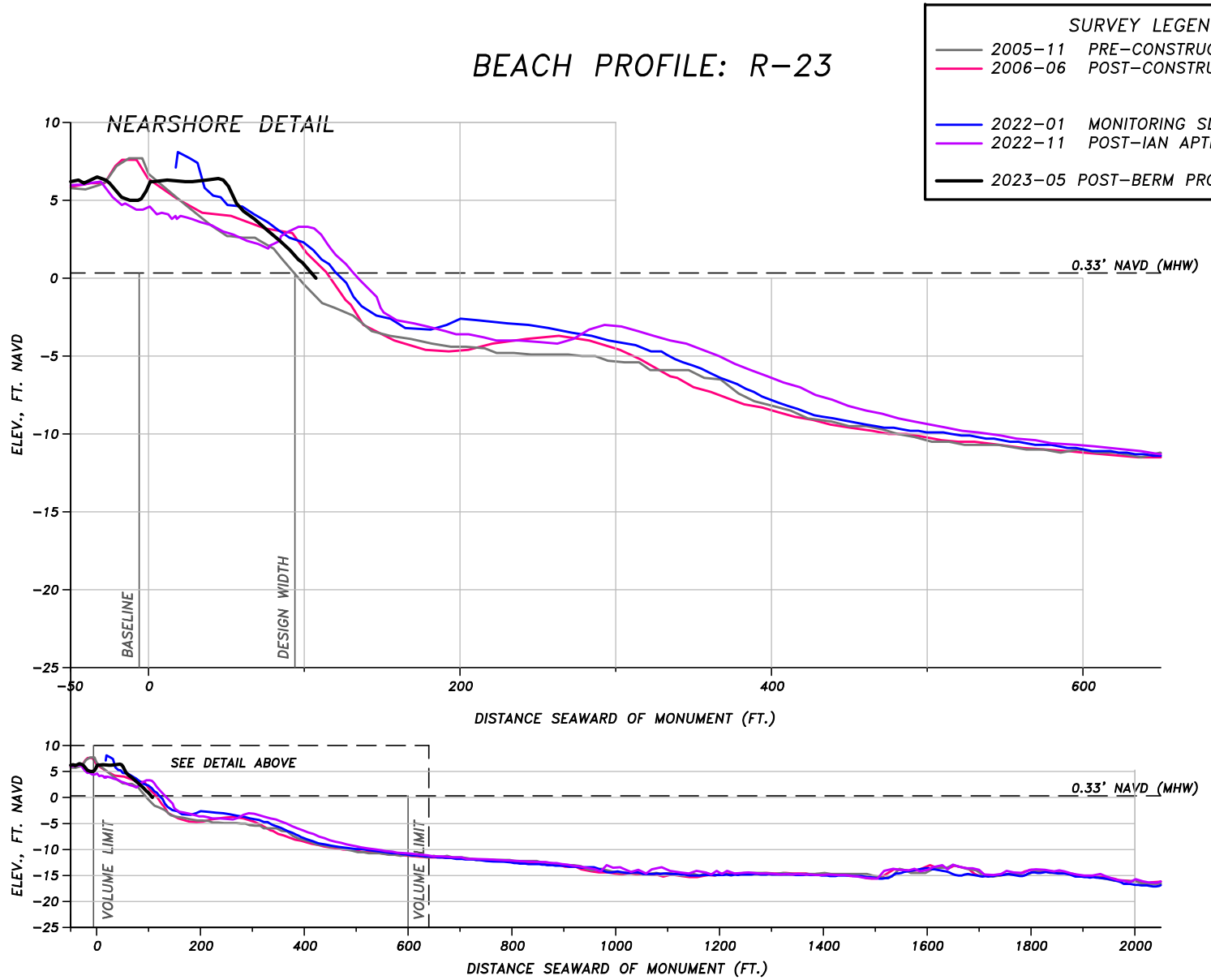

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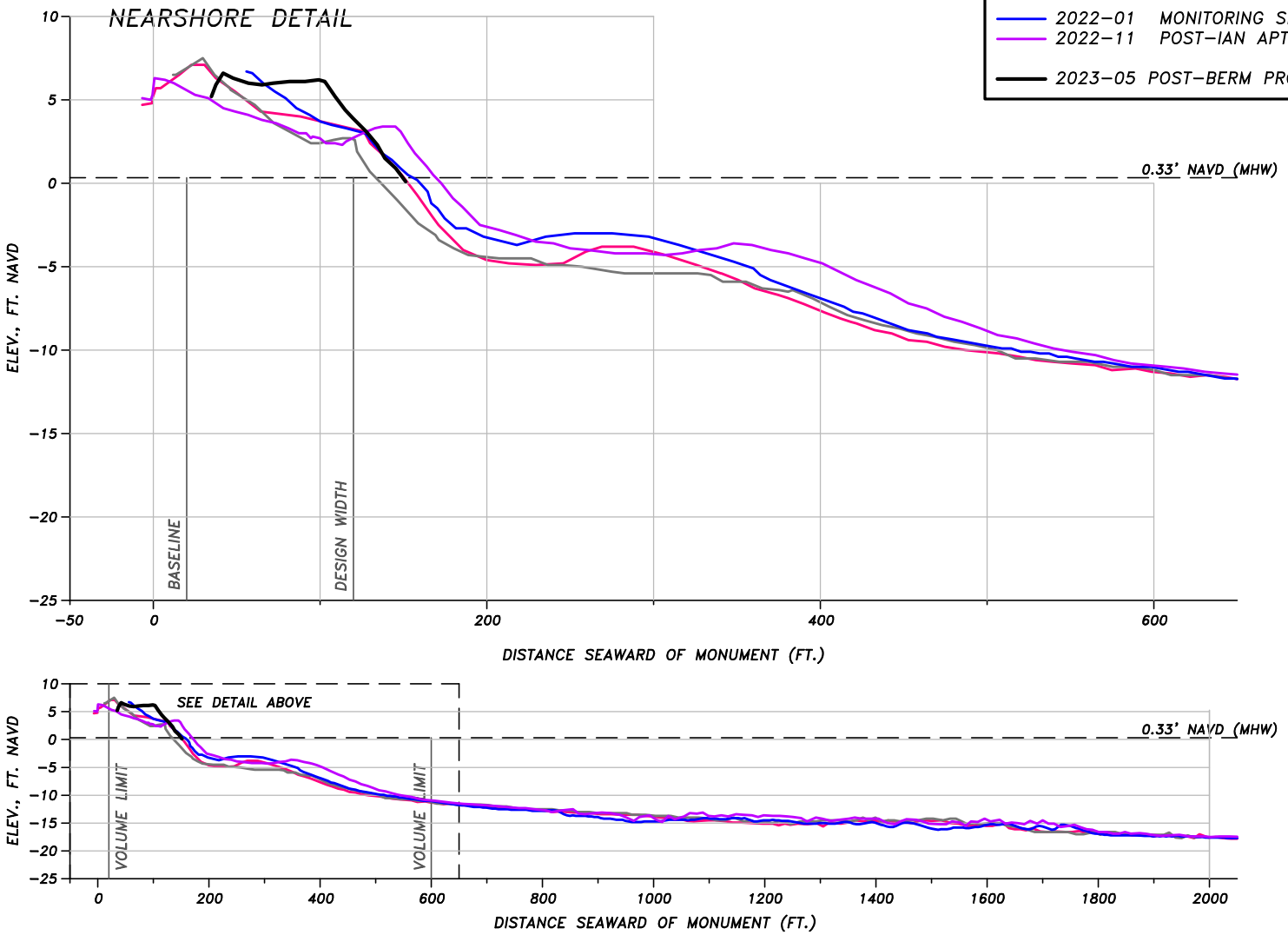

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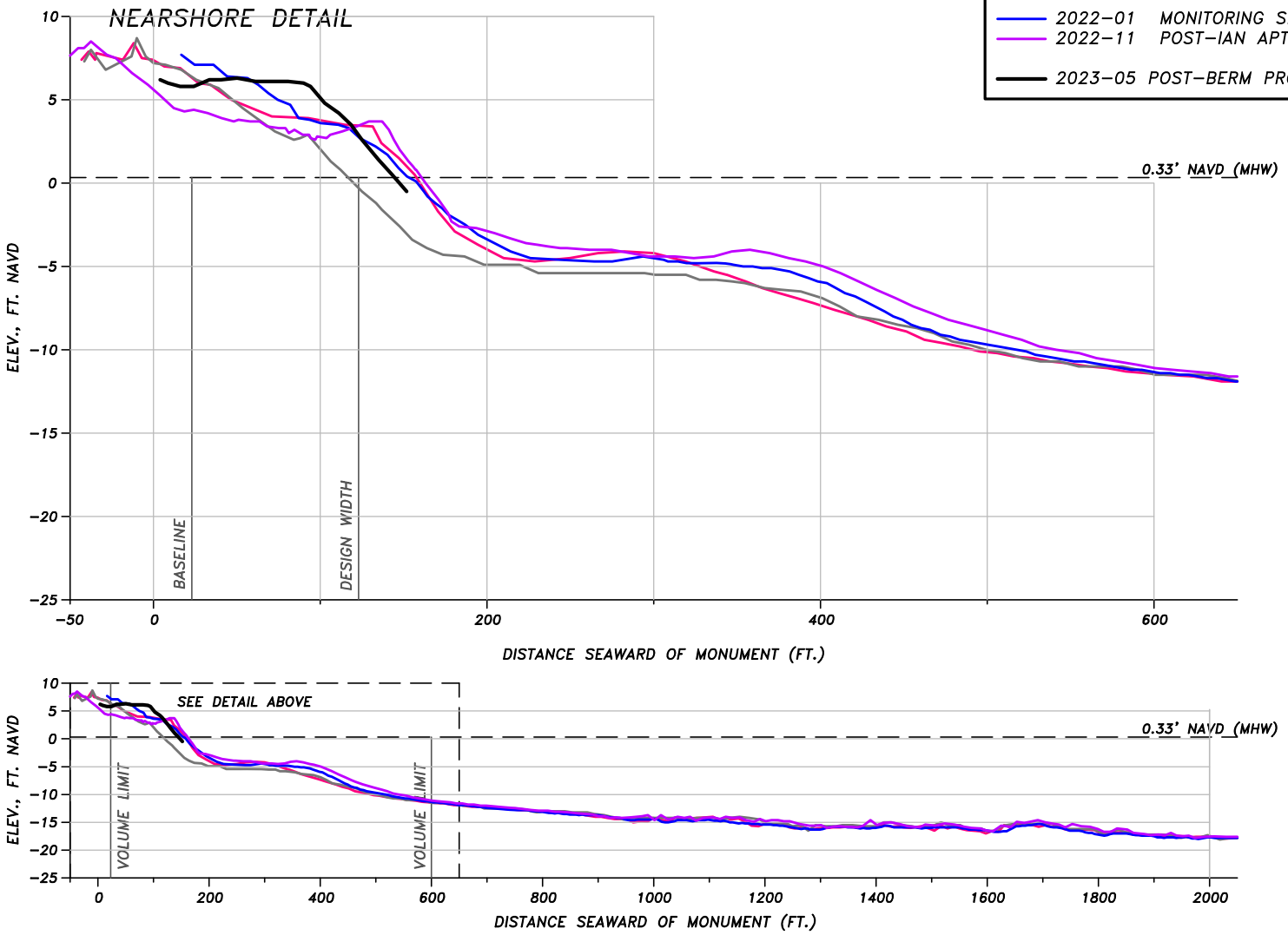

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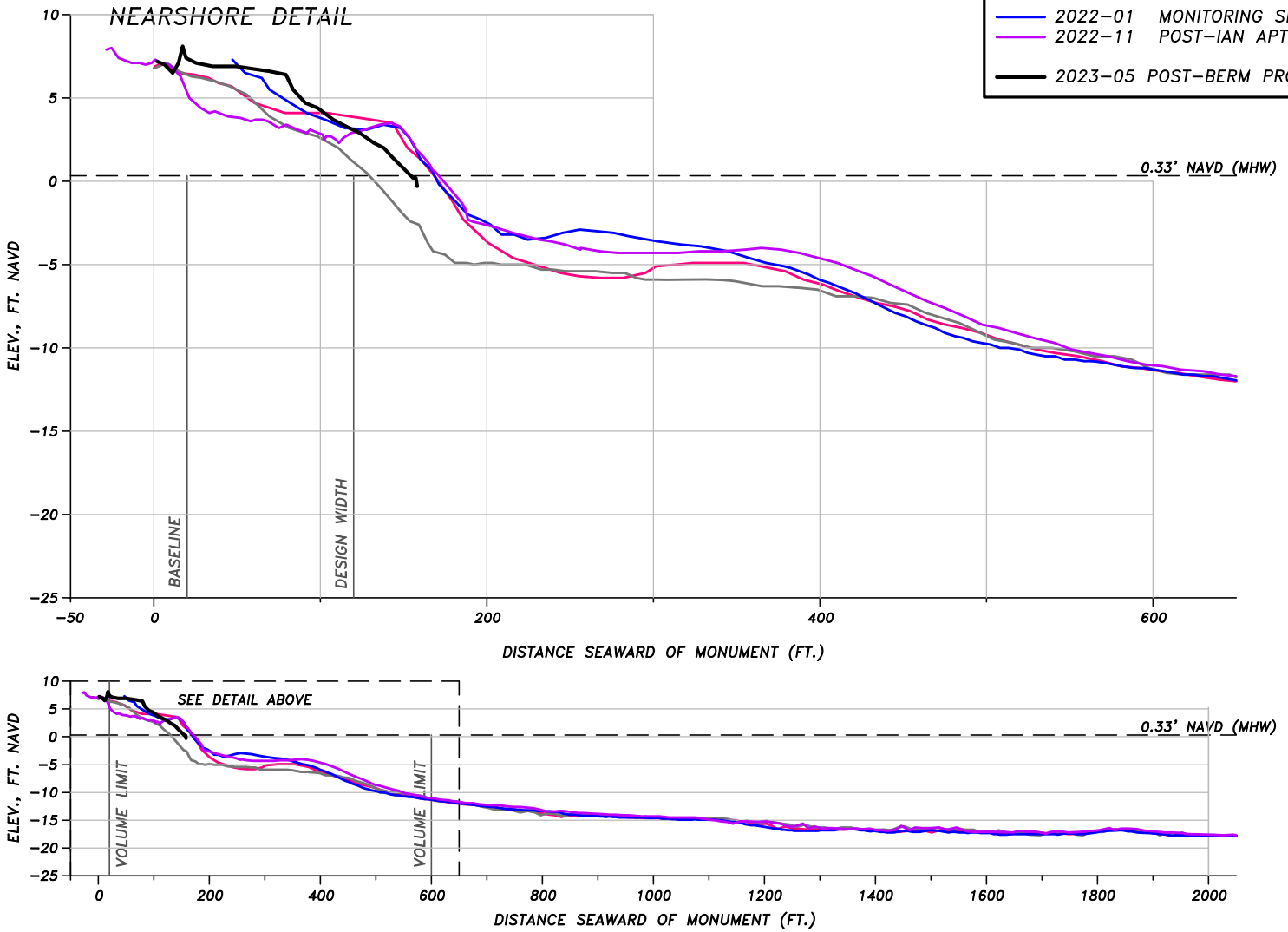

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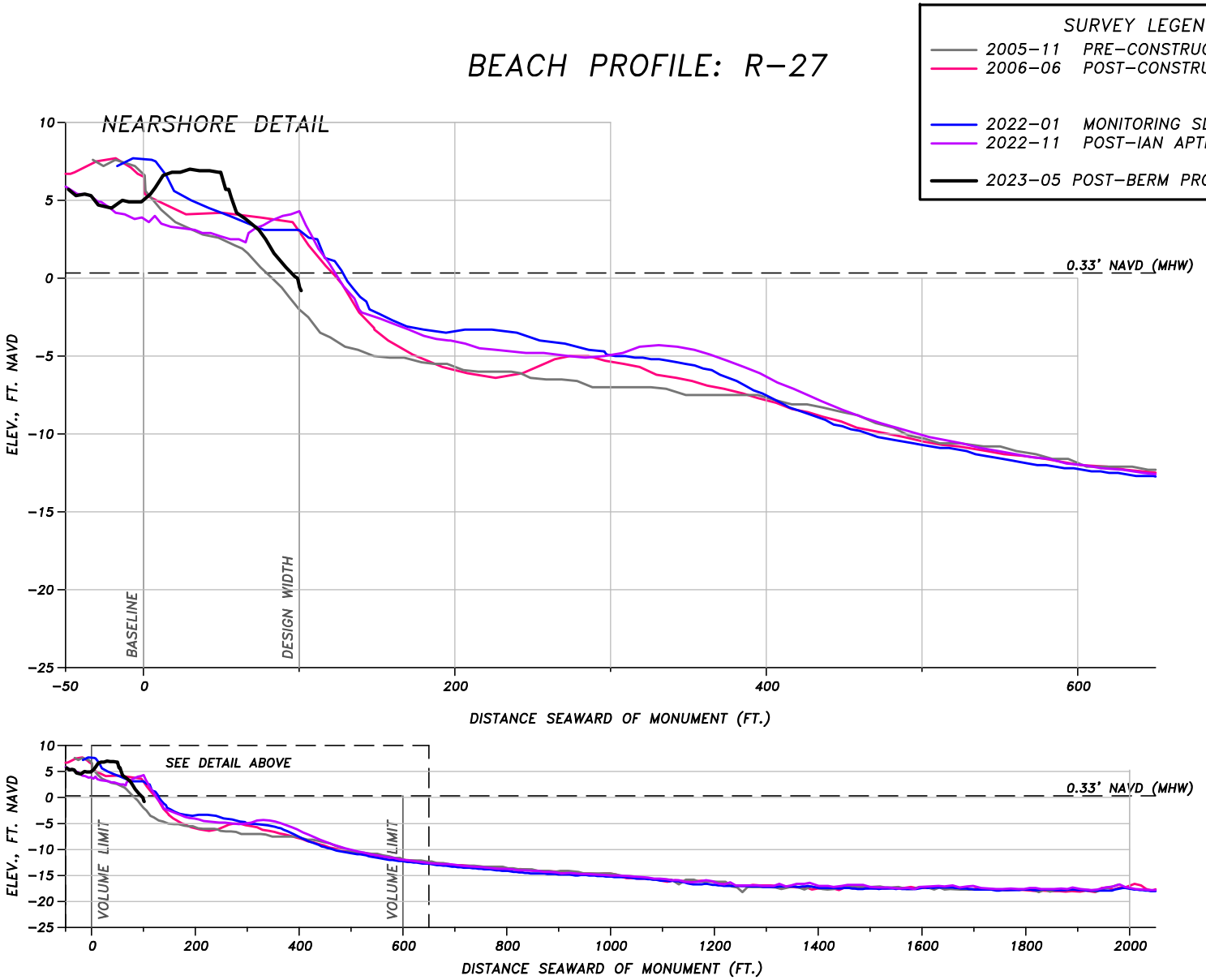

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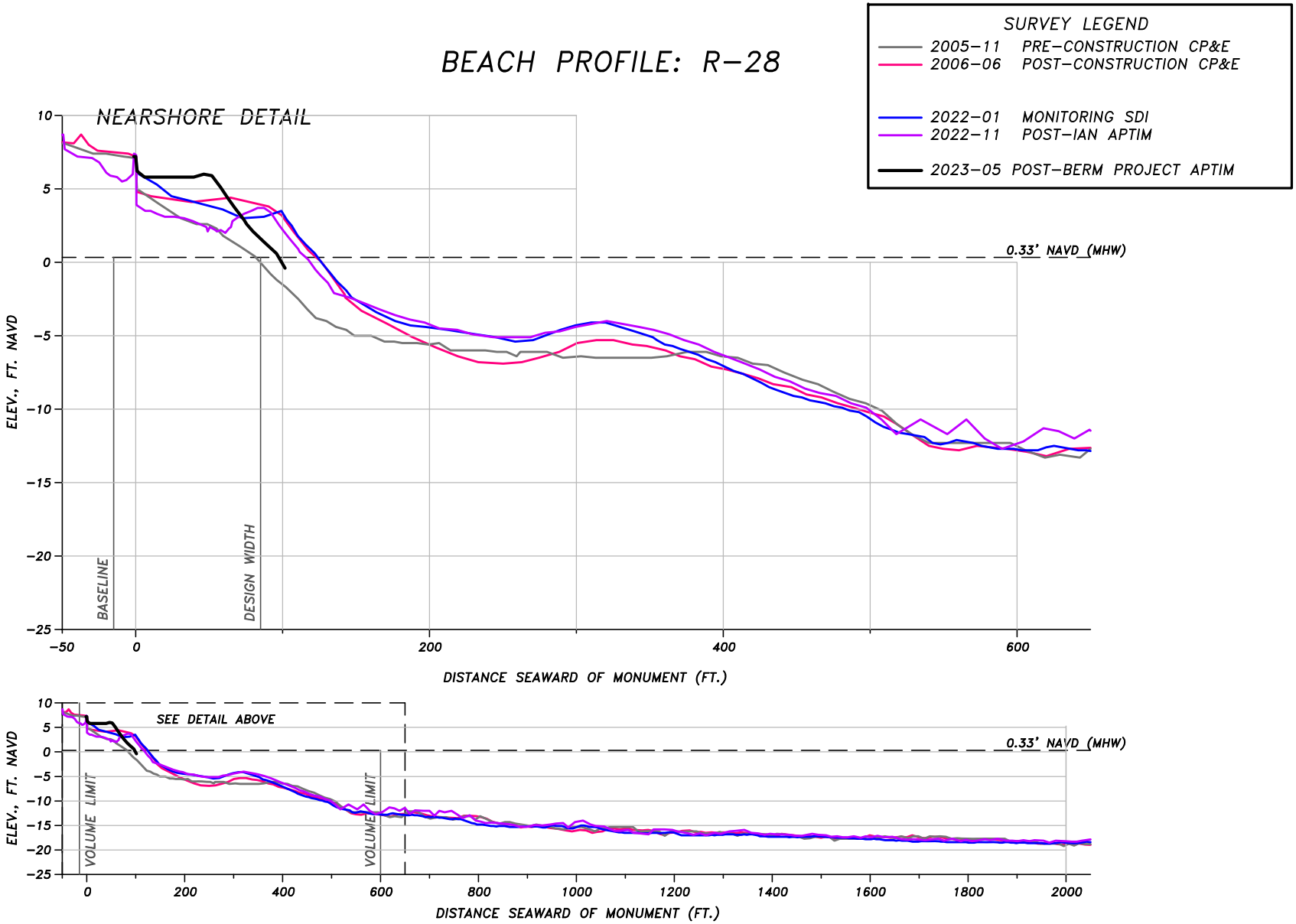

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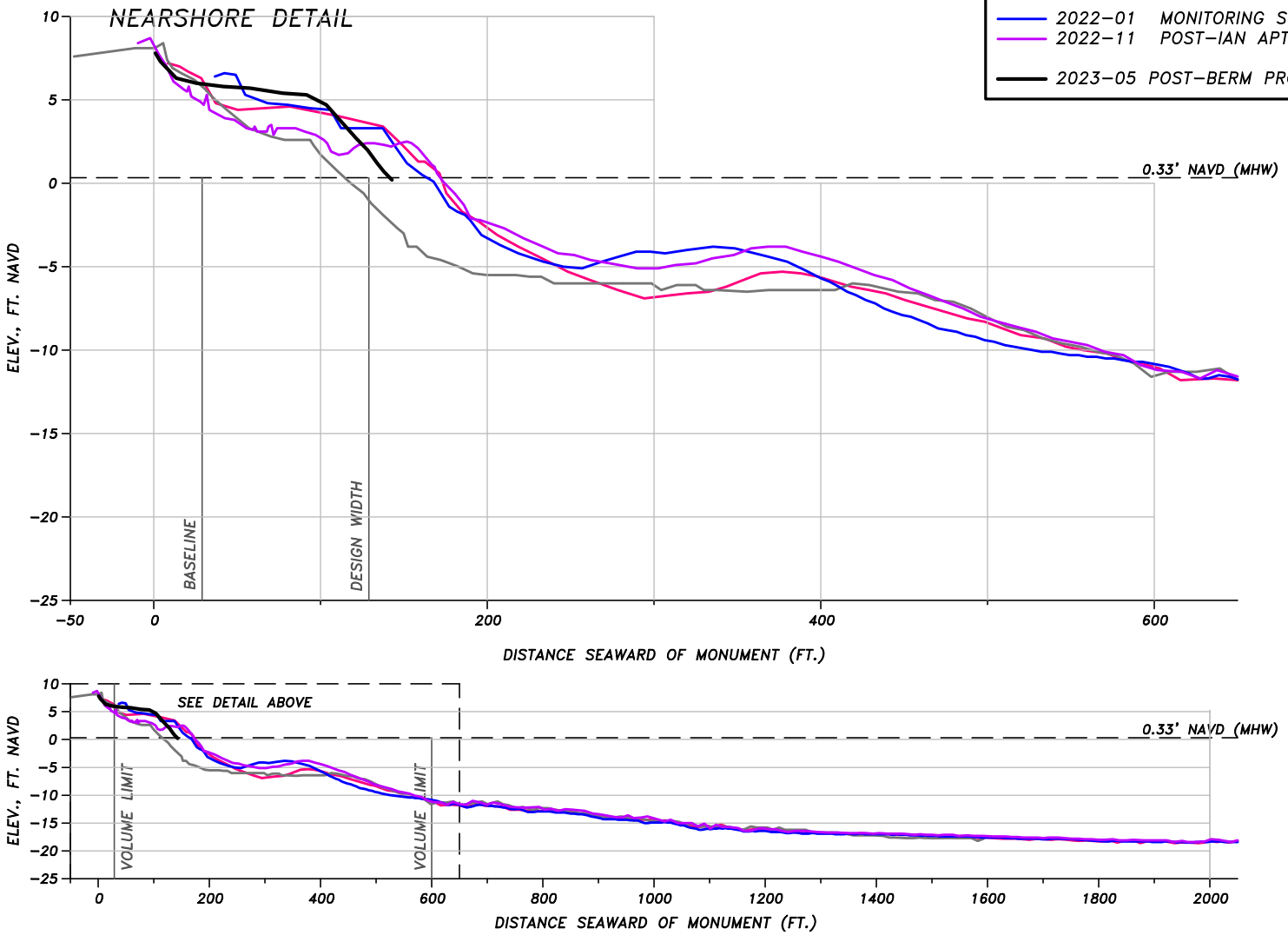
BEACH PROFILE: R-29



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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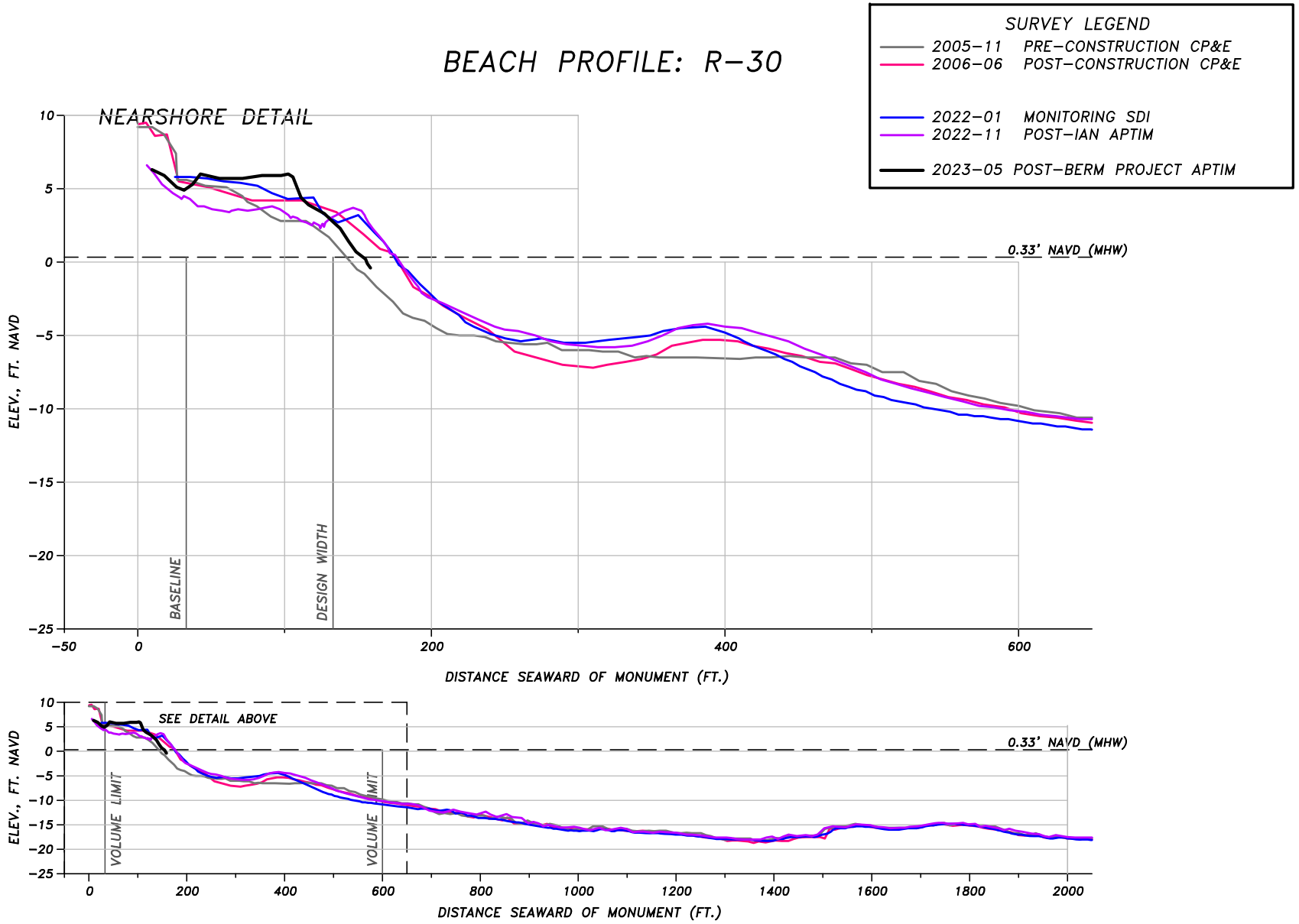
BEACH PROFILE: R-30



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

5679 STRAND COURT
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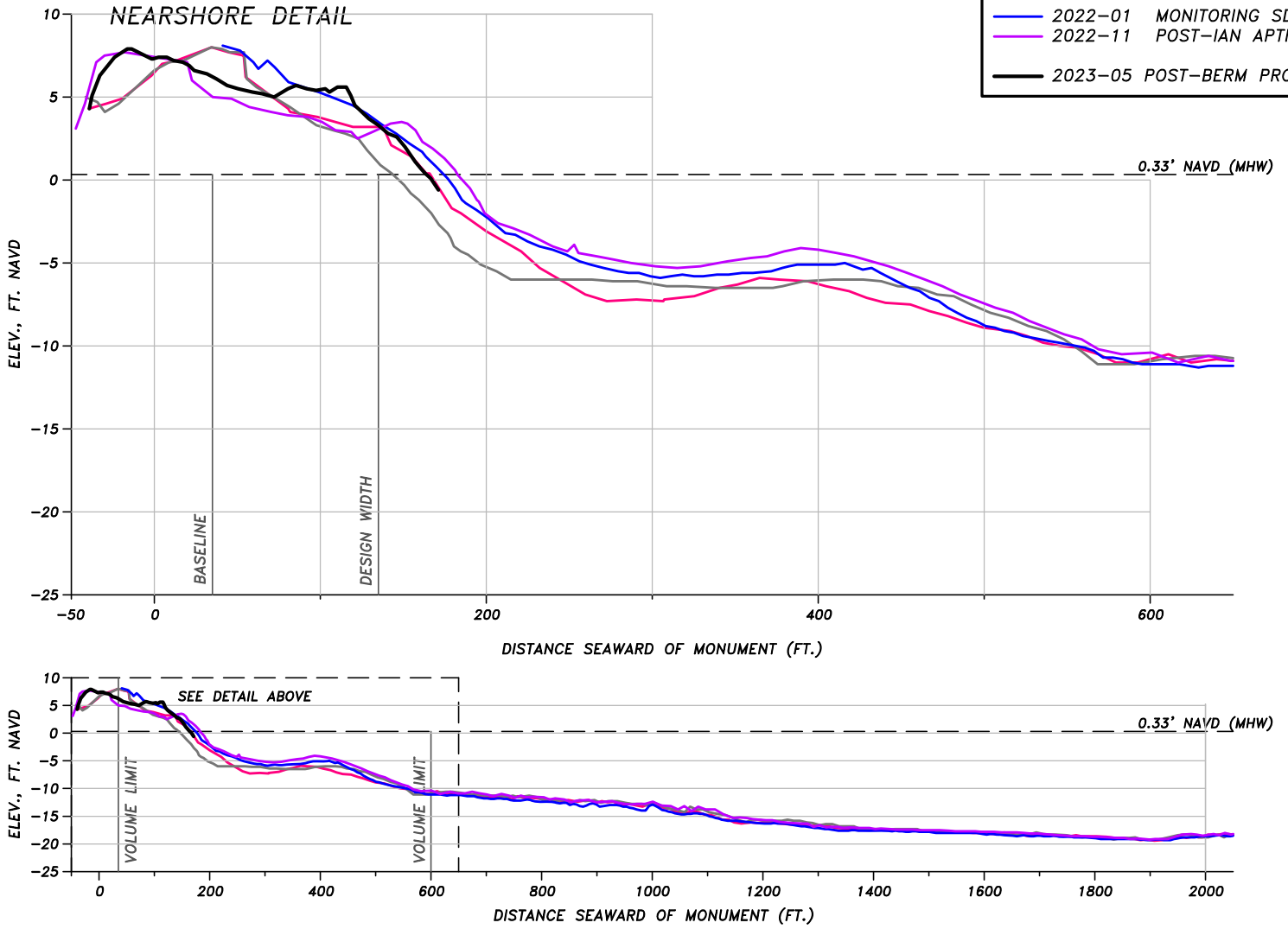
BEACH PROFILE: R-31



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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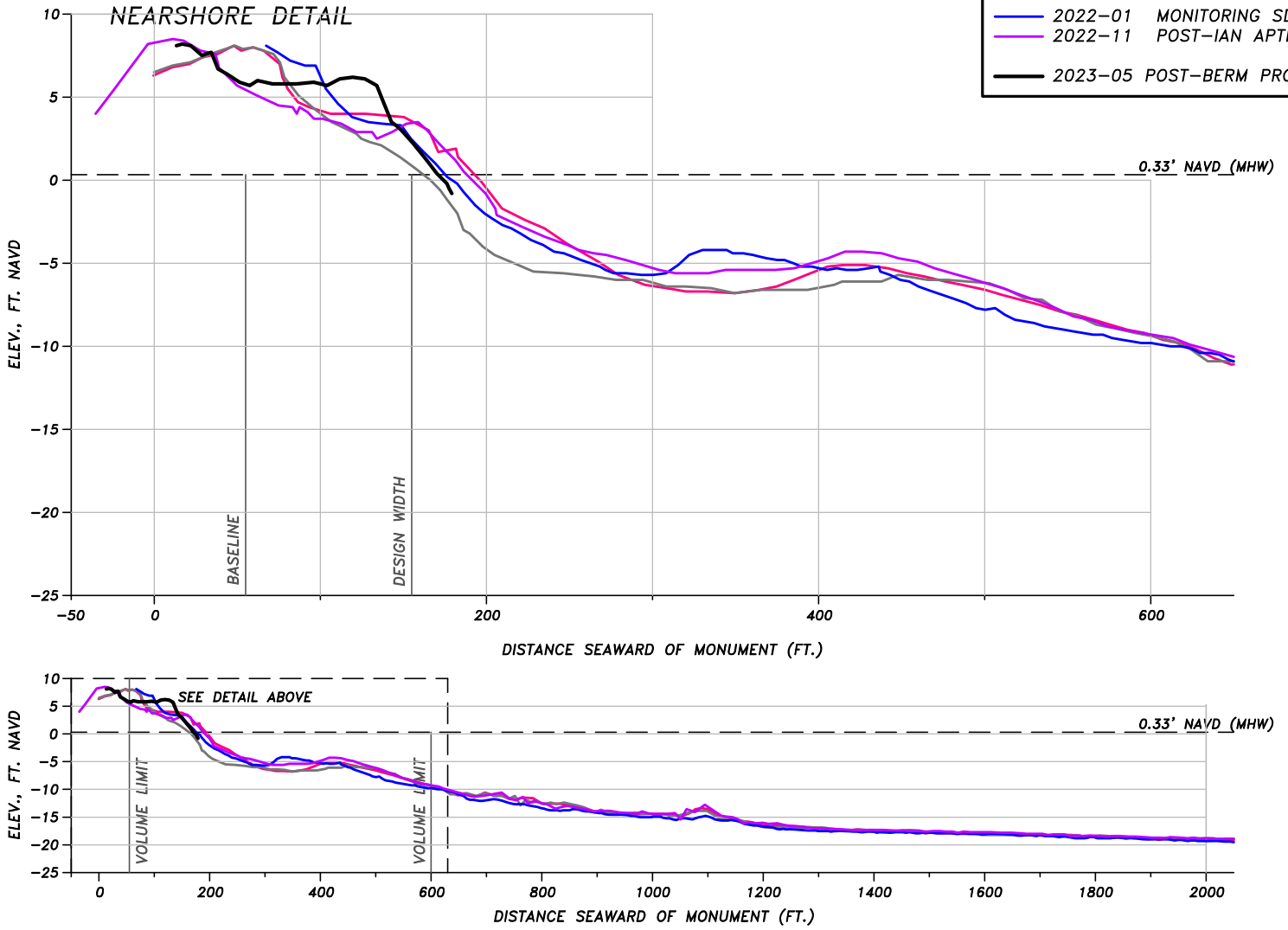
BEACH PROFILE: R-32



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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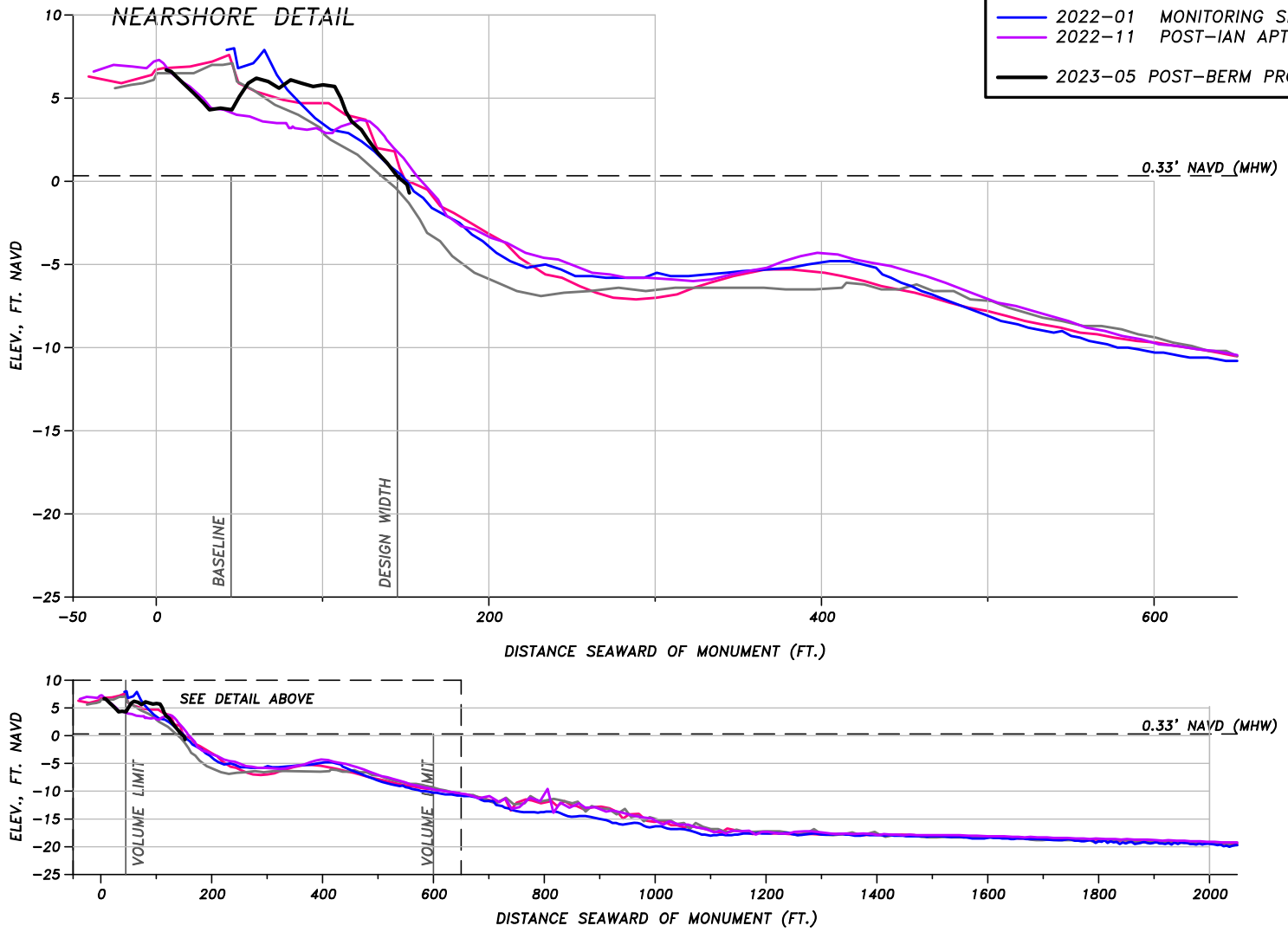
BEACH PROFILE: R-33



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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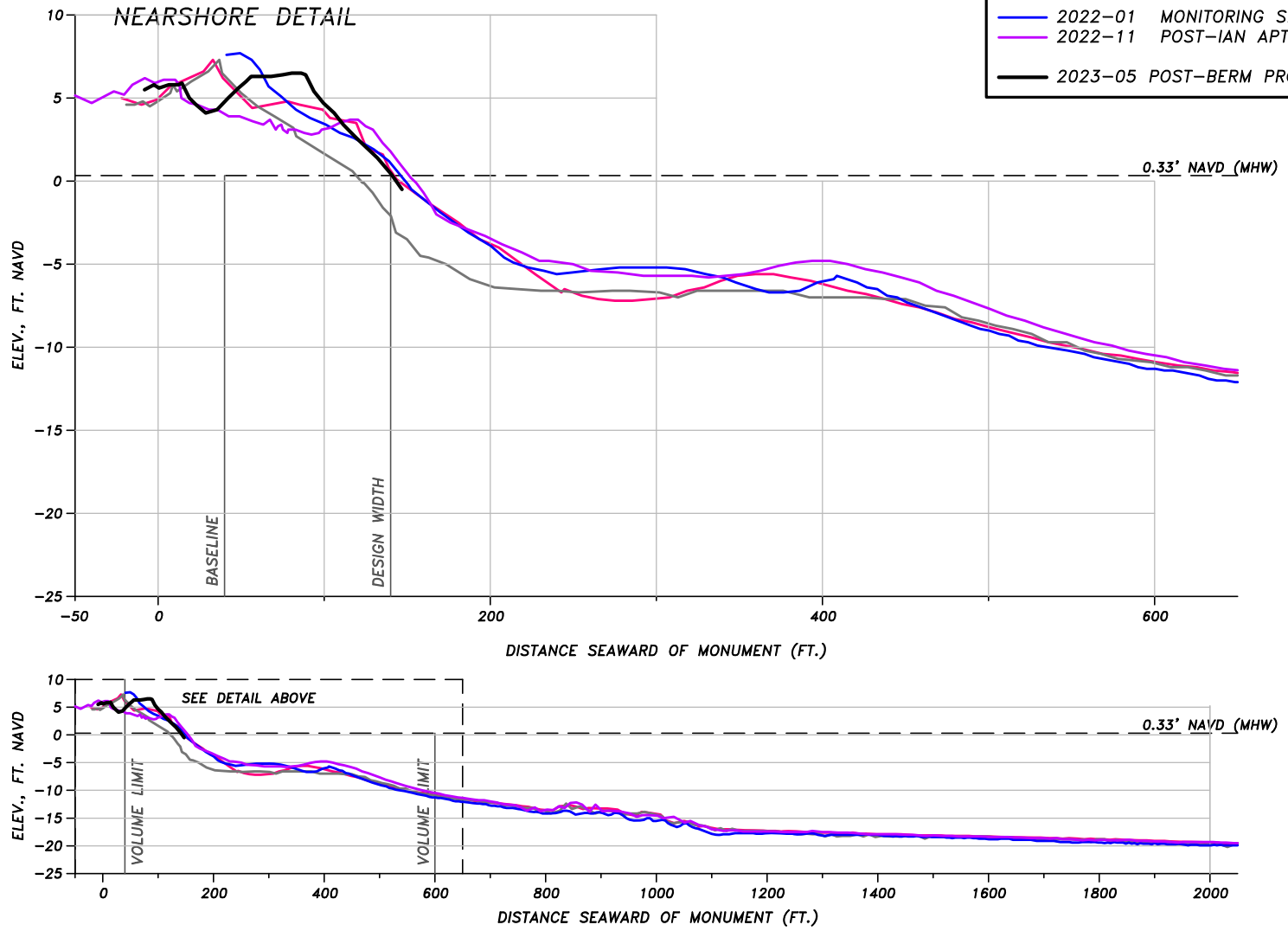
BEACH PROFILE: R-34



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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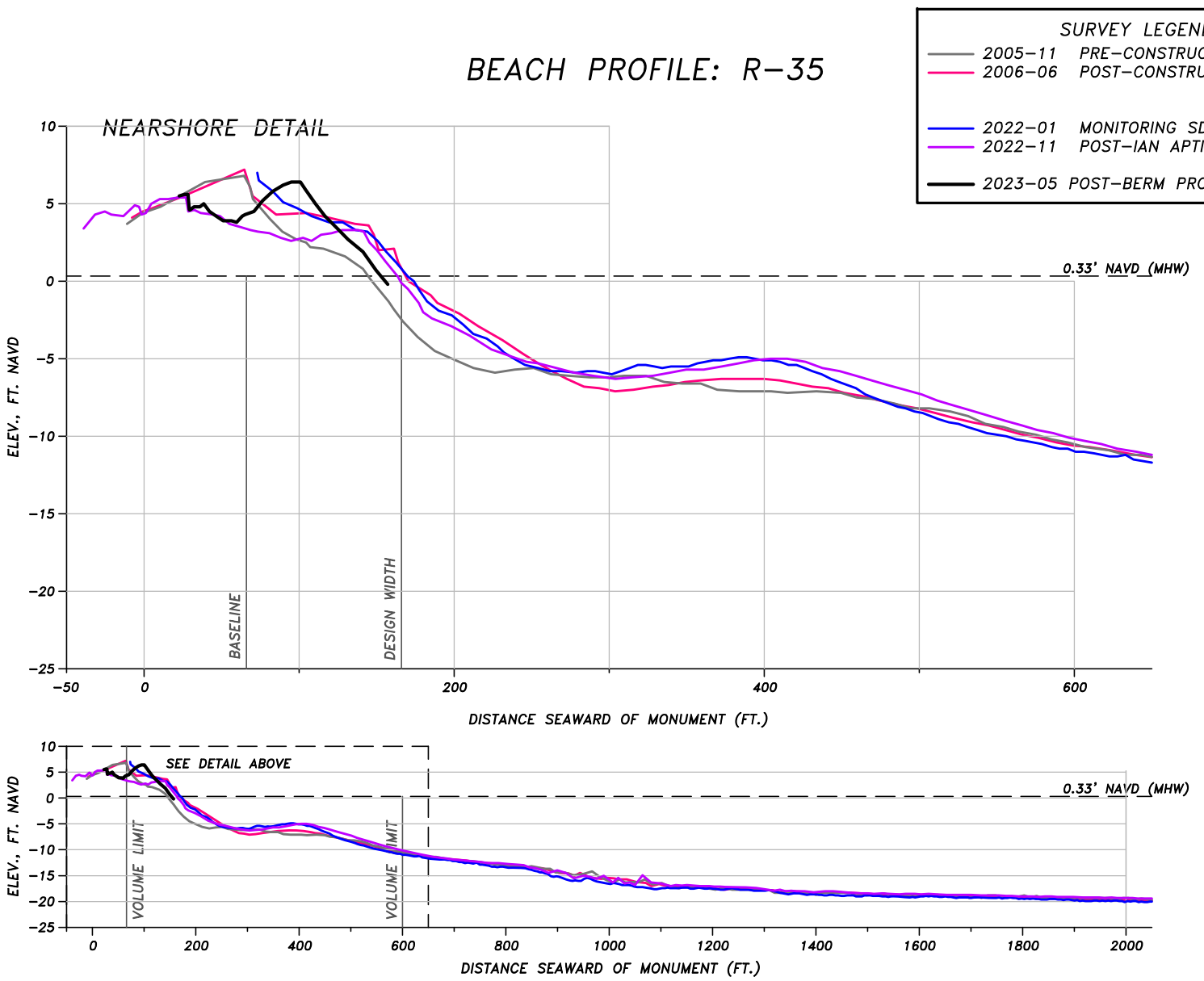
BEACH PROFILE: R-35



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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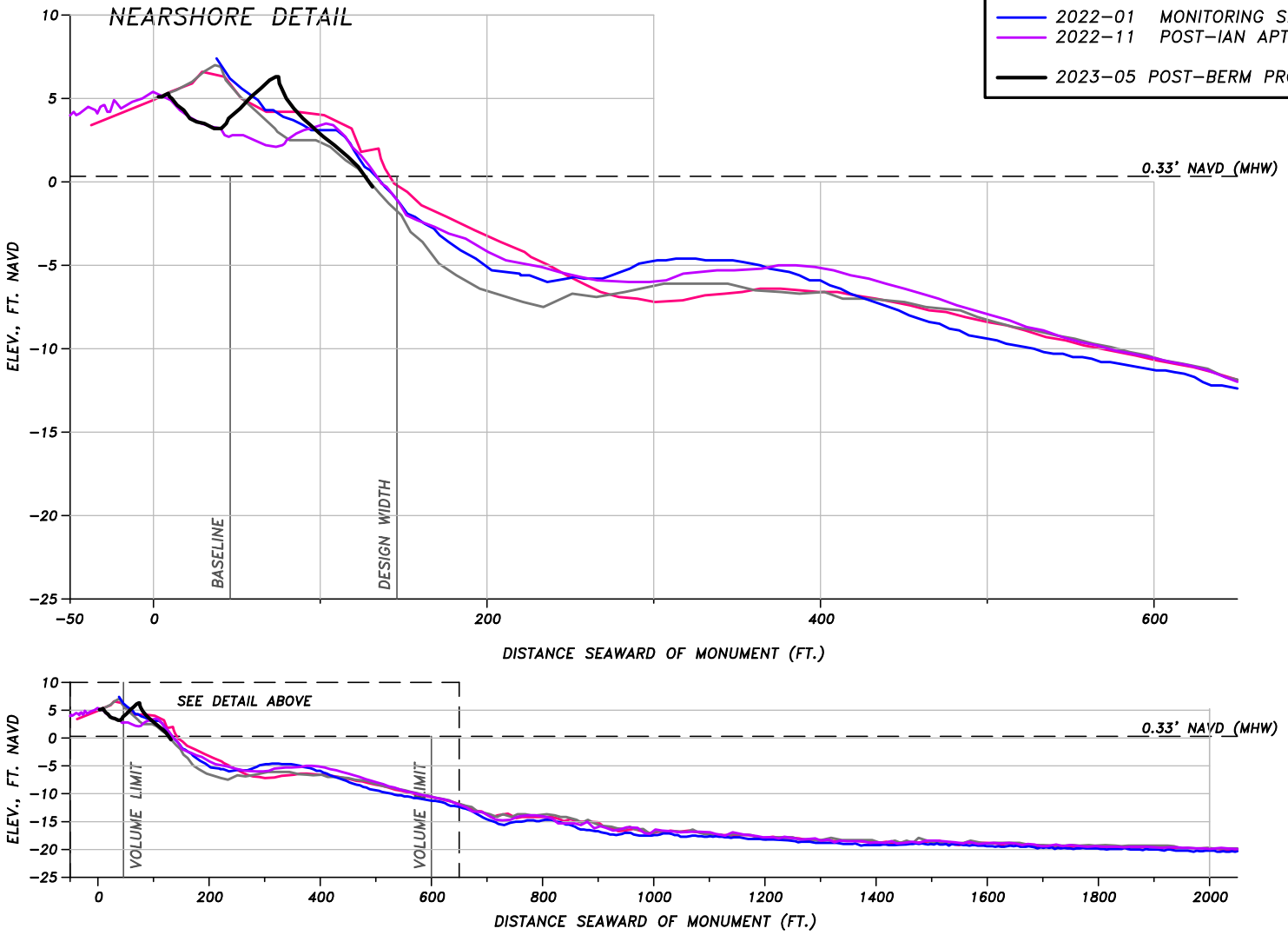
BEACH PROFILE: R-36



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COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
FOR: COLLIER COUNTY		
DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
JOB: 18022	DATUM: NAVD	FIGURE:

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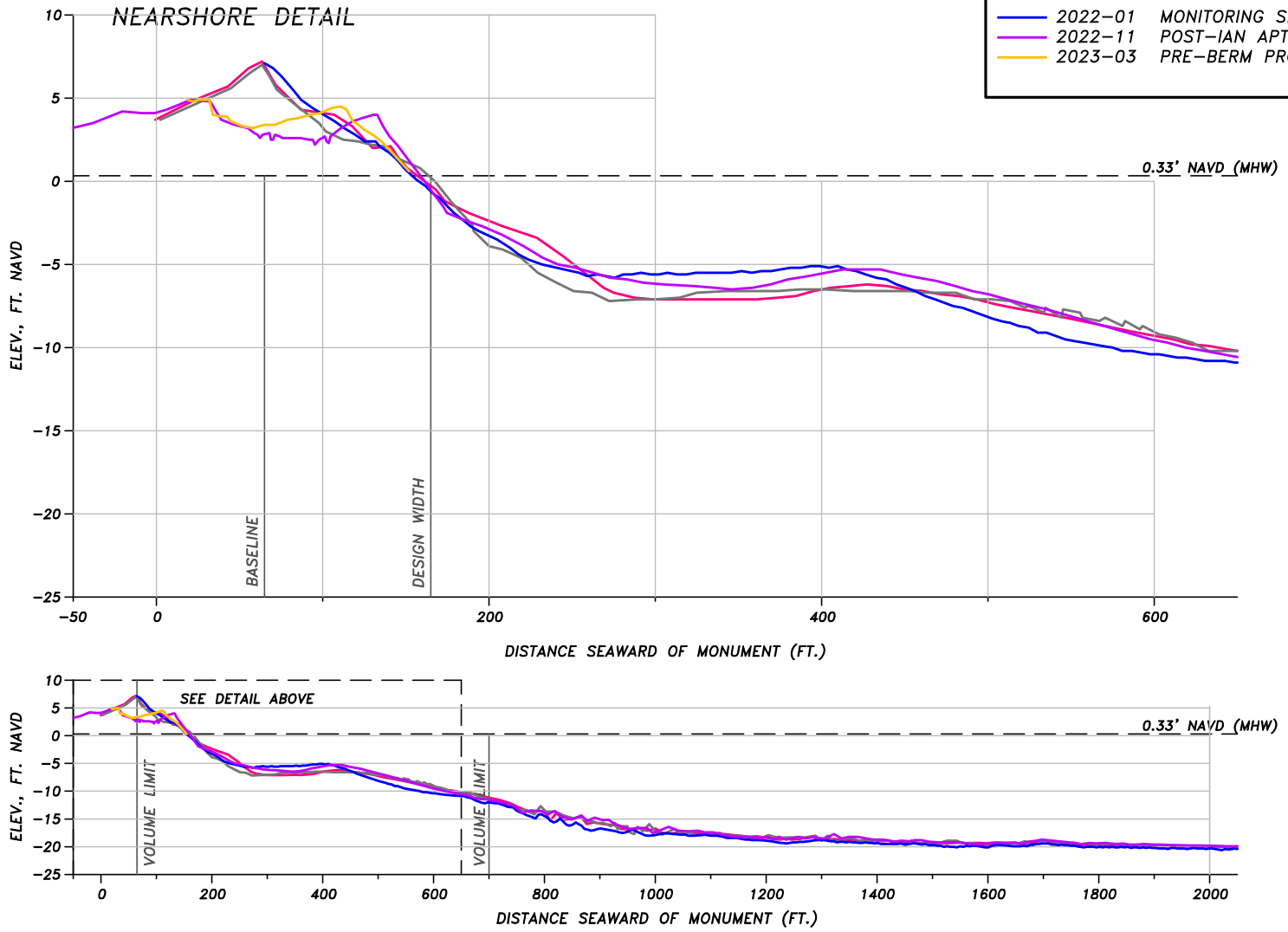
BEACH PROFILE: R-37



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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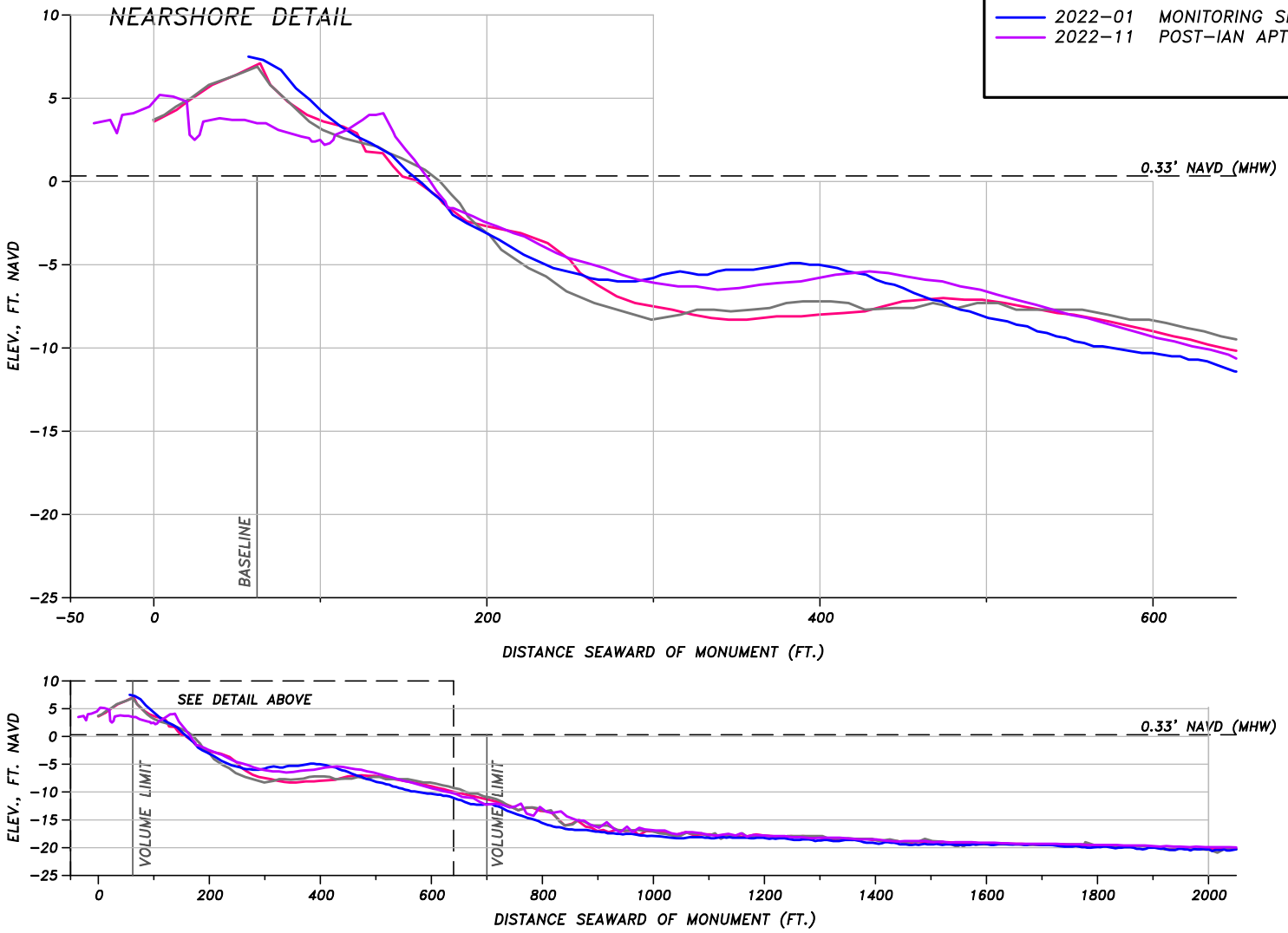
BEACH PROFILE: R-38



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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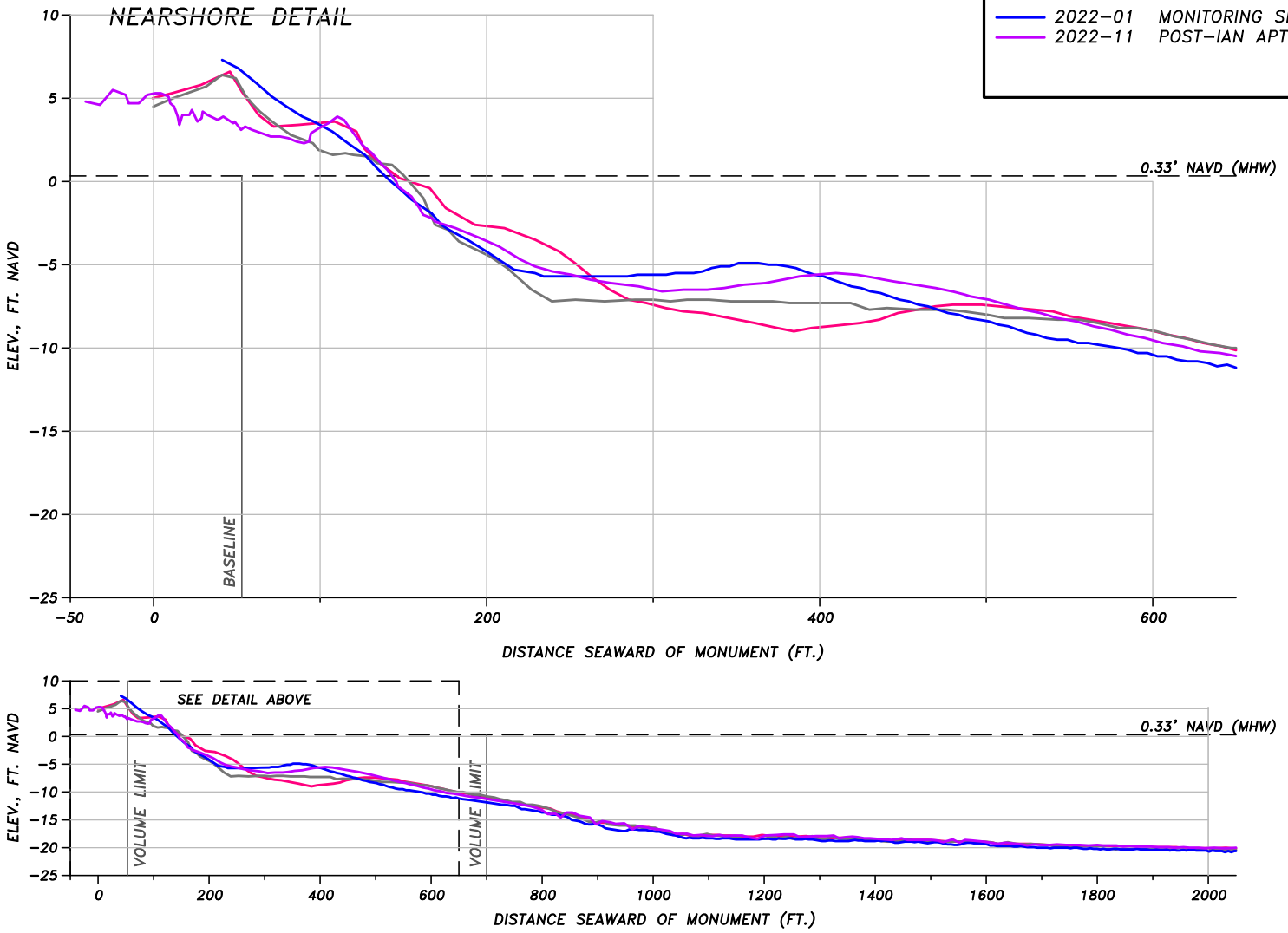
BEACH PROFILE: R-39



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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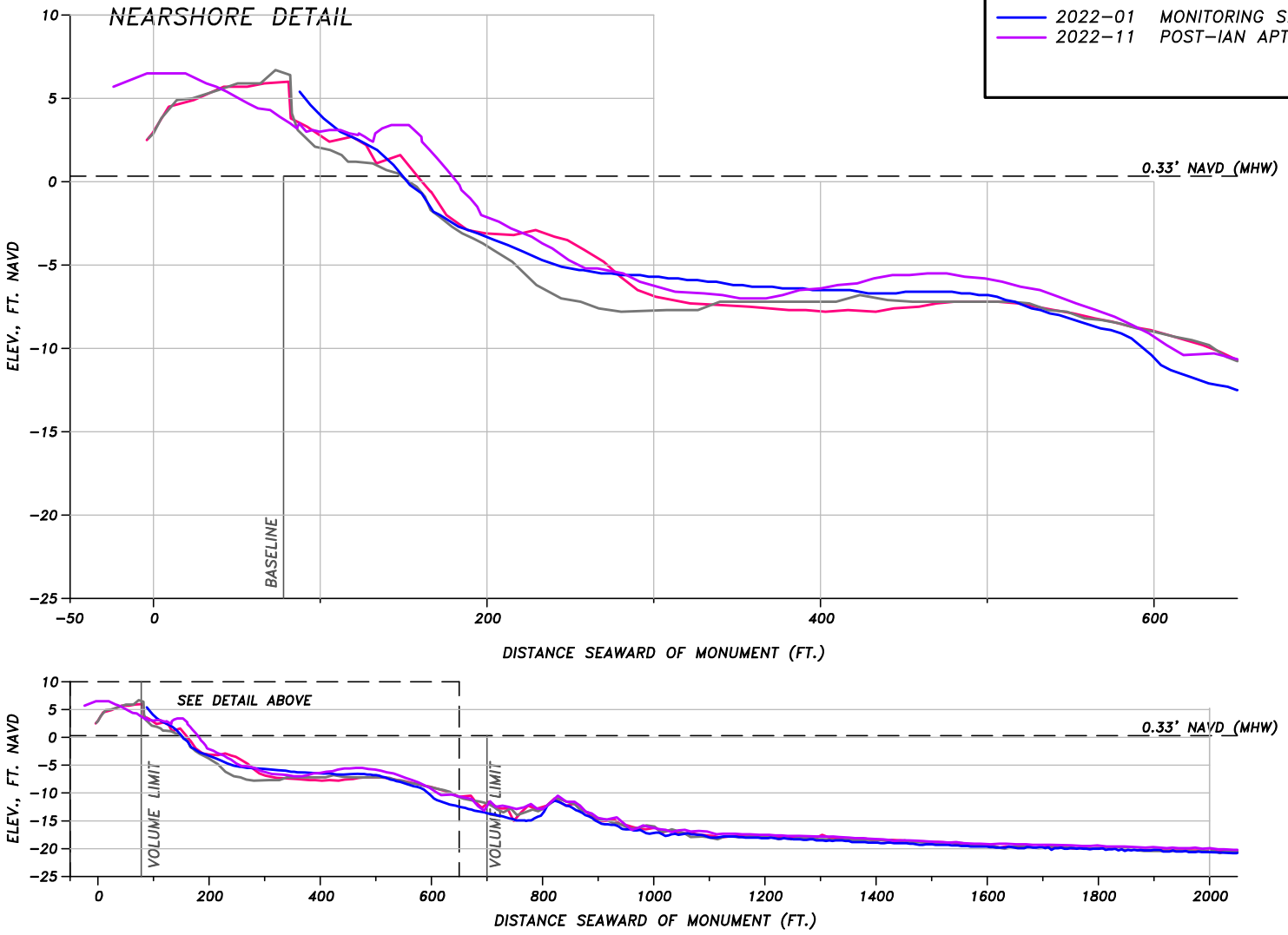
BEACH PROFILE: R-40



HUMISTON & MOORE ENGINEERS
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COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
FOR: COLLIER COUNTY		
DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
JOB: 18022	DATUM: NAVD	FIGURE:

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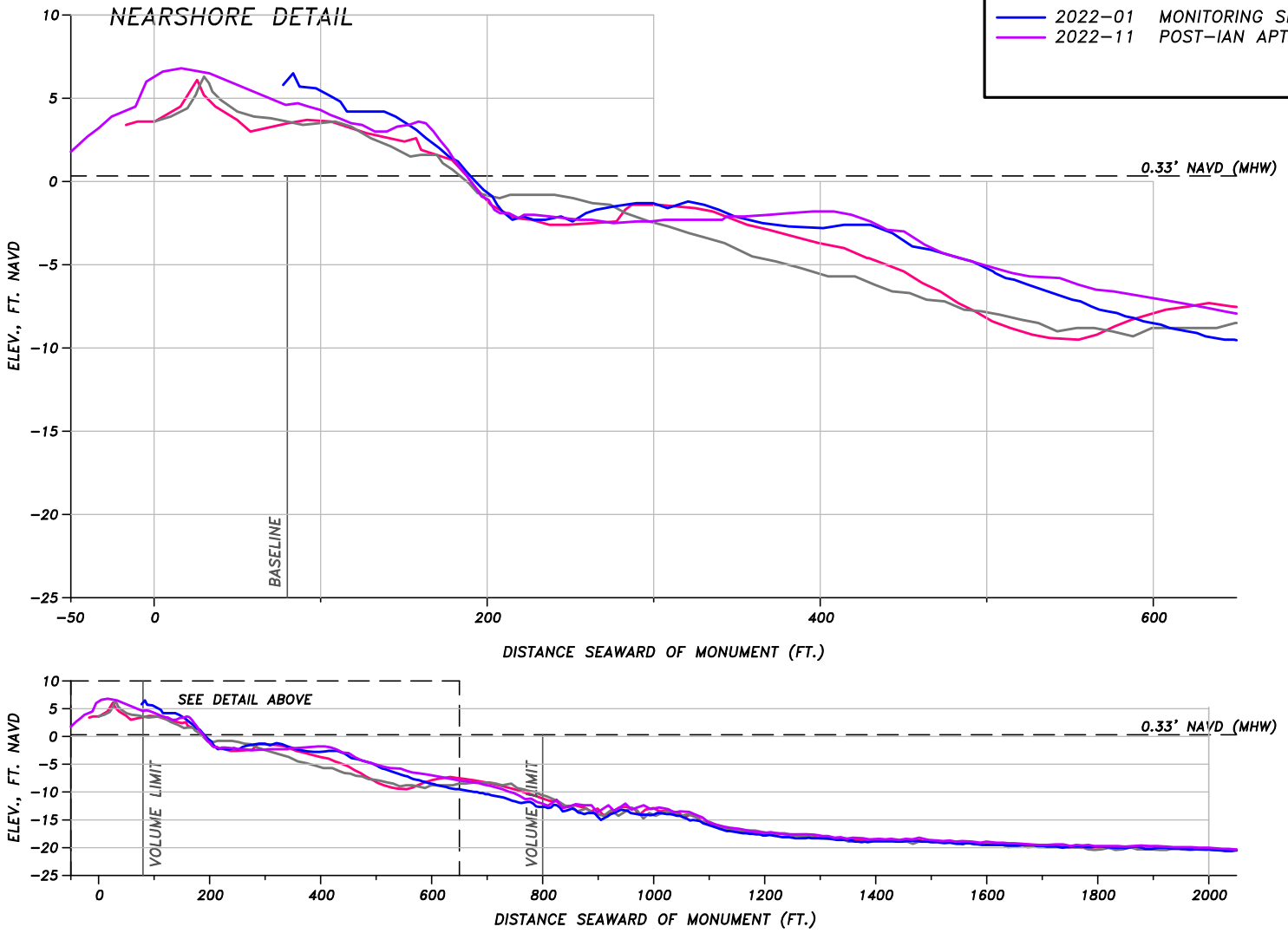
BEACH PROFILE: R-41



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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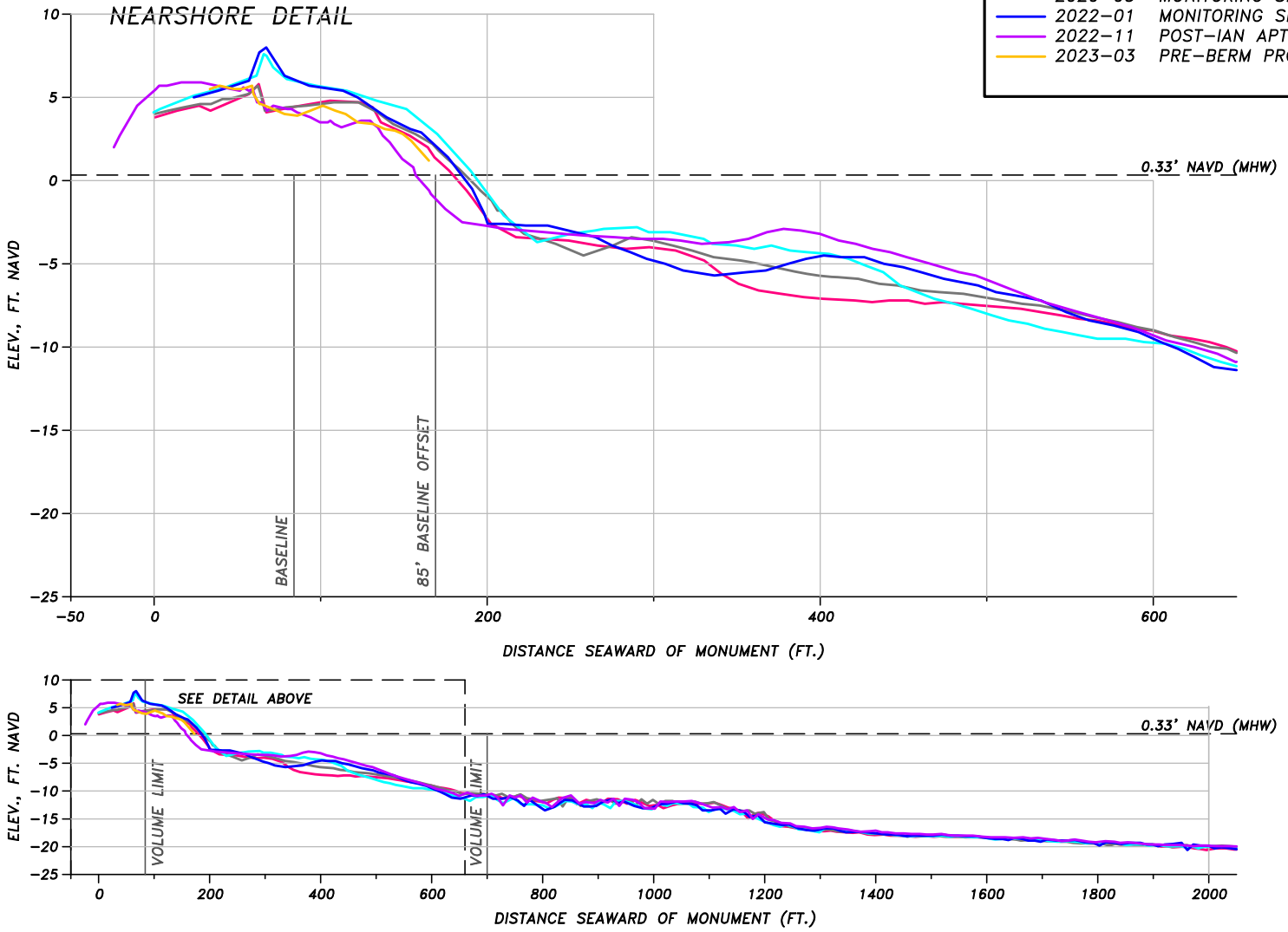
BEACH PROFILE: R-42



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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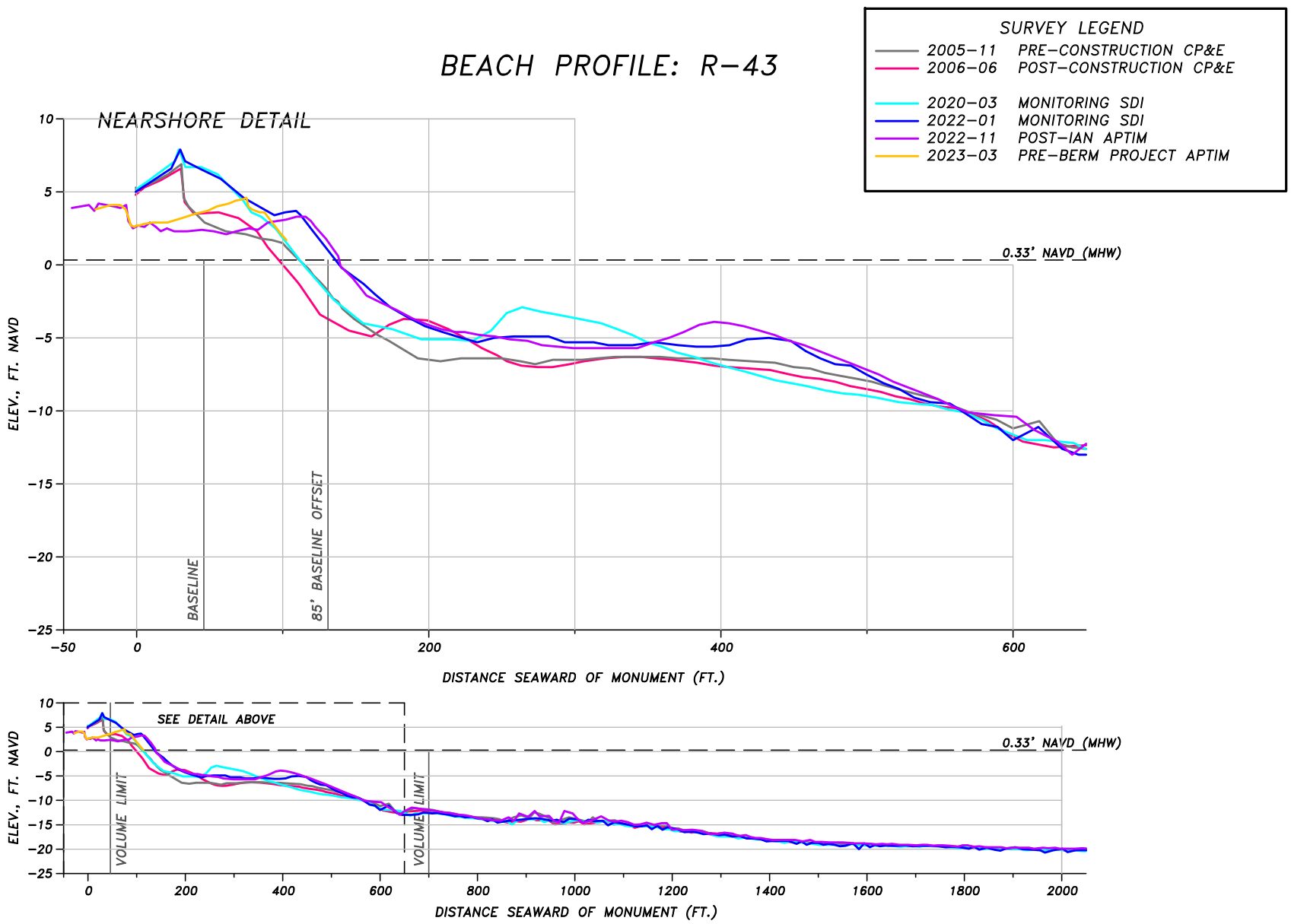
BEACH PROFILE: R-43



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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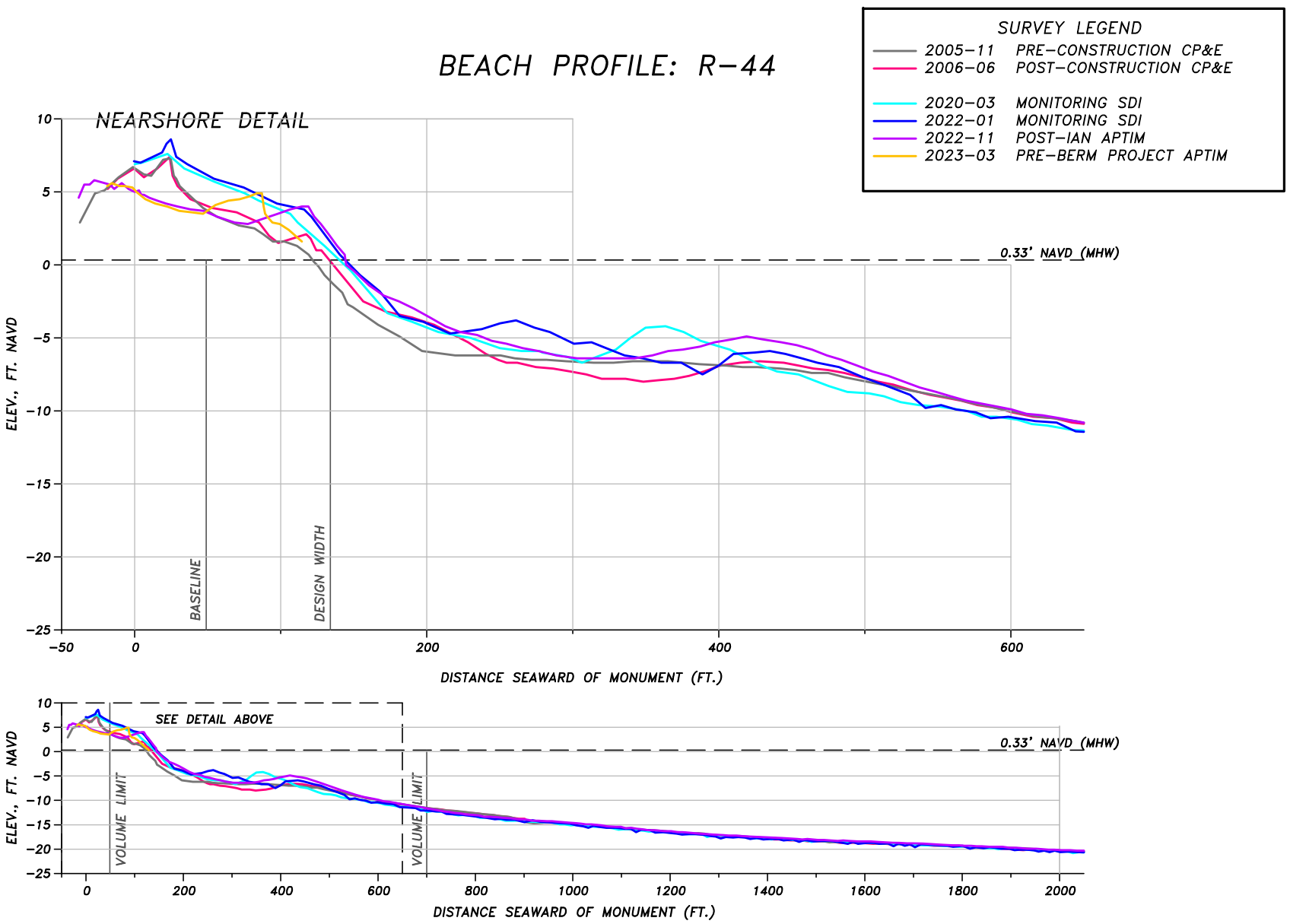
BEACH PROFILE: R-44



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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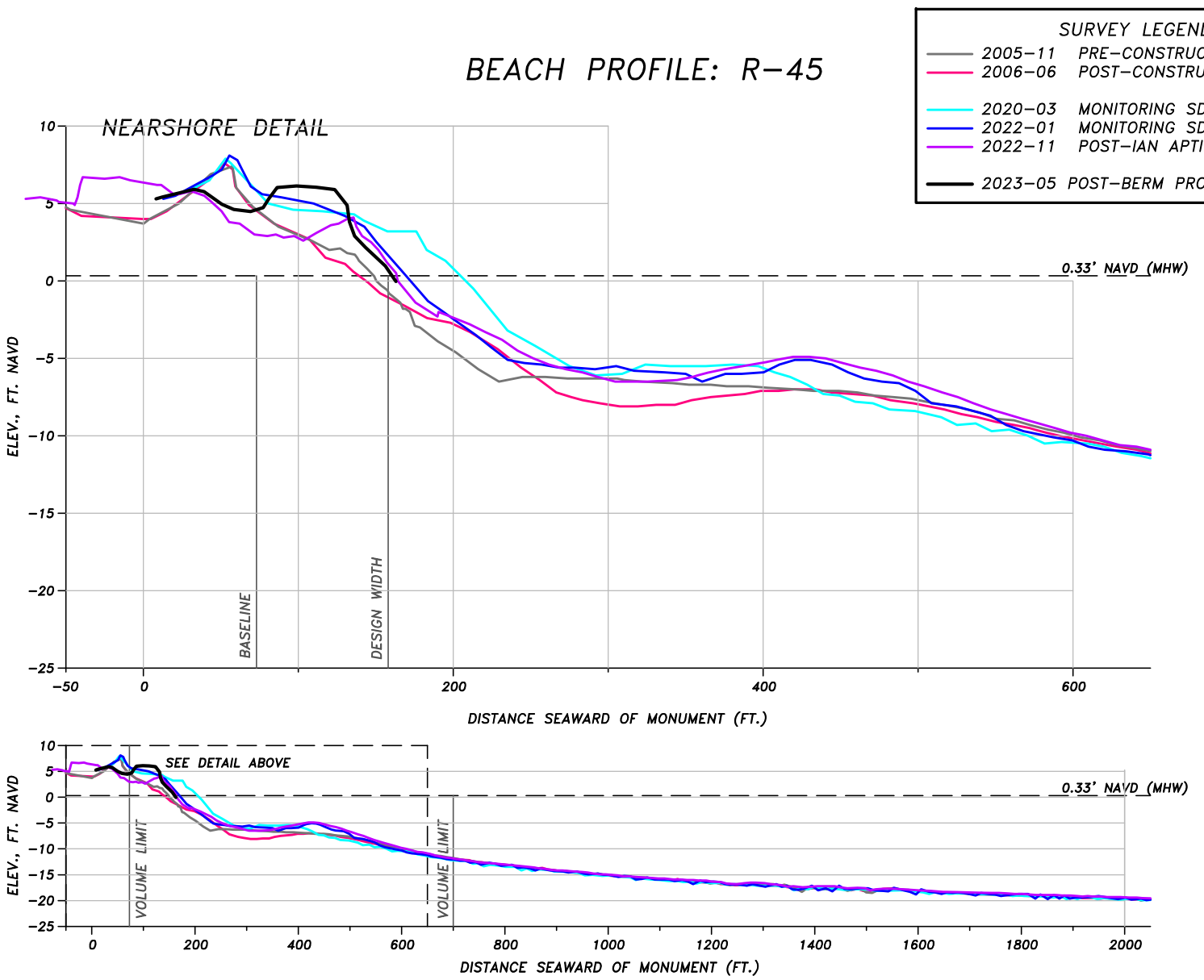
BEACH PROFILE: R-45



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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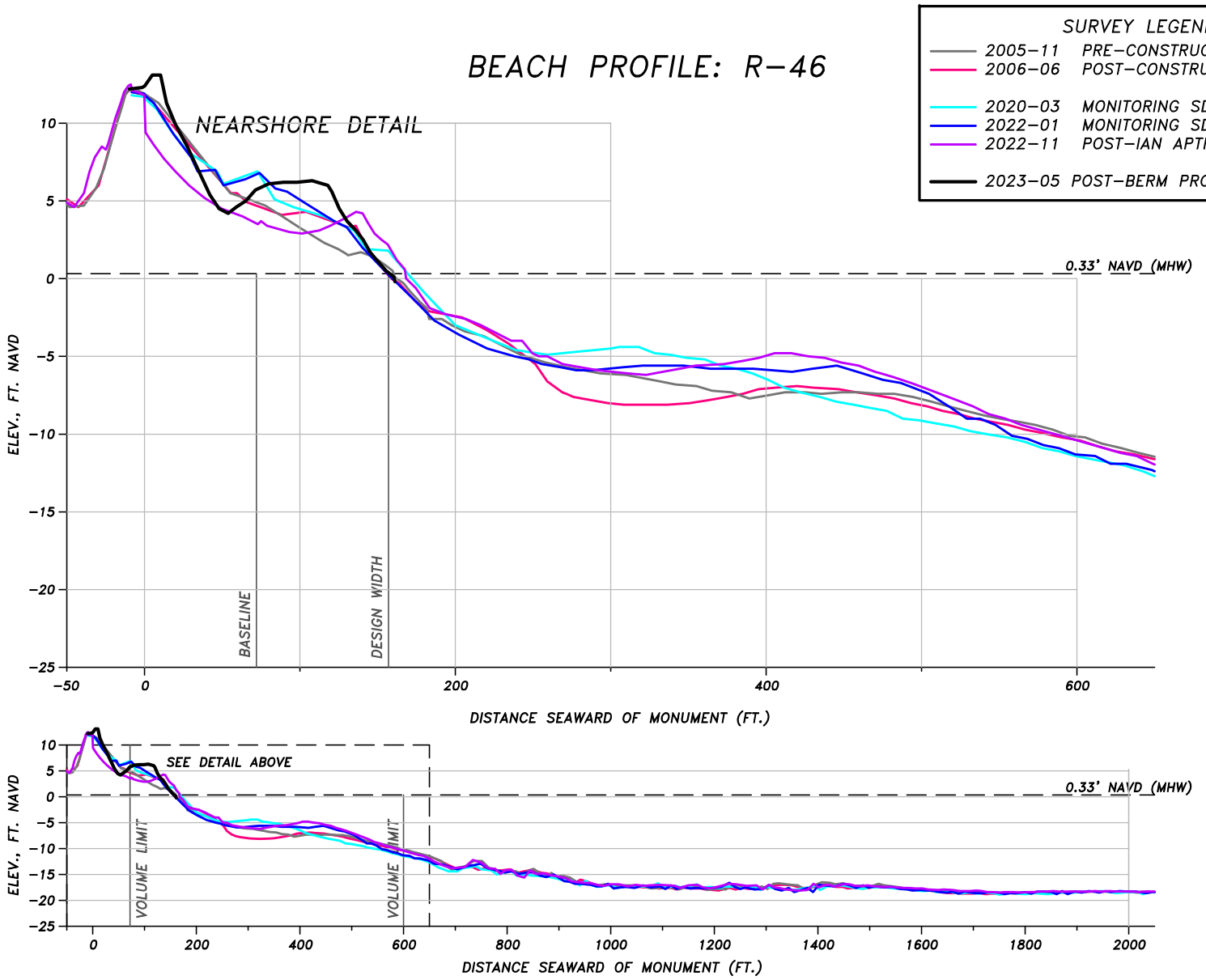
BEACH PROFILE: R-46



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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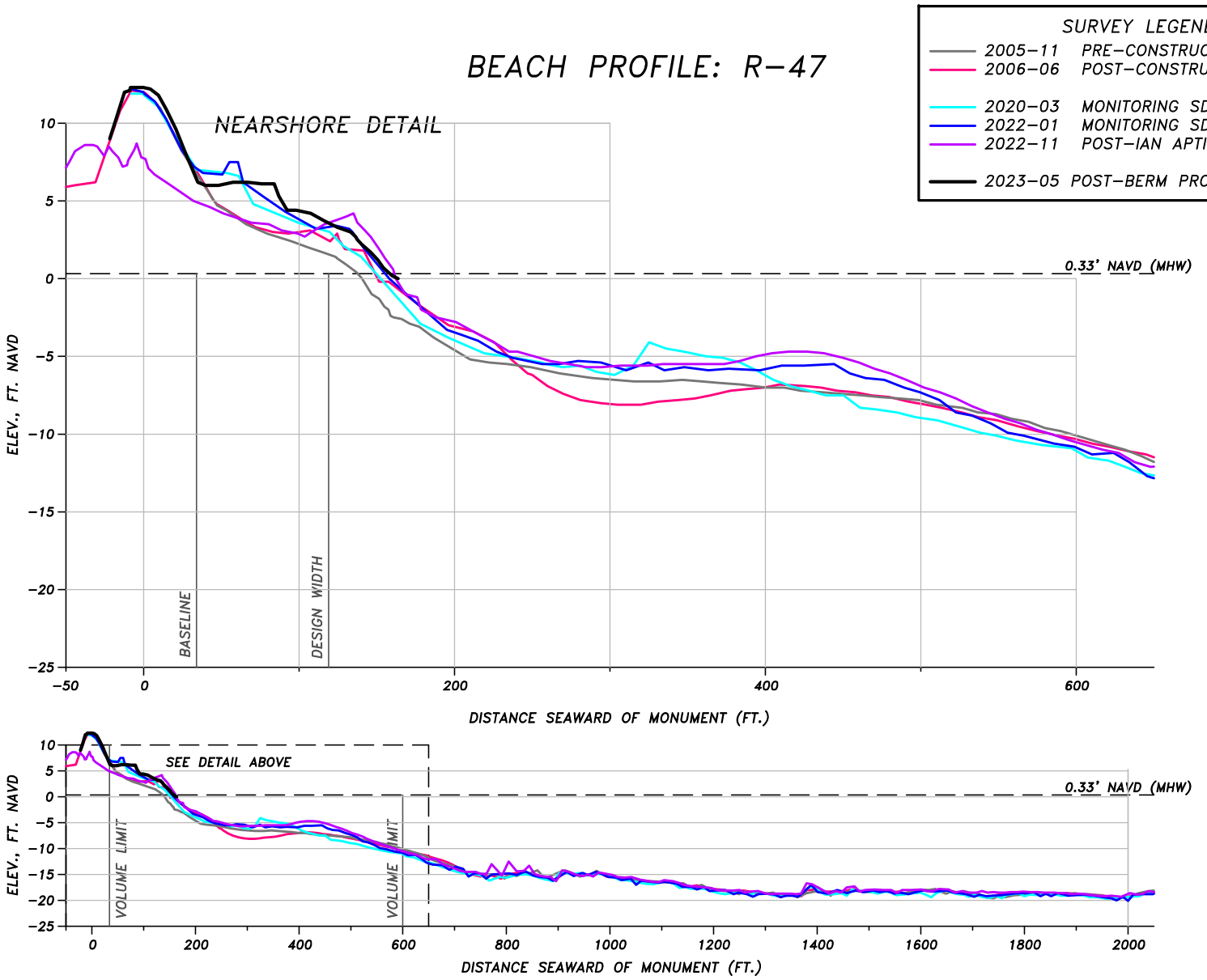
BEACH PROFILE: R-47



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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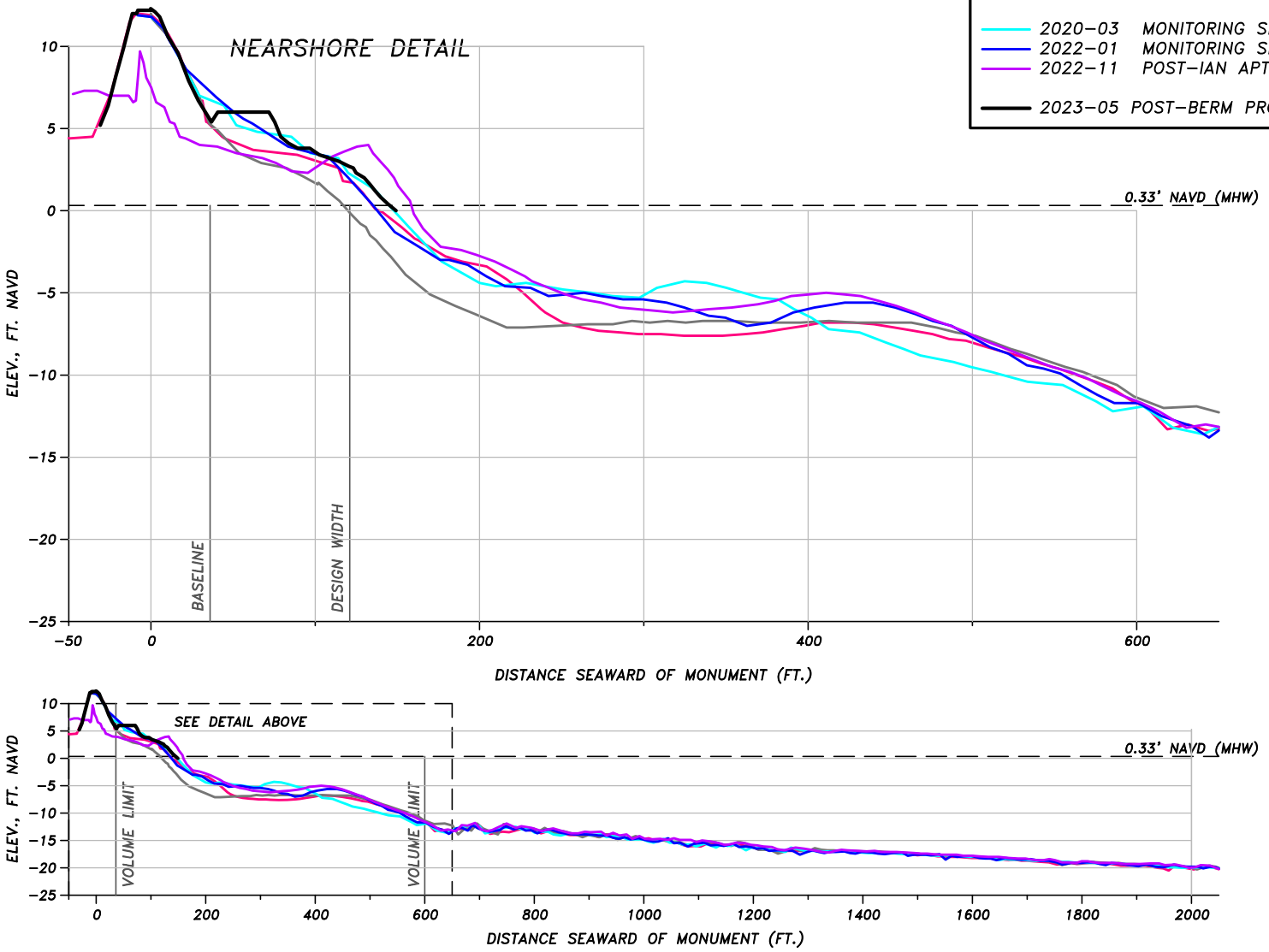
BEACH PROFILE: R-48



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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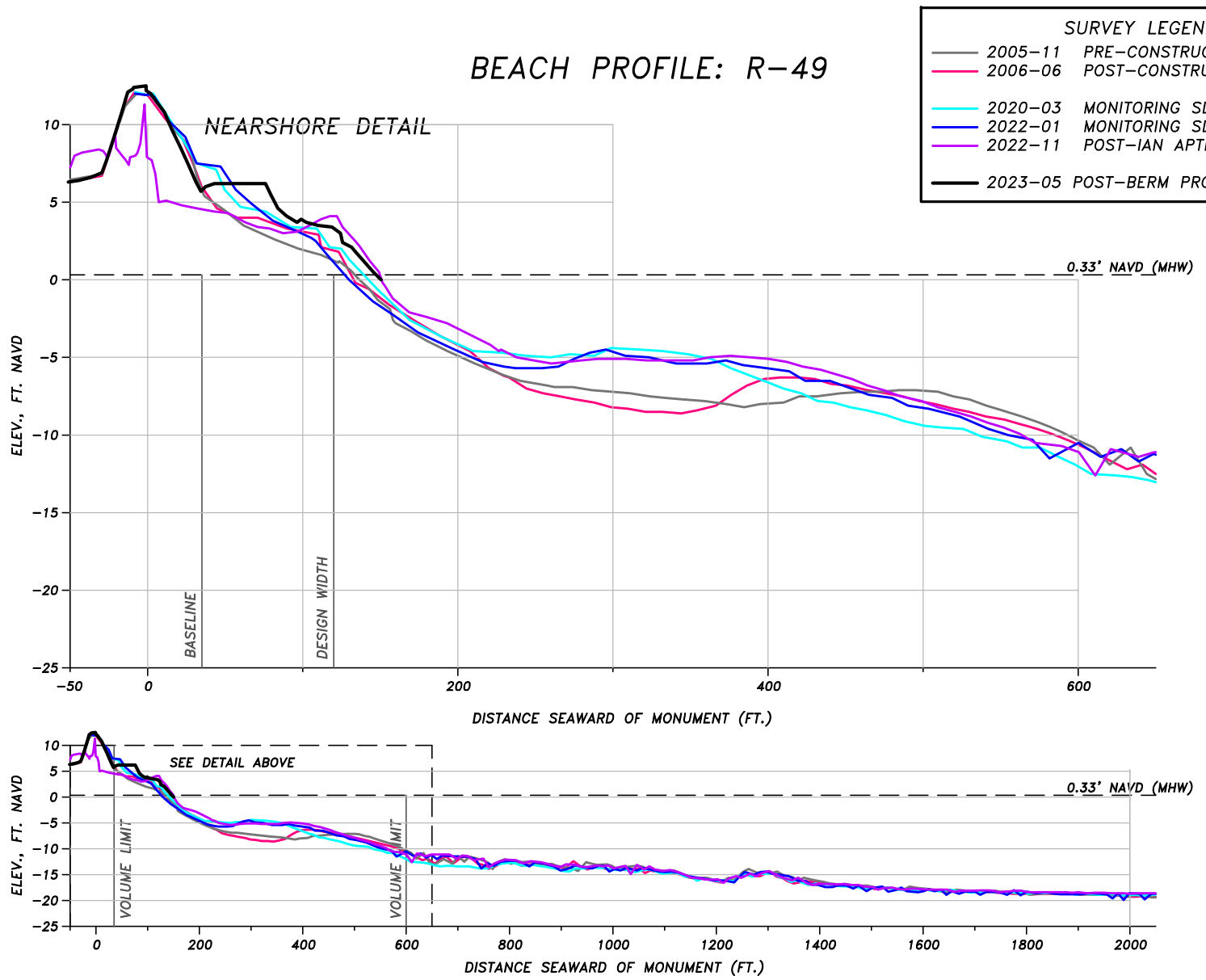
BEACH PROFILE: R-49



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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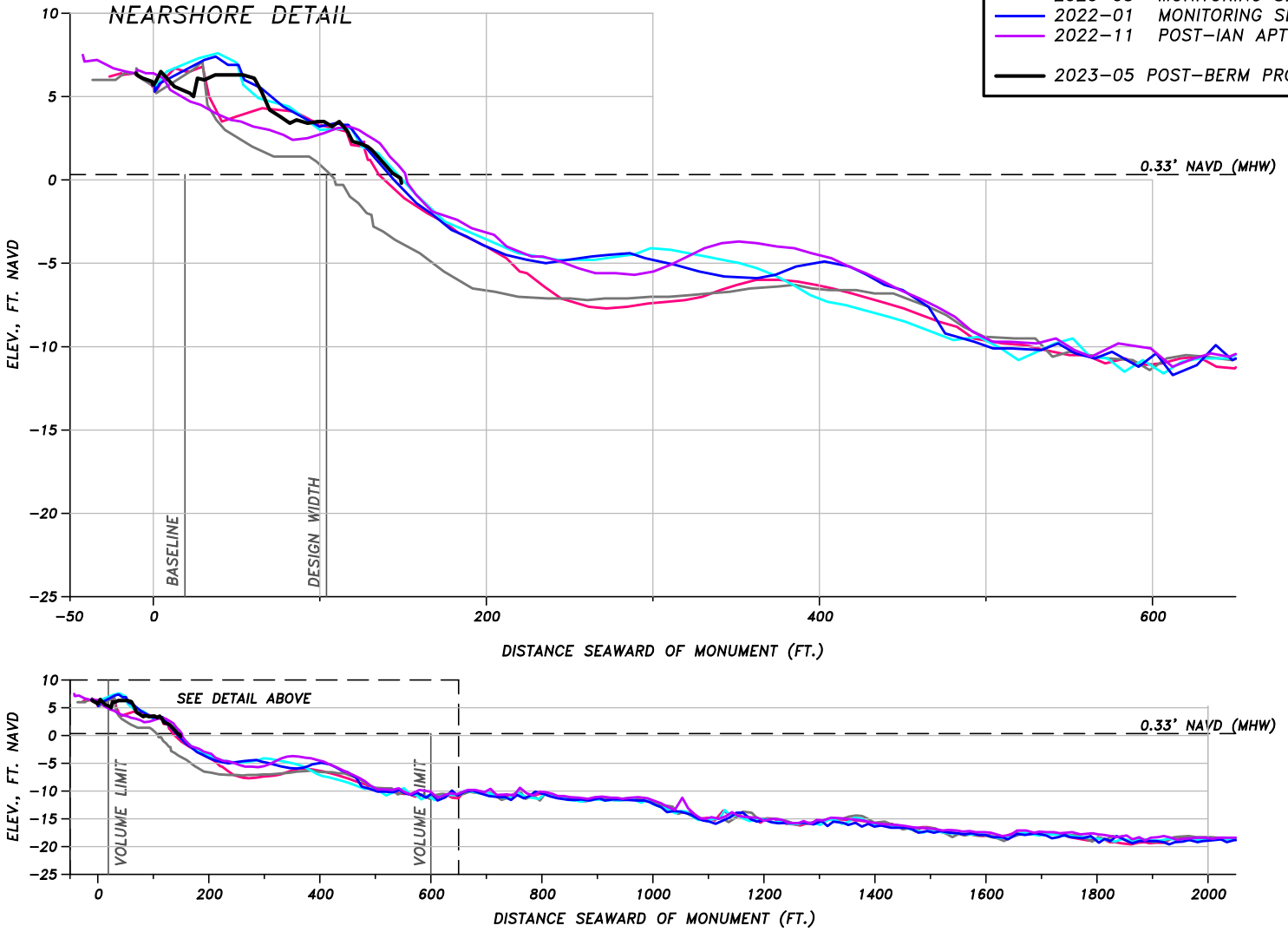
BEACH PROFILE: R-50



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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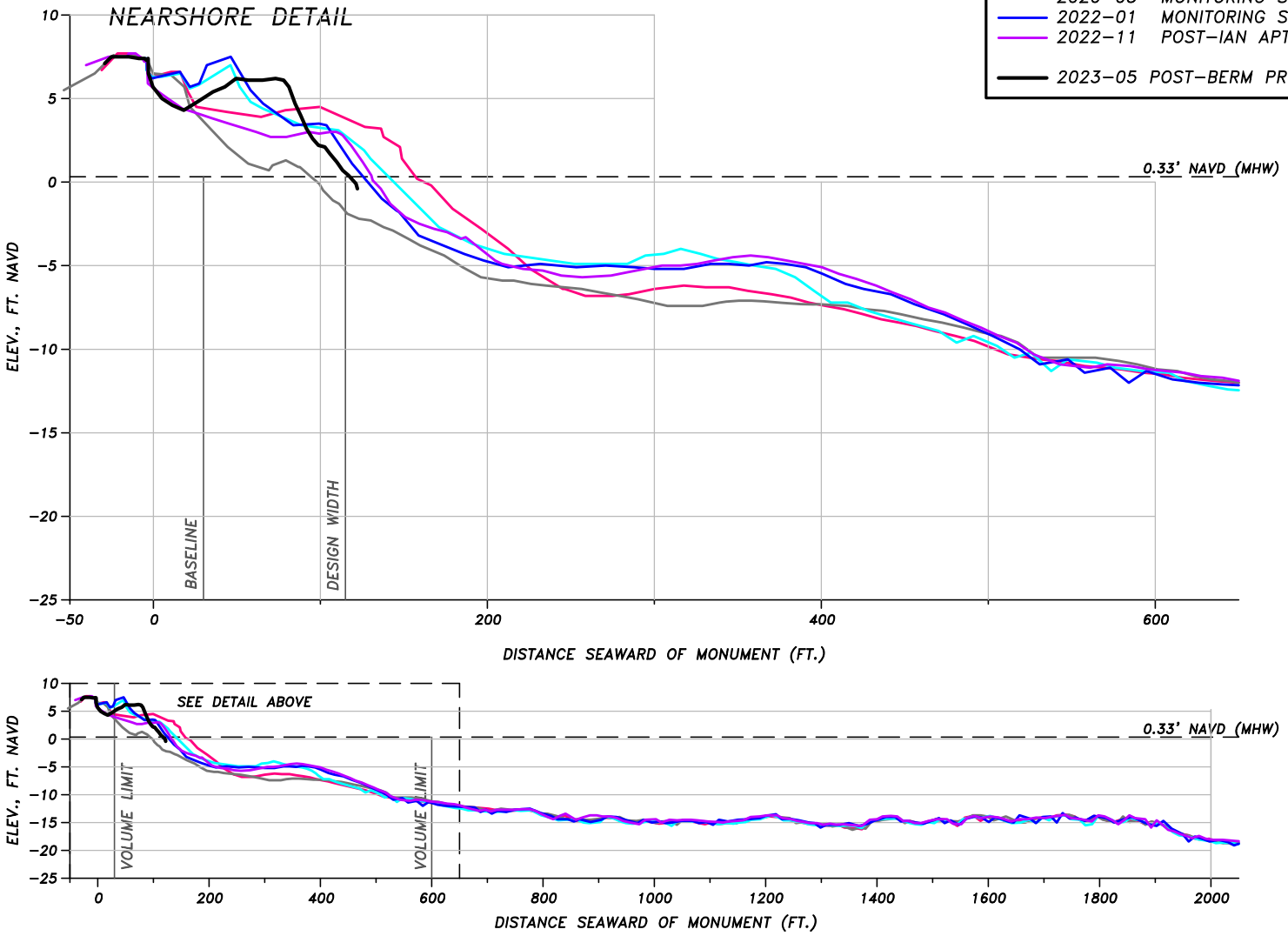
BEACH PROFILE: R-51



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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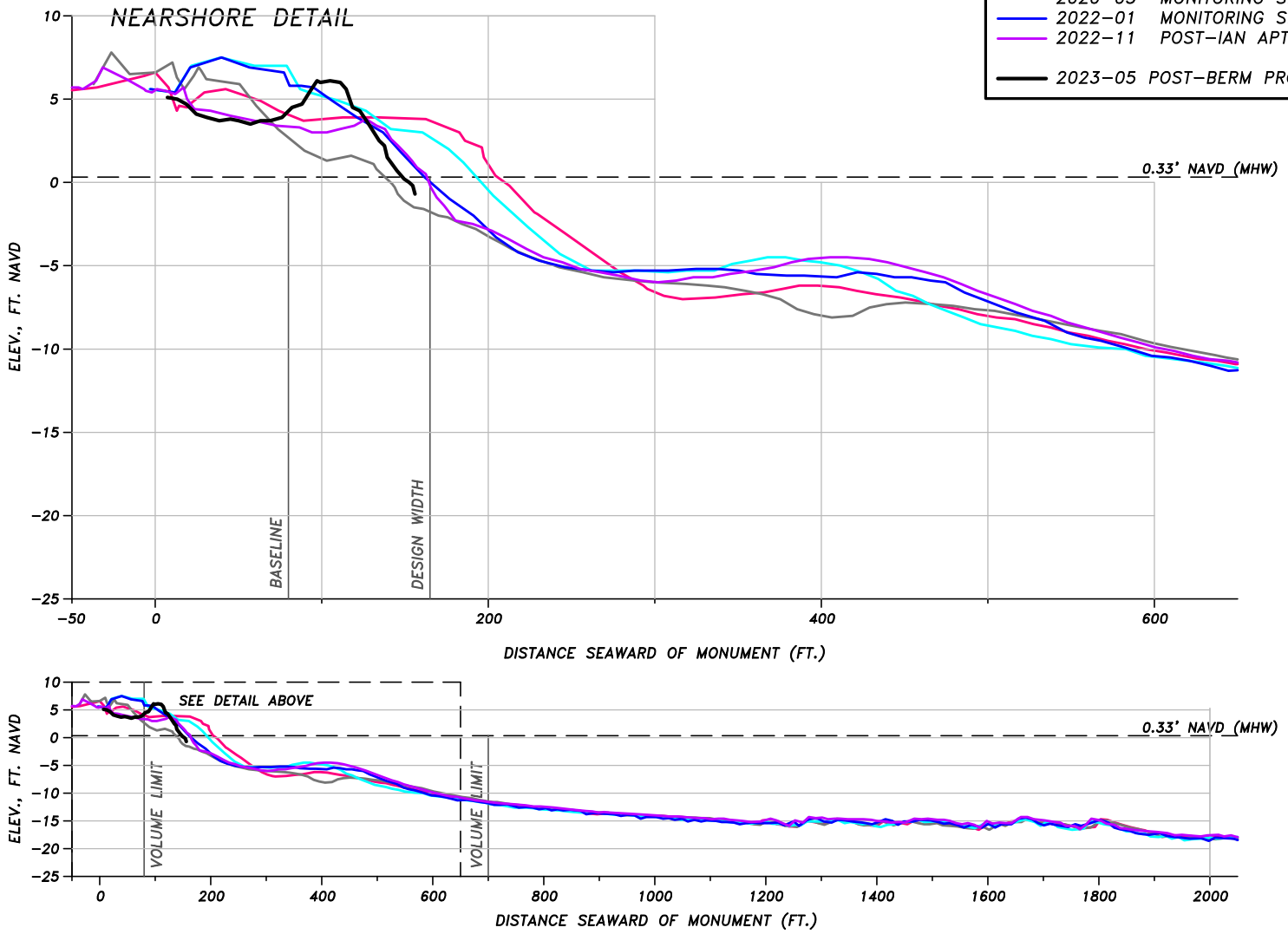
BEACH PROFILE: R-52



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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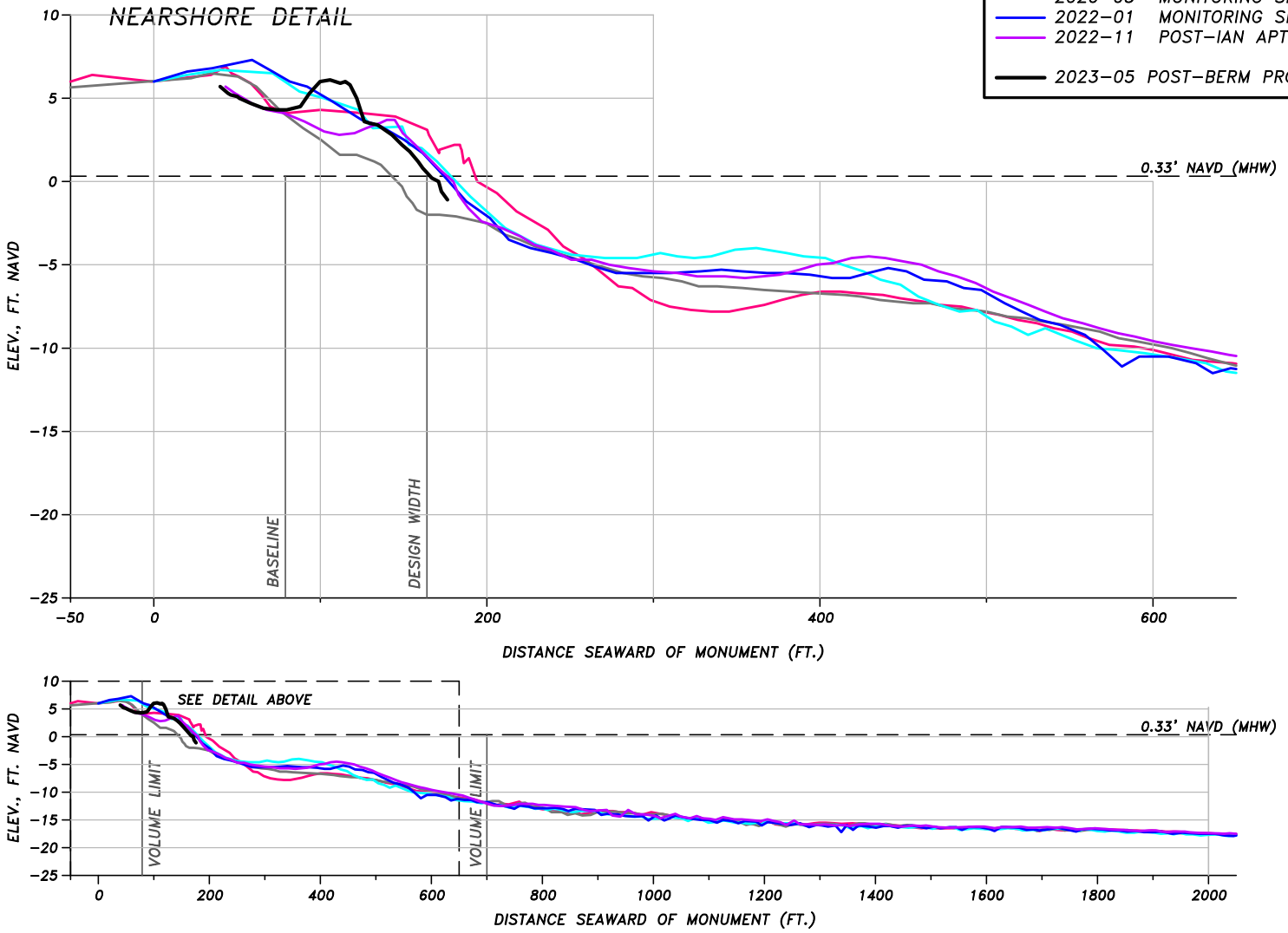
BEACH PROFILE: R-53



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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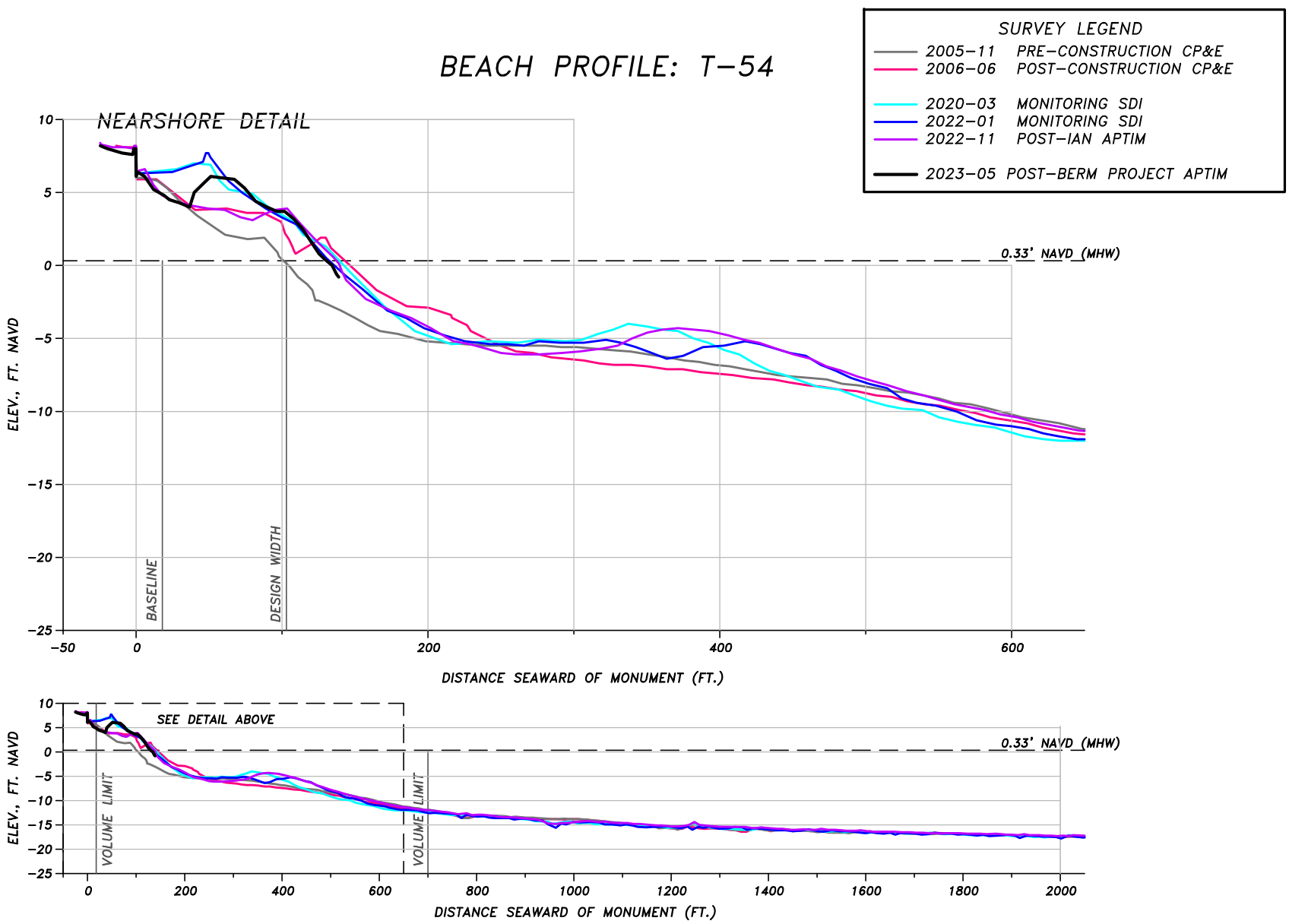
BEACH PROFILE: T-54



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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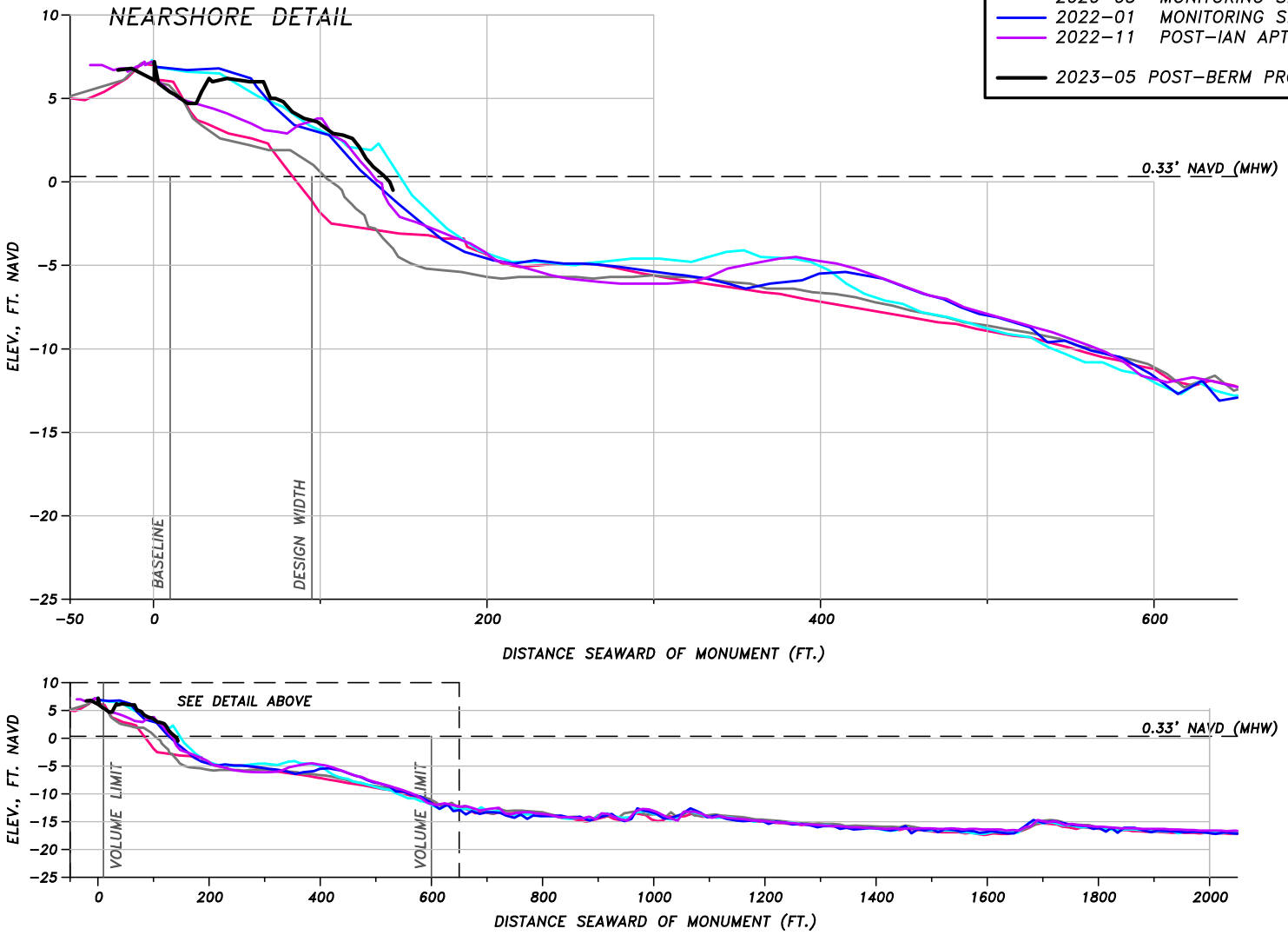
BEACH PROFILE: U-55



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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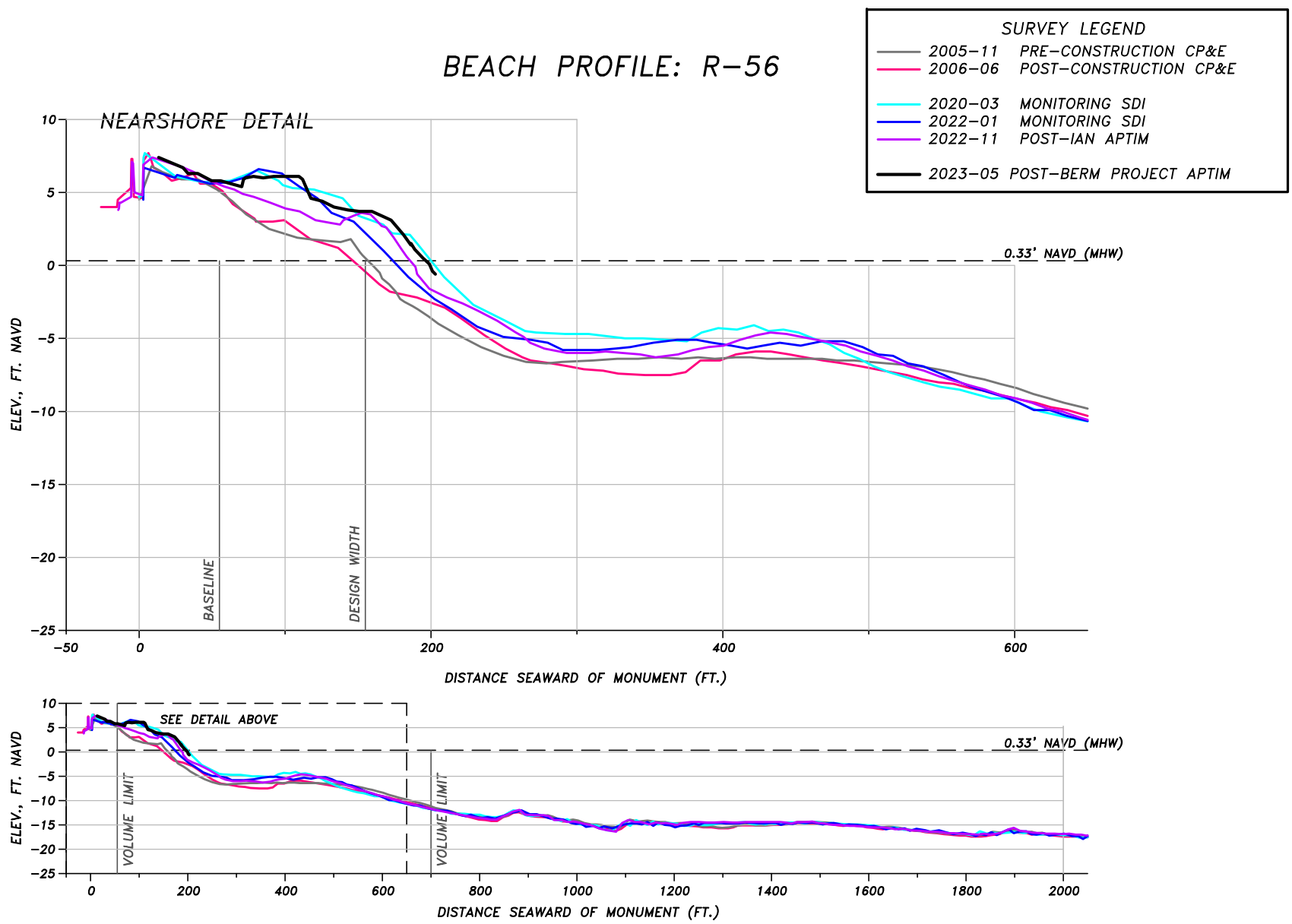
BEACH PROFILE: R-56



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	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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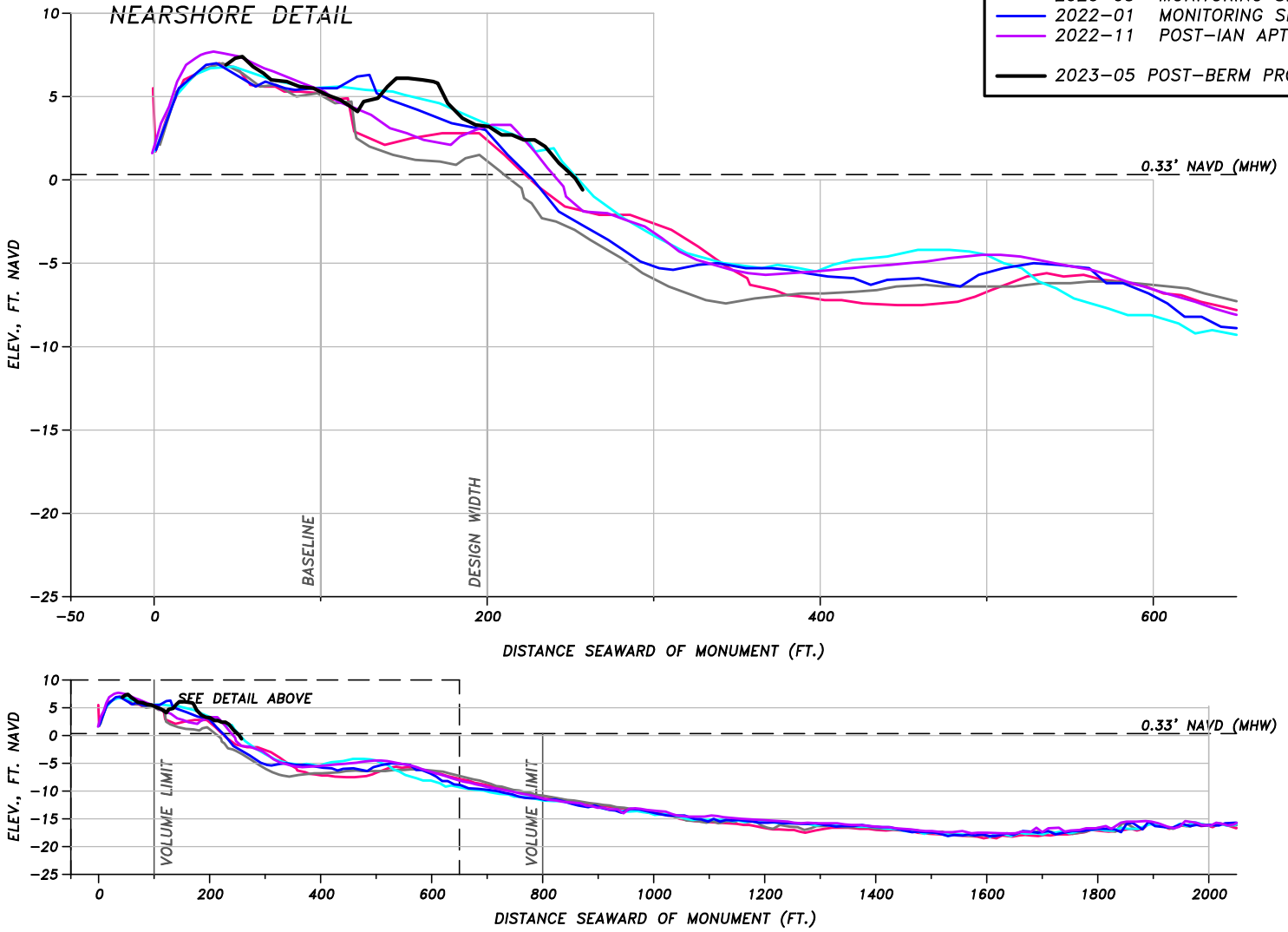
BEACH PROFILE: T-57



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
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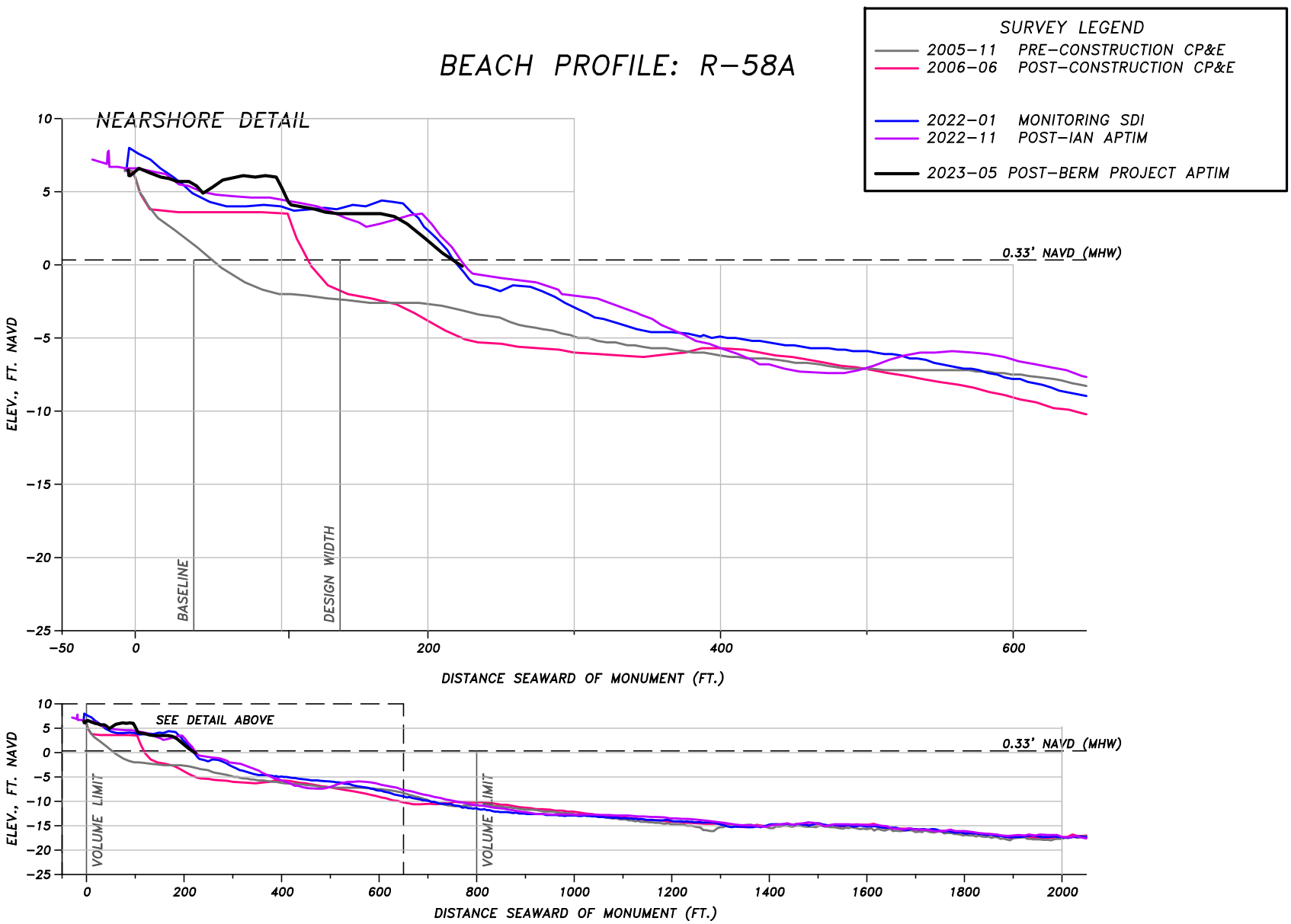
BEACH PROFILE: R-58A



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
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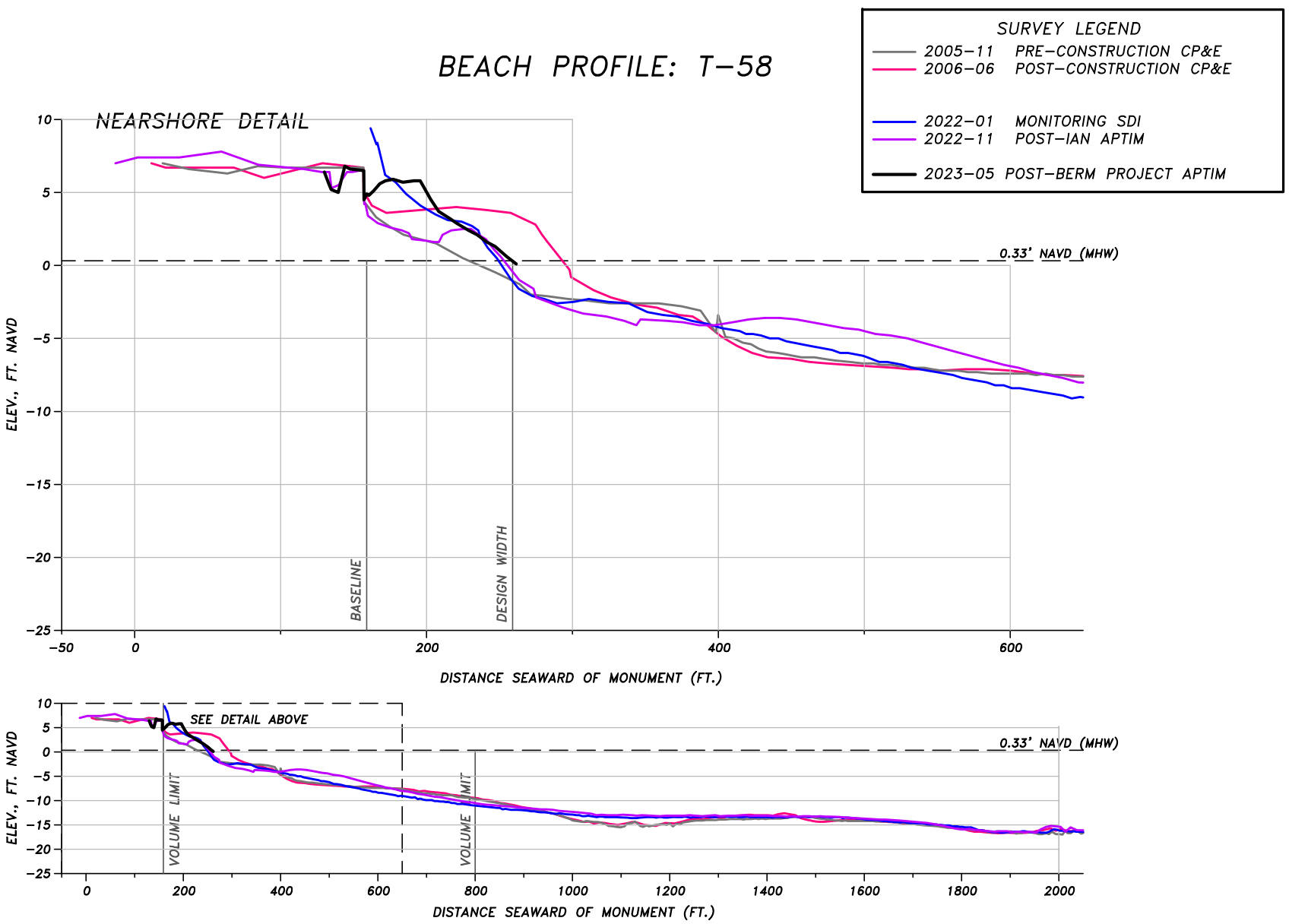
BEACH PROFILE: T-58



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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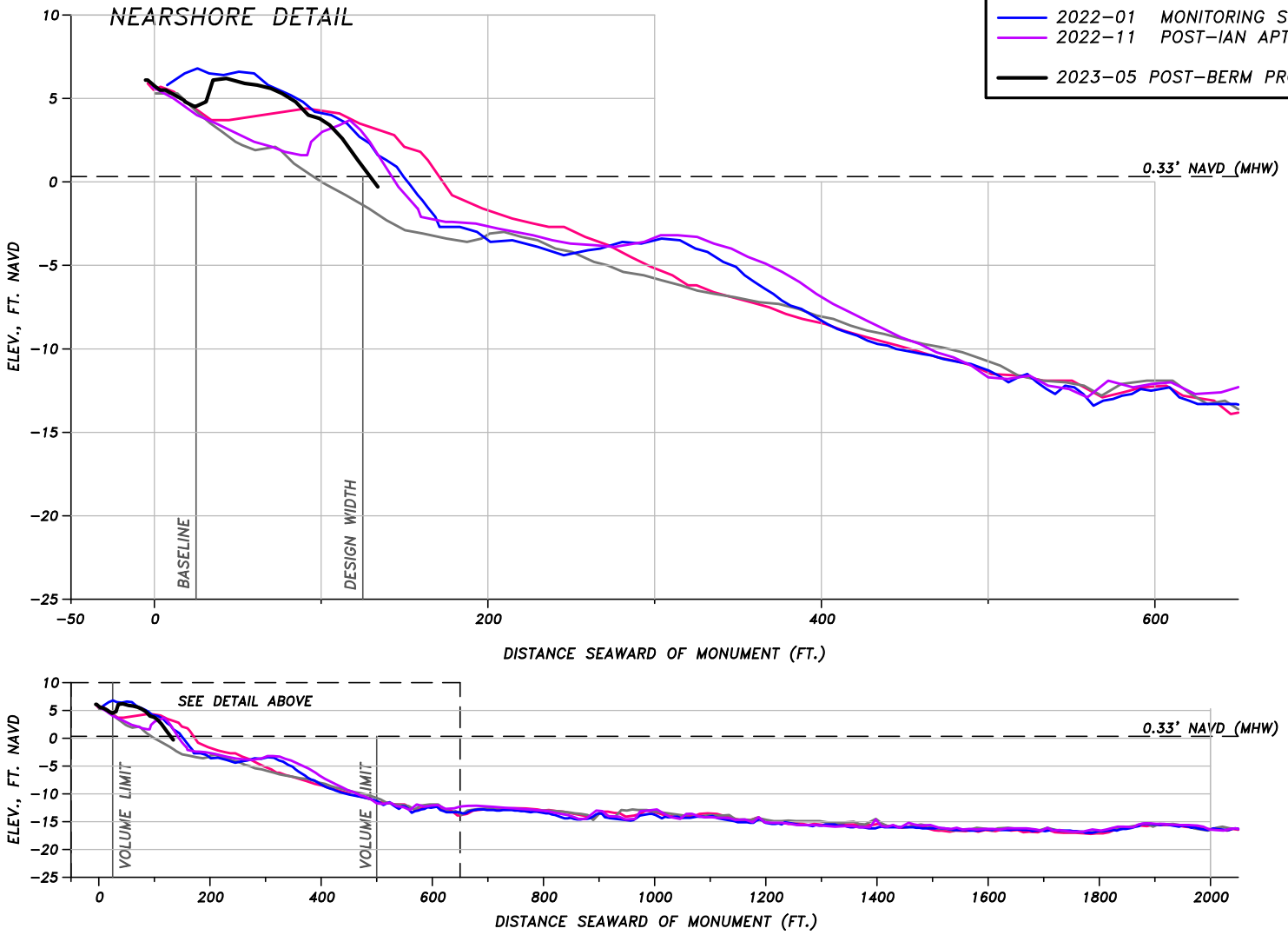
BEACH PROFILE: R-59



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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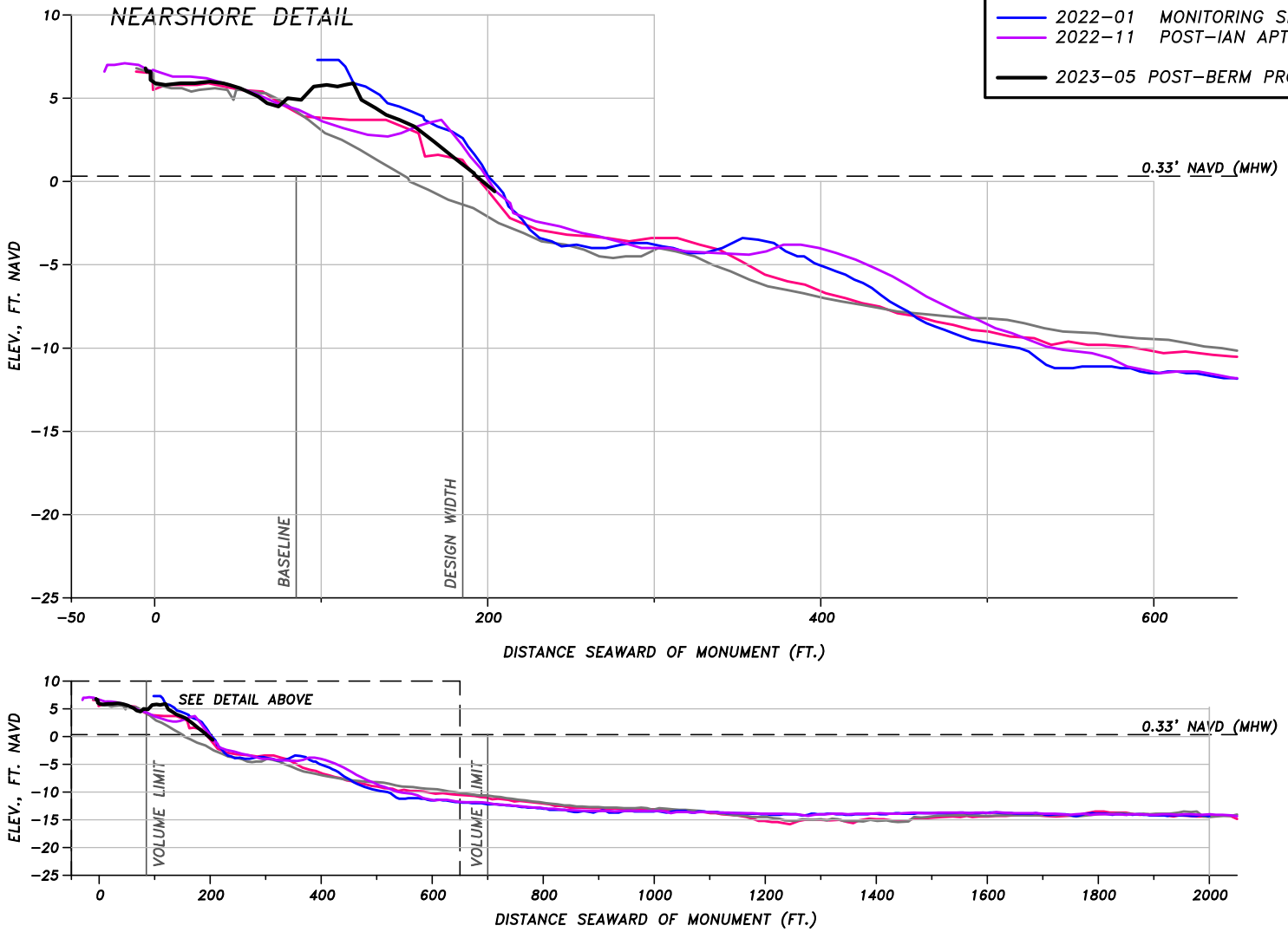
BEACH PROFILE: R-60



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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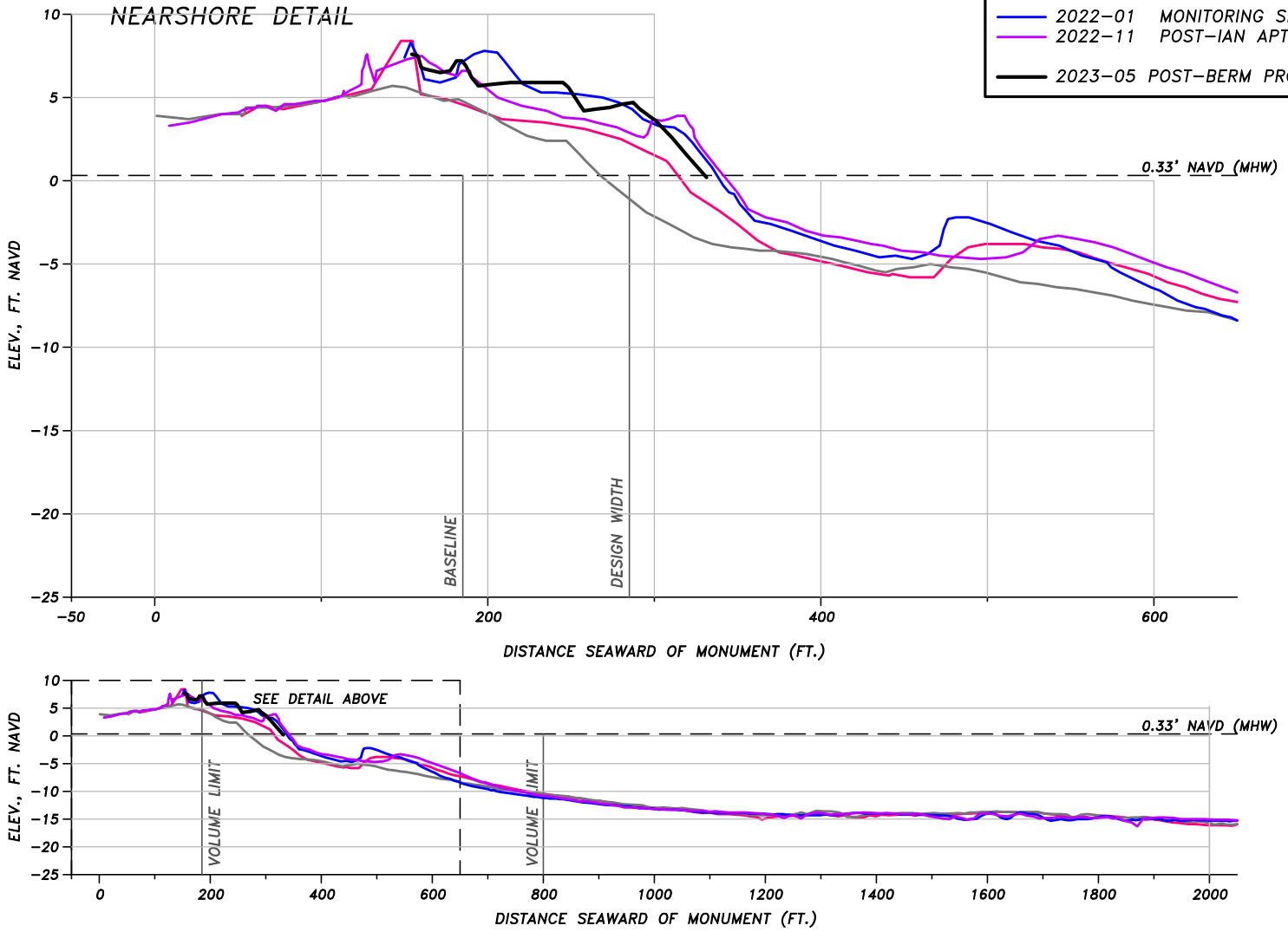
BEACH PROFILE: R-61



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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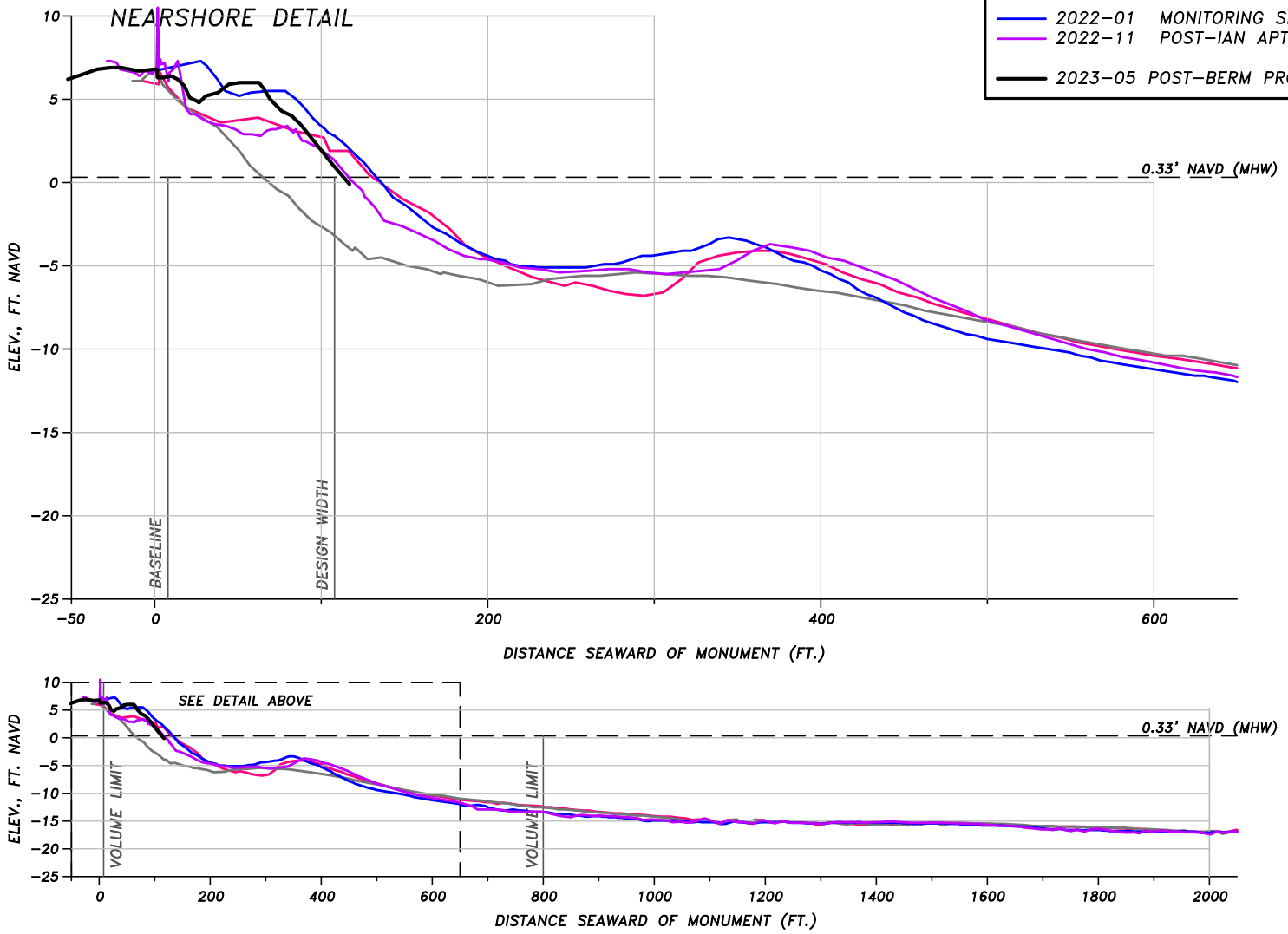
BEACH PROFILE: T-62



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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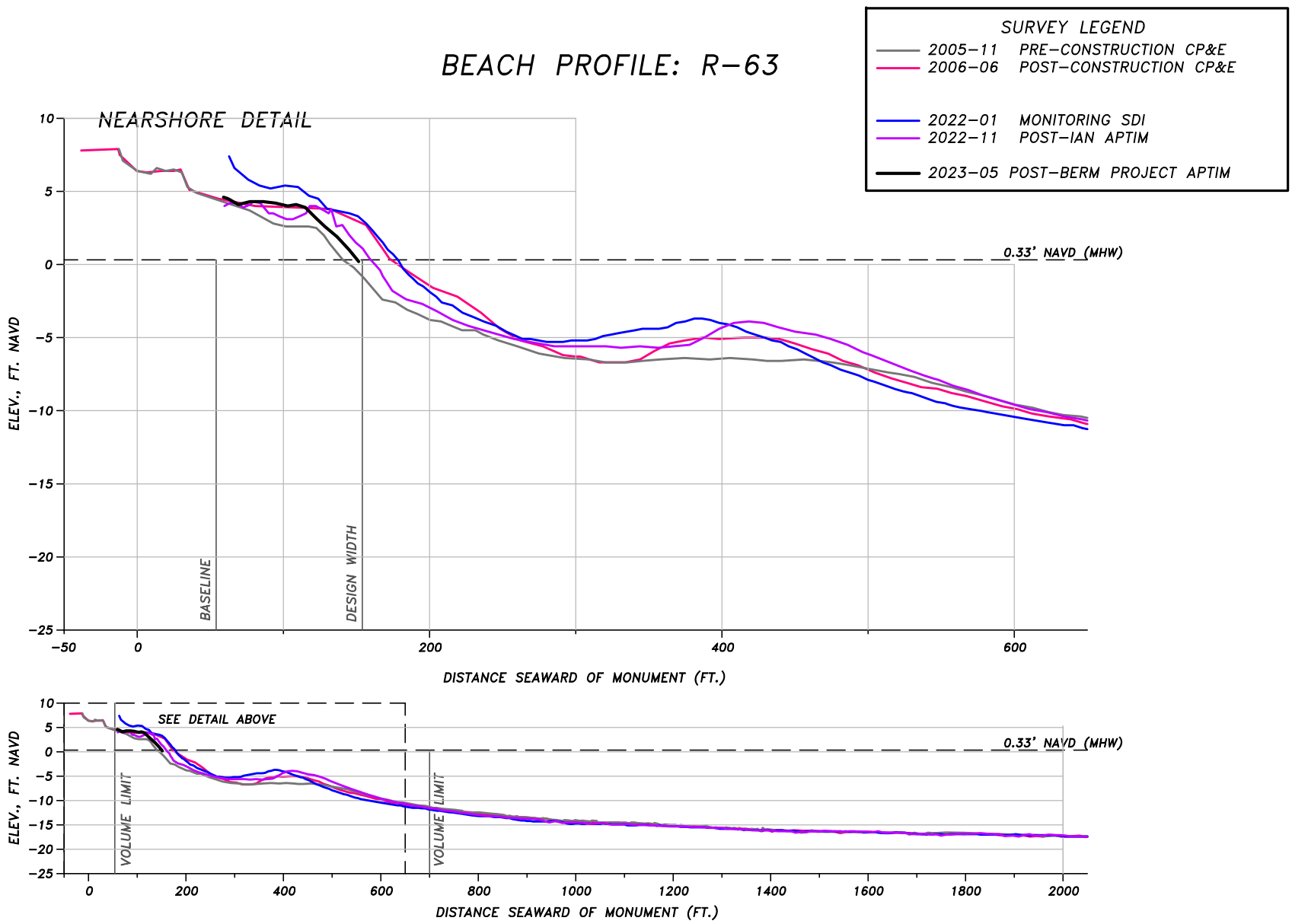
BEACH PROFILE: R-63



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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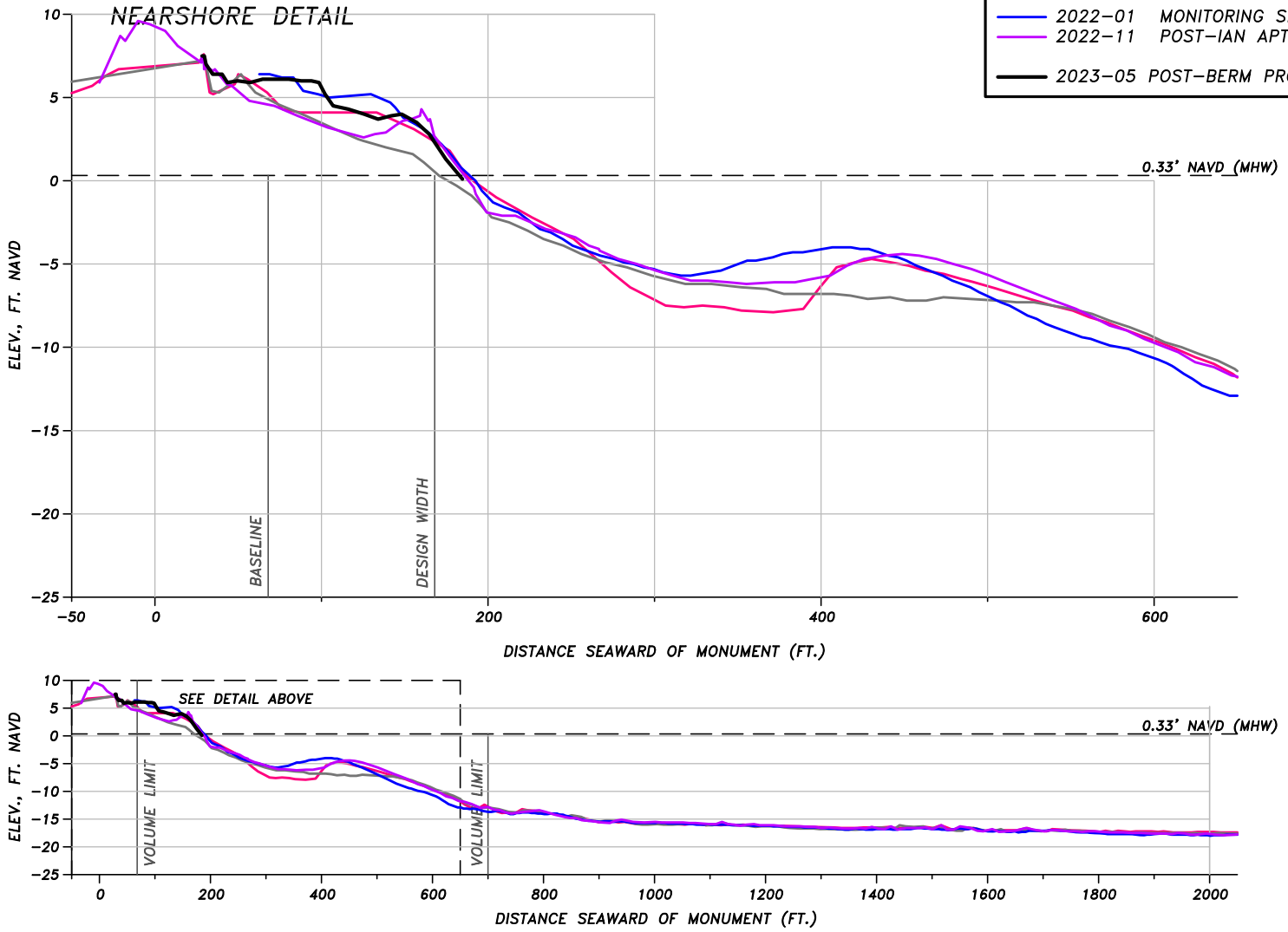
BEACH PROFILE: R-64



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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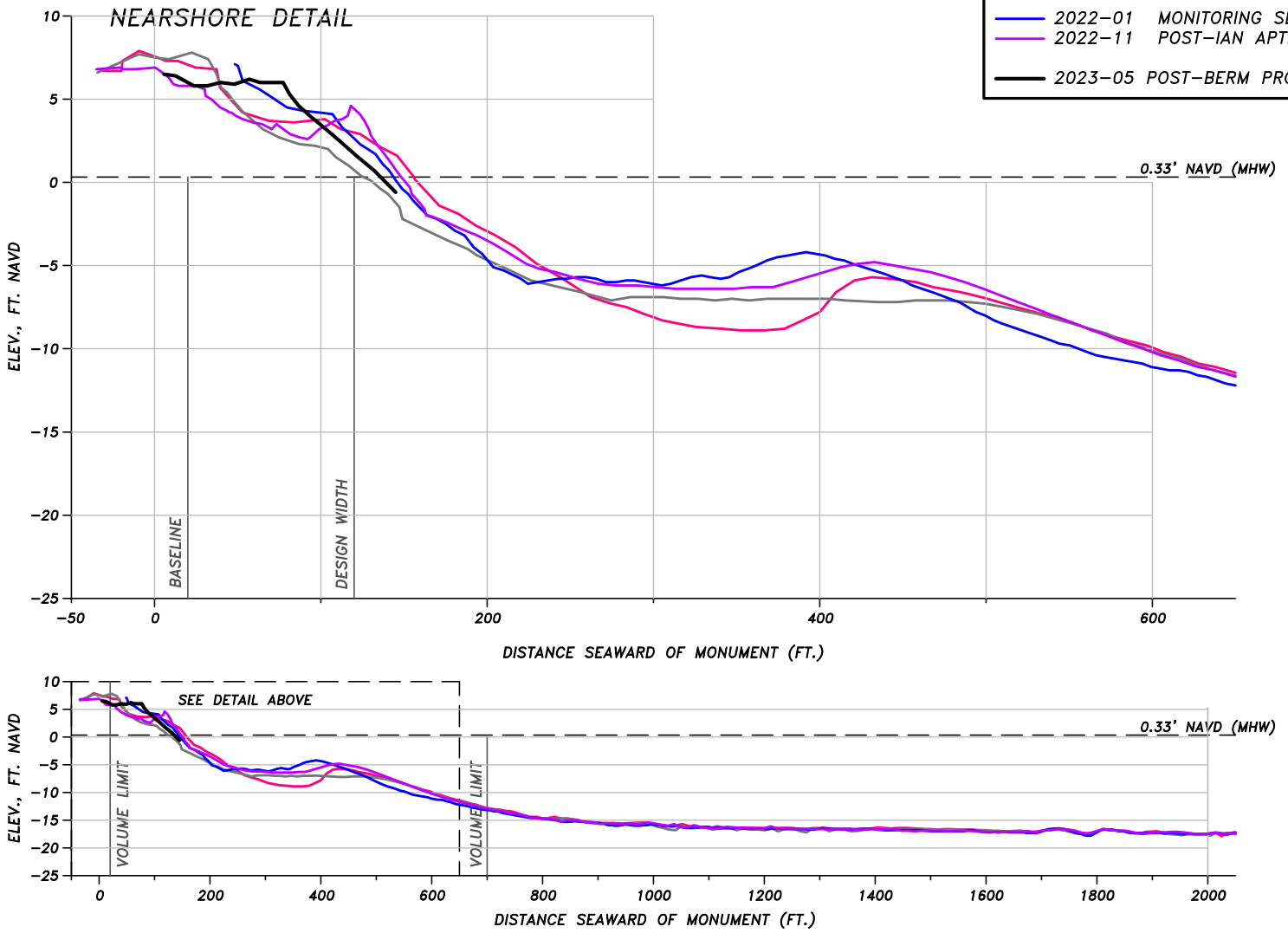
BEACH PROFILE: T-65



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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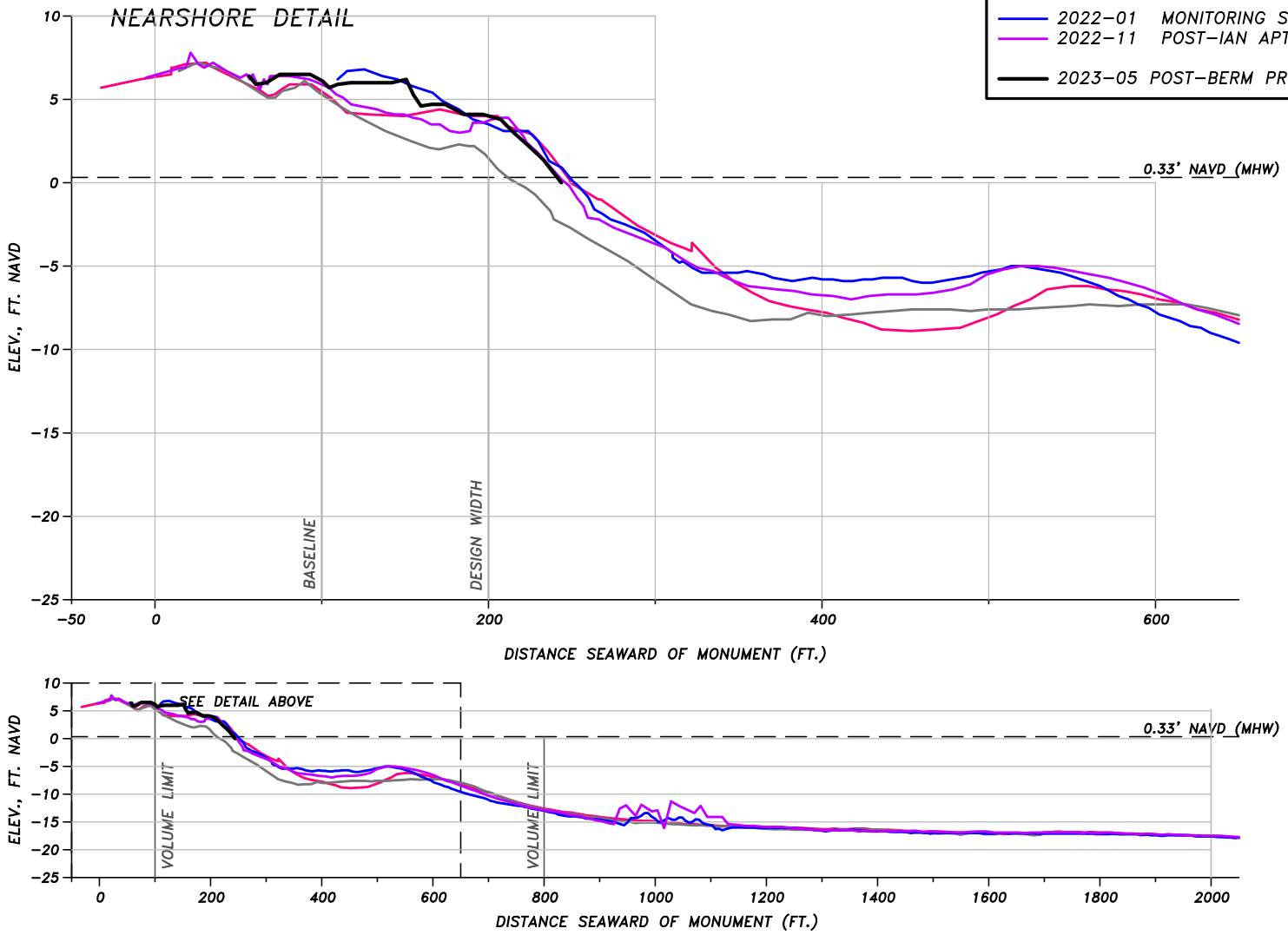
BEACH PROFILE: R-66



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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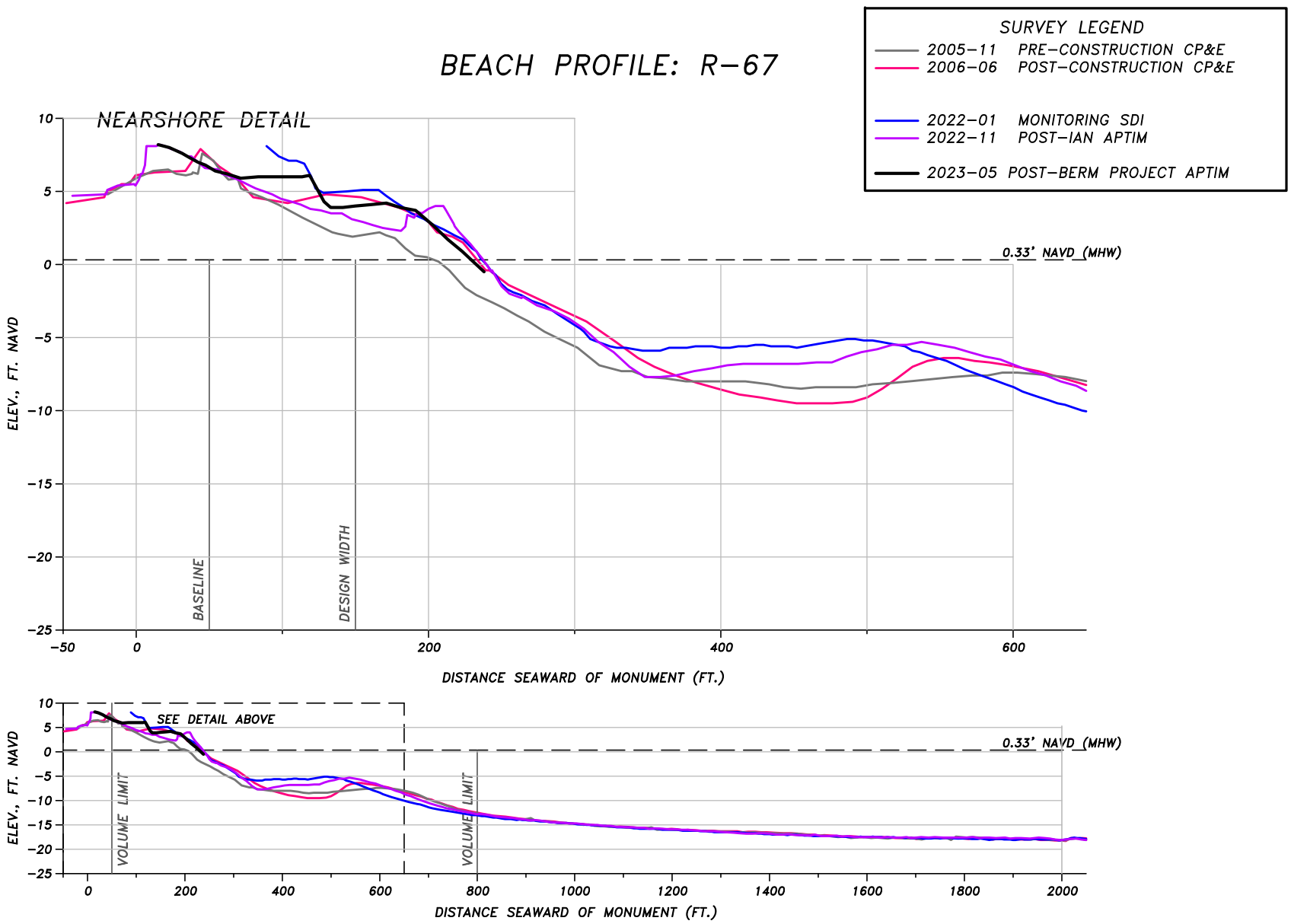
BEACH PROFILE: R-67



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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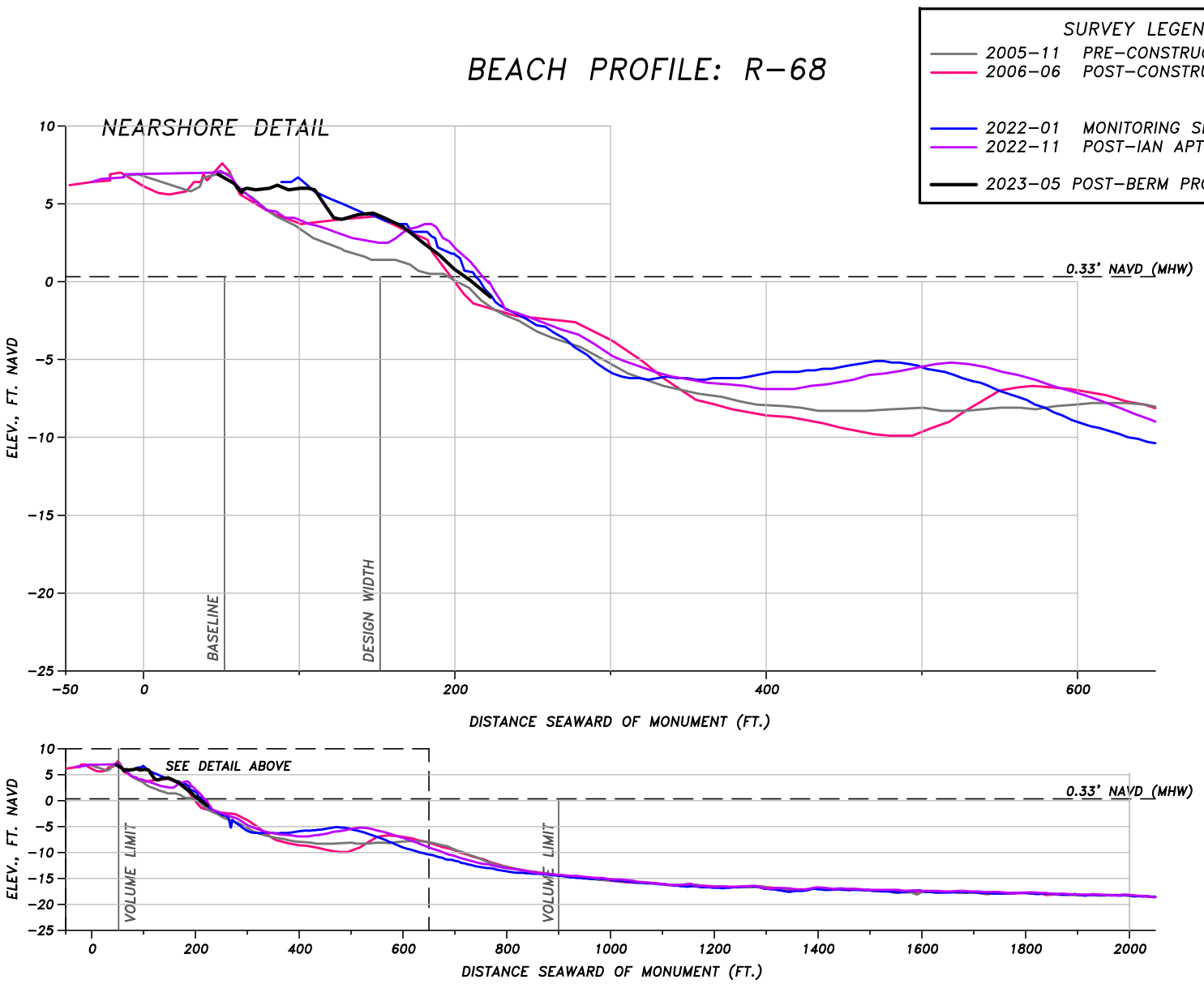
BEACH PROFILE: R-68



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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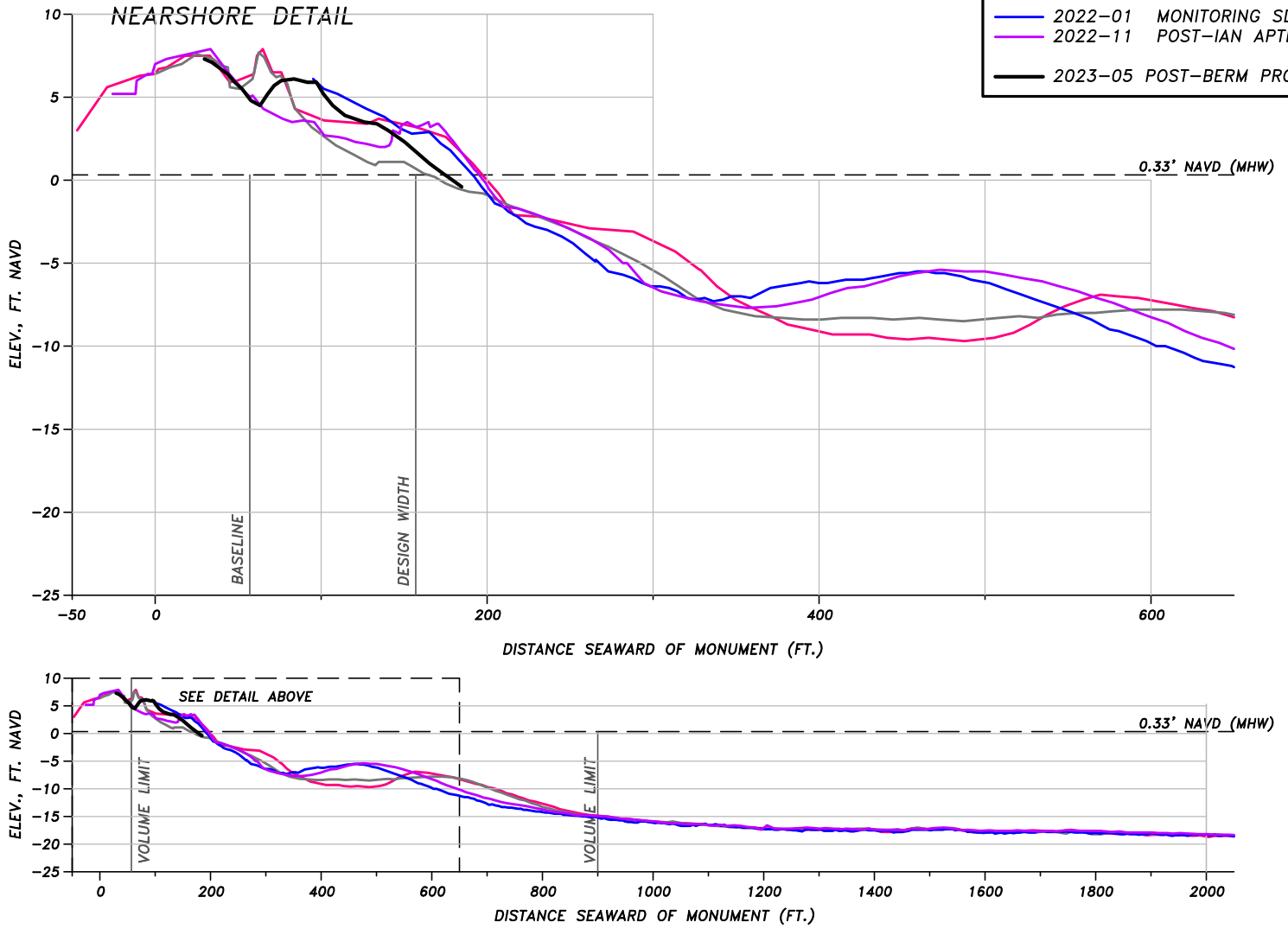
BEACH PROFILE: T-69



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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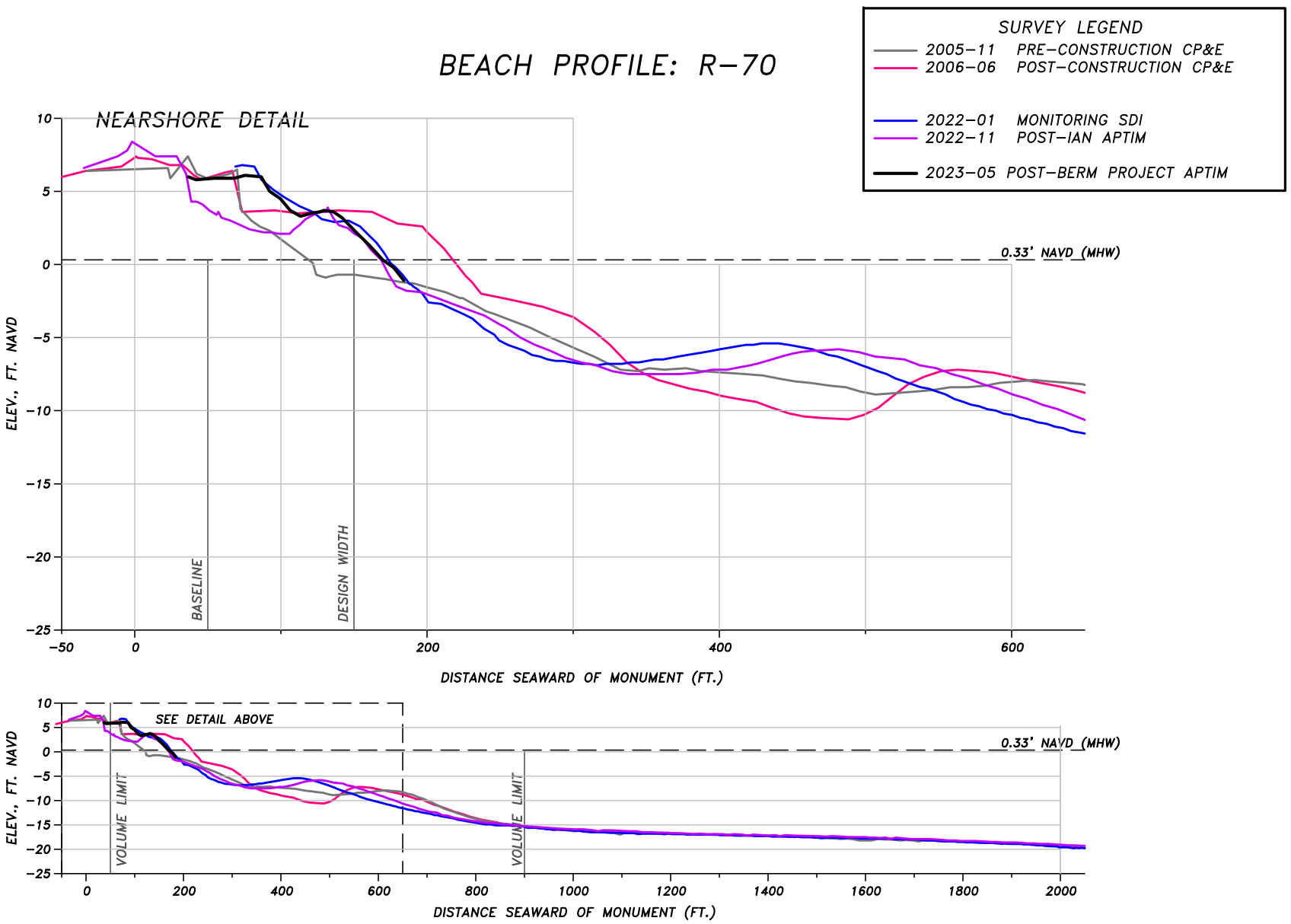
BEACH PROFILE: R-70



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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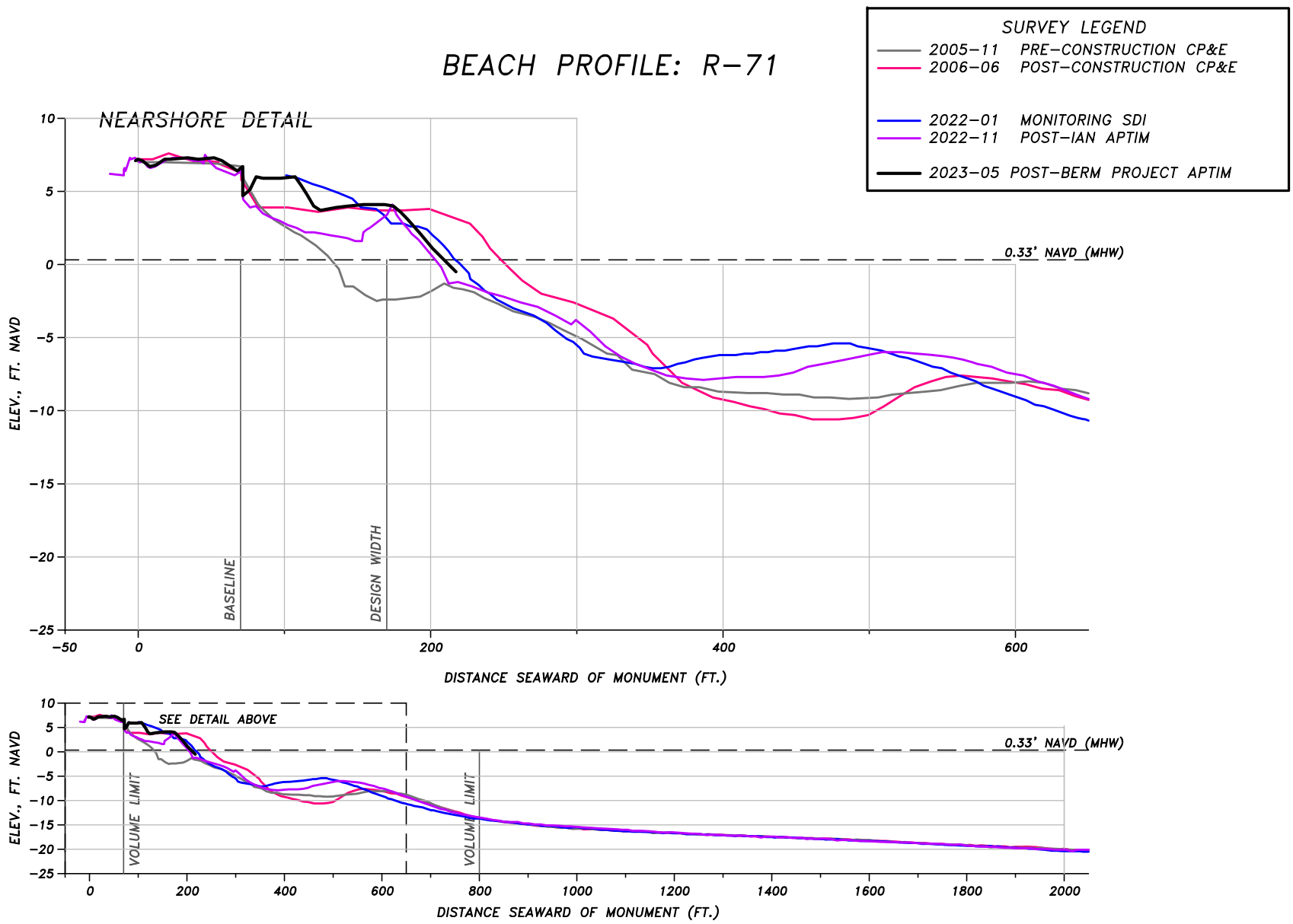
BEACH PROFILE: R-71



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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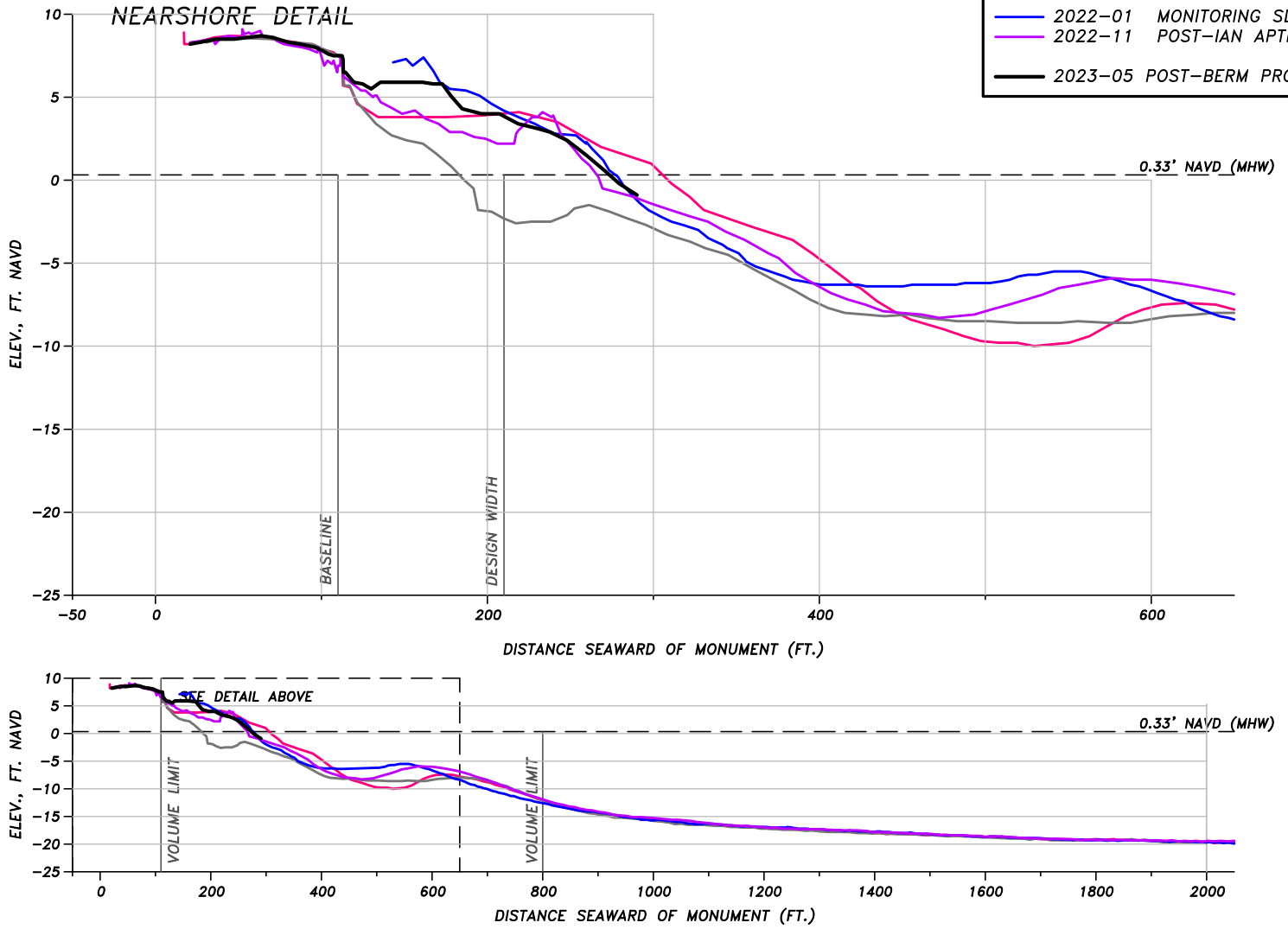
BEACH PROFILE: R-72



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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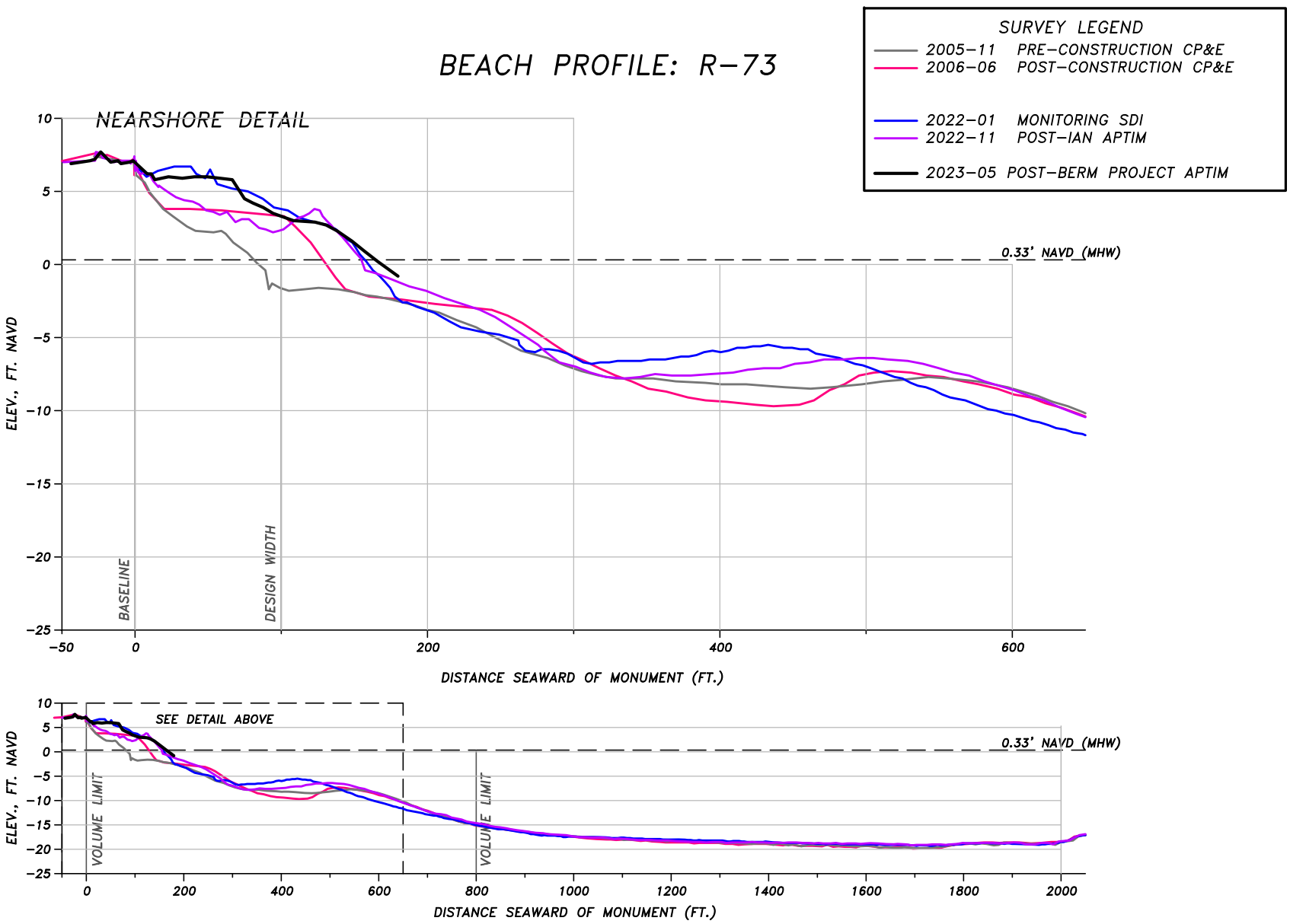
BEACH PROFILE: R-73



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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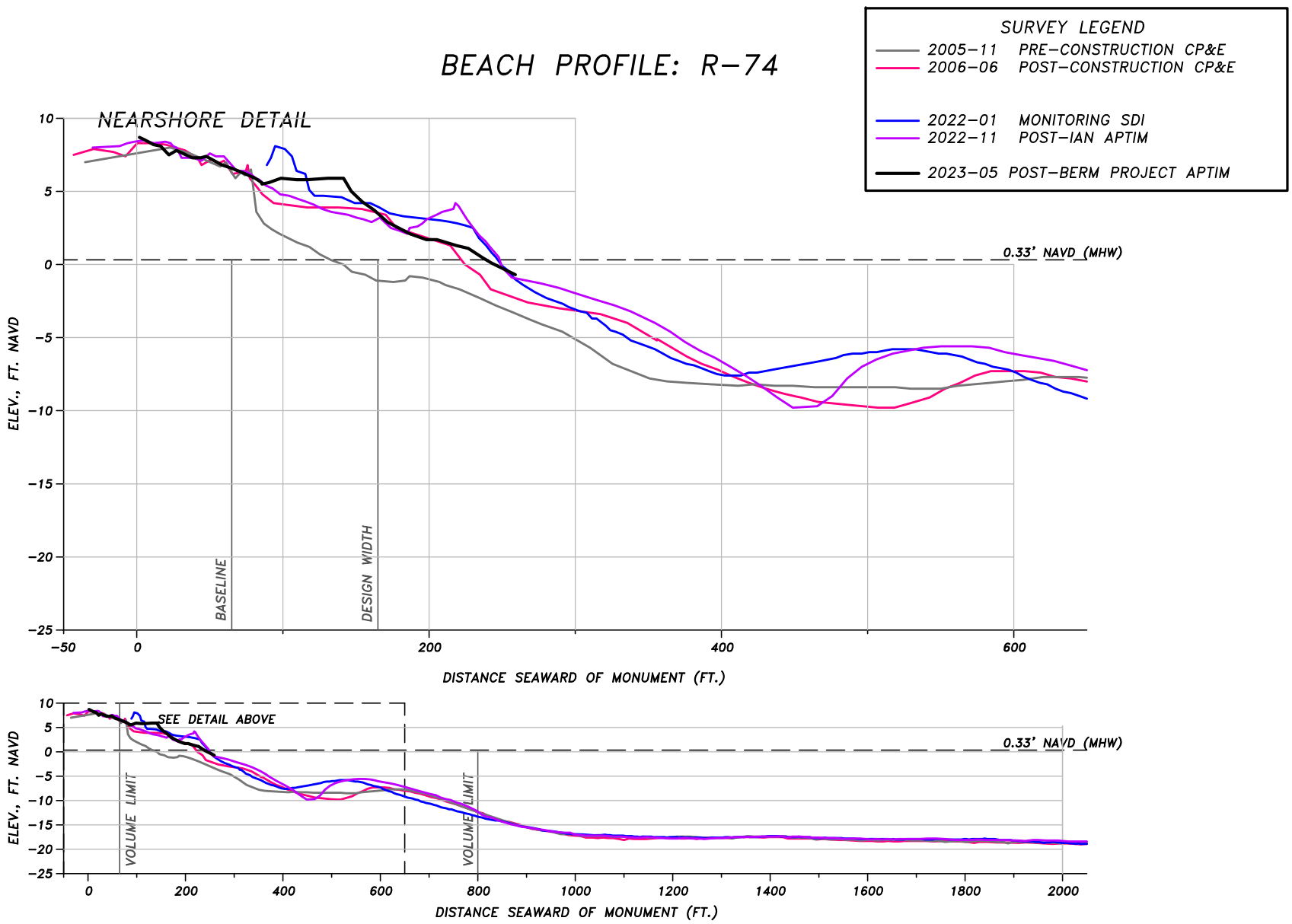
BEACH PROFILE: R-74



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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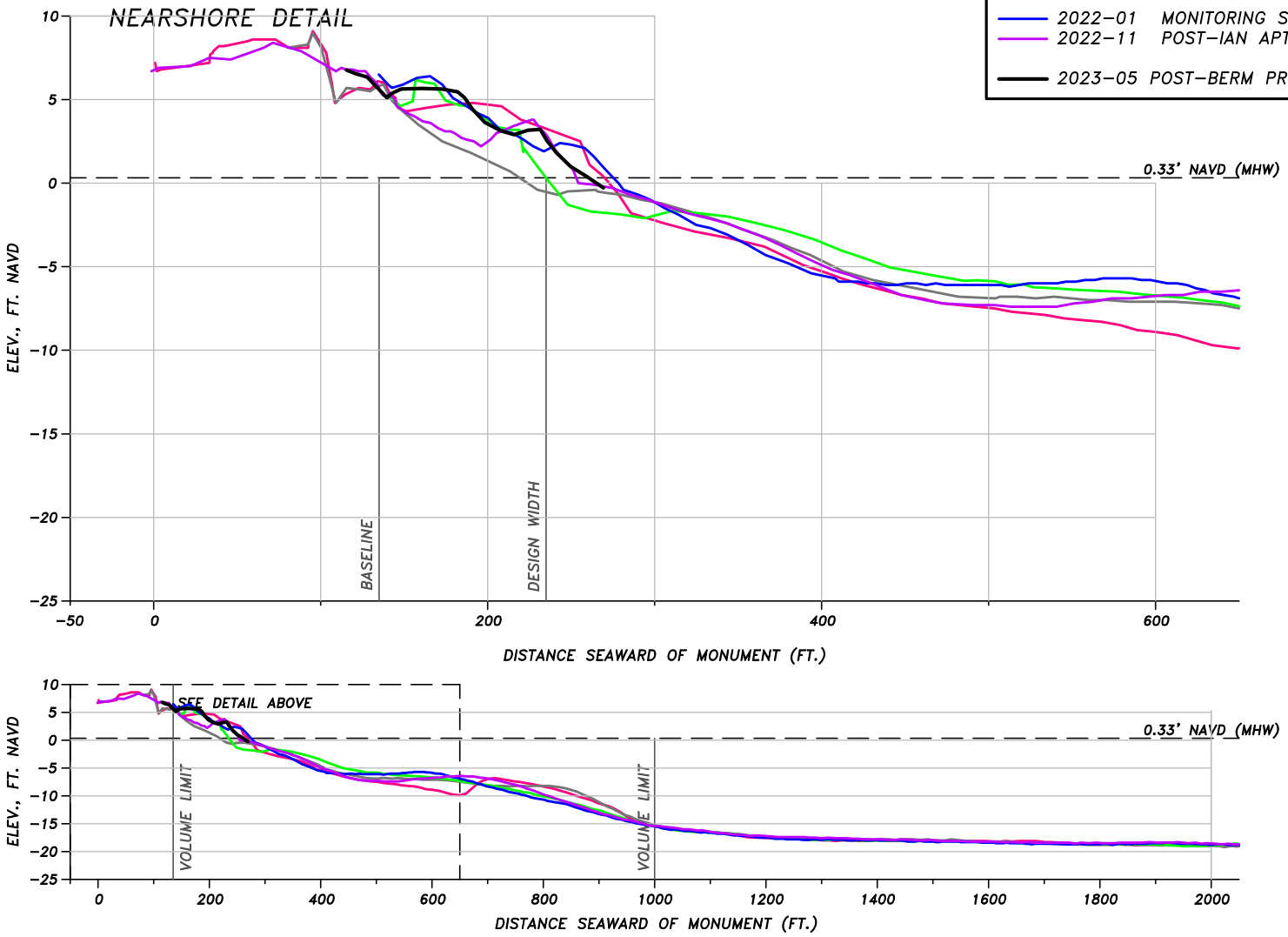
BEACH PROFILE: R-75



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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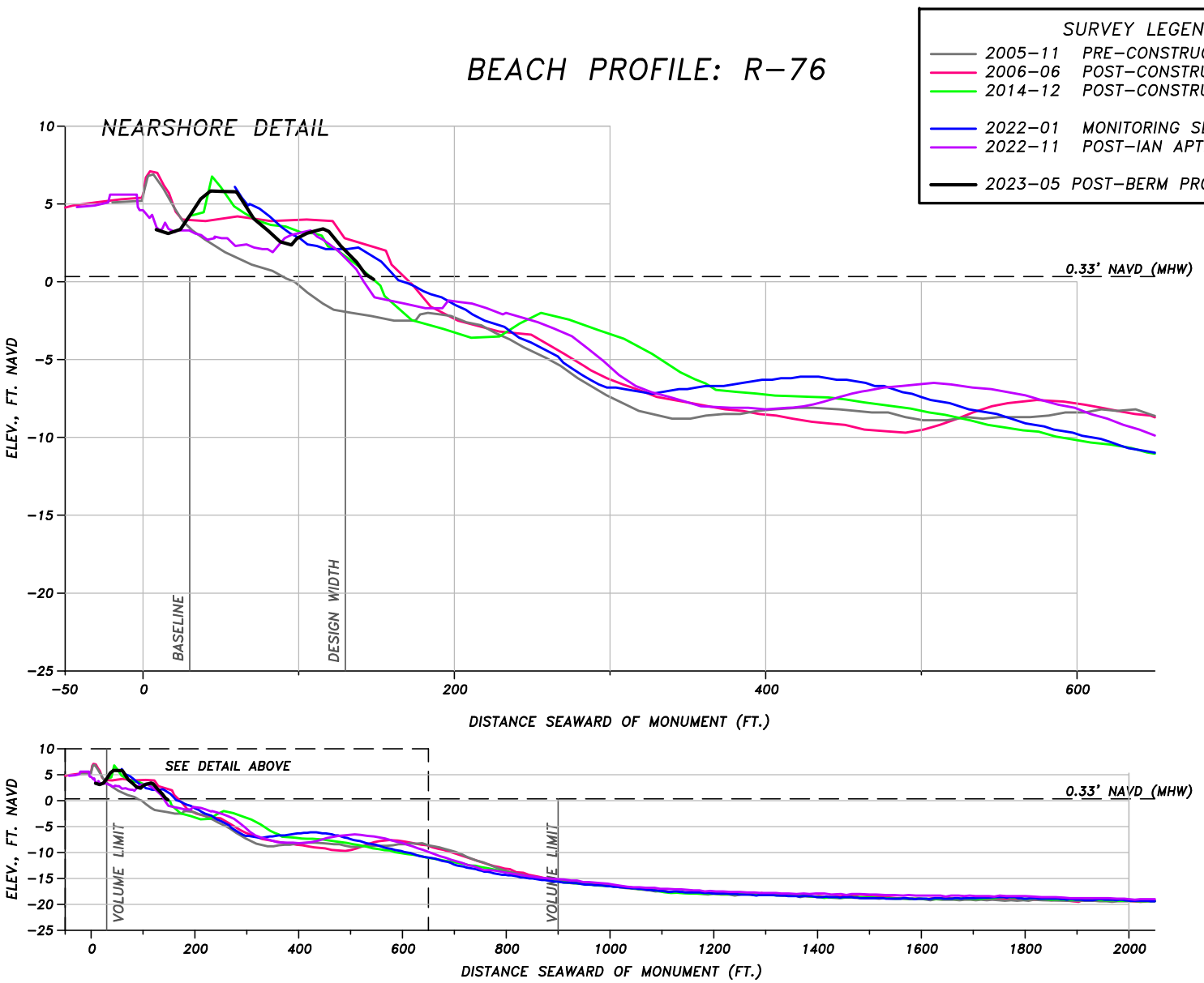
BEACH PROFILE: R-76



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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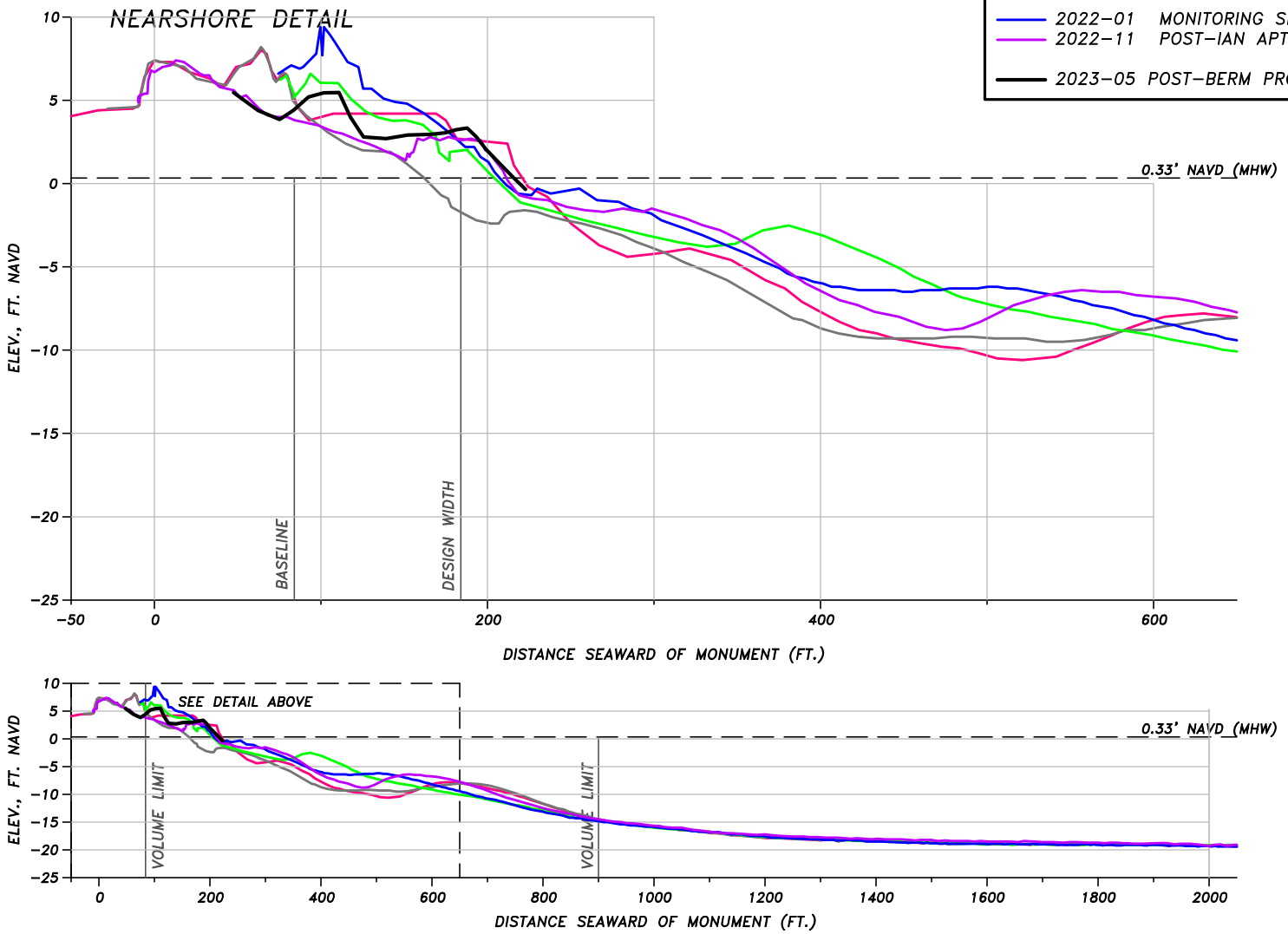
BEACH PROFILE: R-77



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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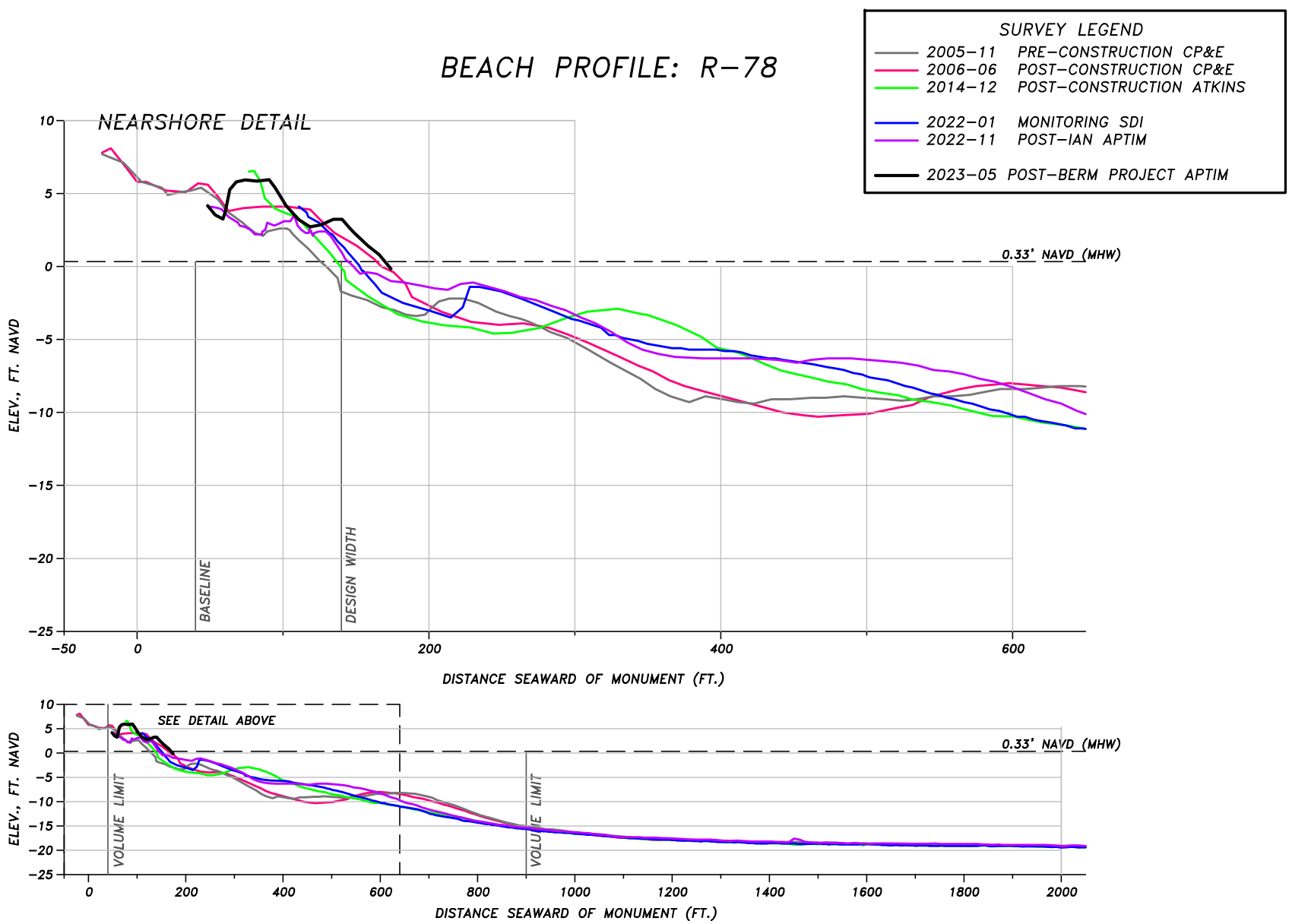
BEACH PROFILE: R-78



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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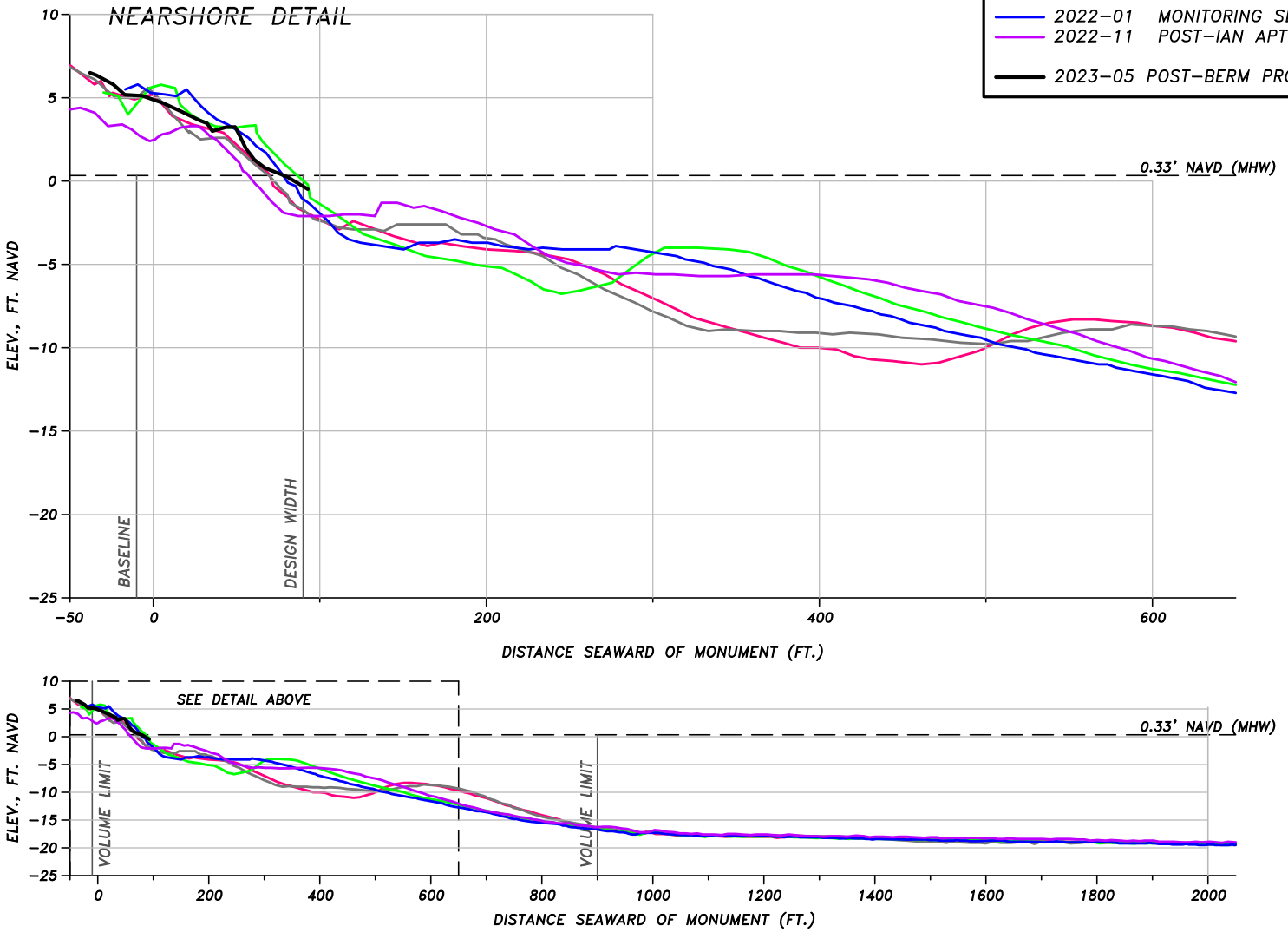
BEACH PROFILE: R-79



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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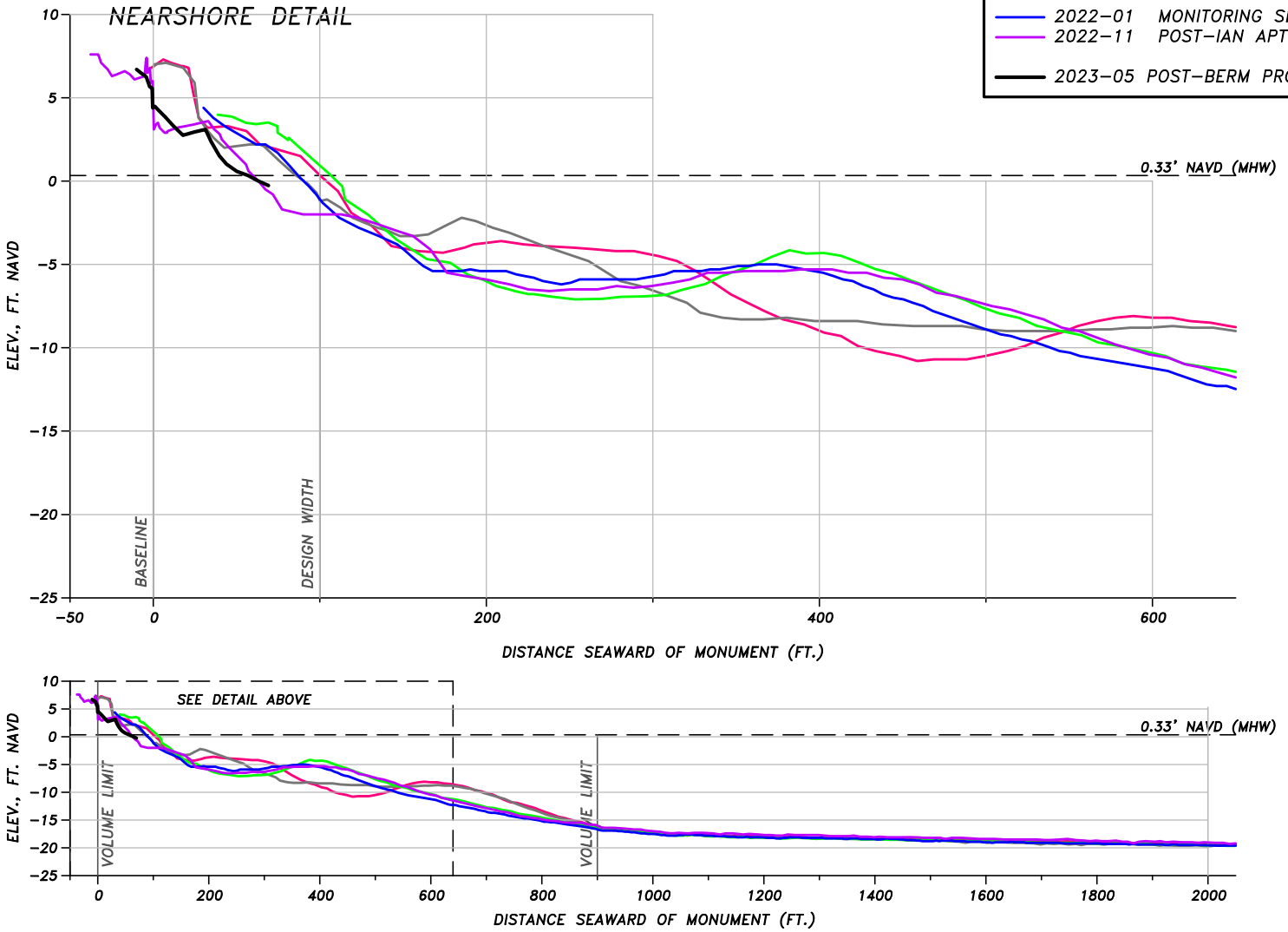
BEACH PROFILE: R-80



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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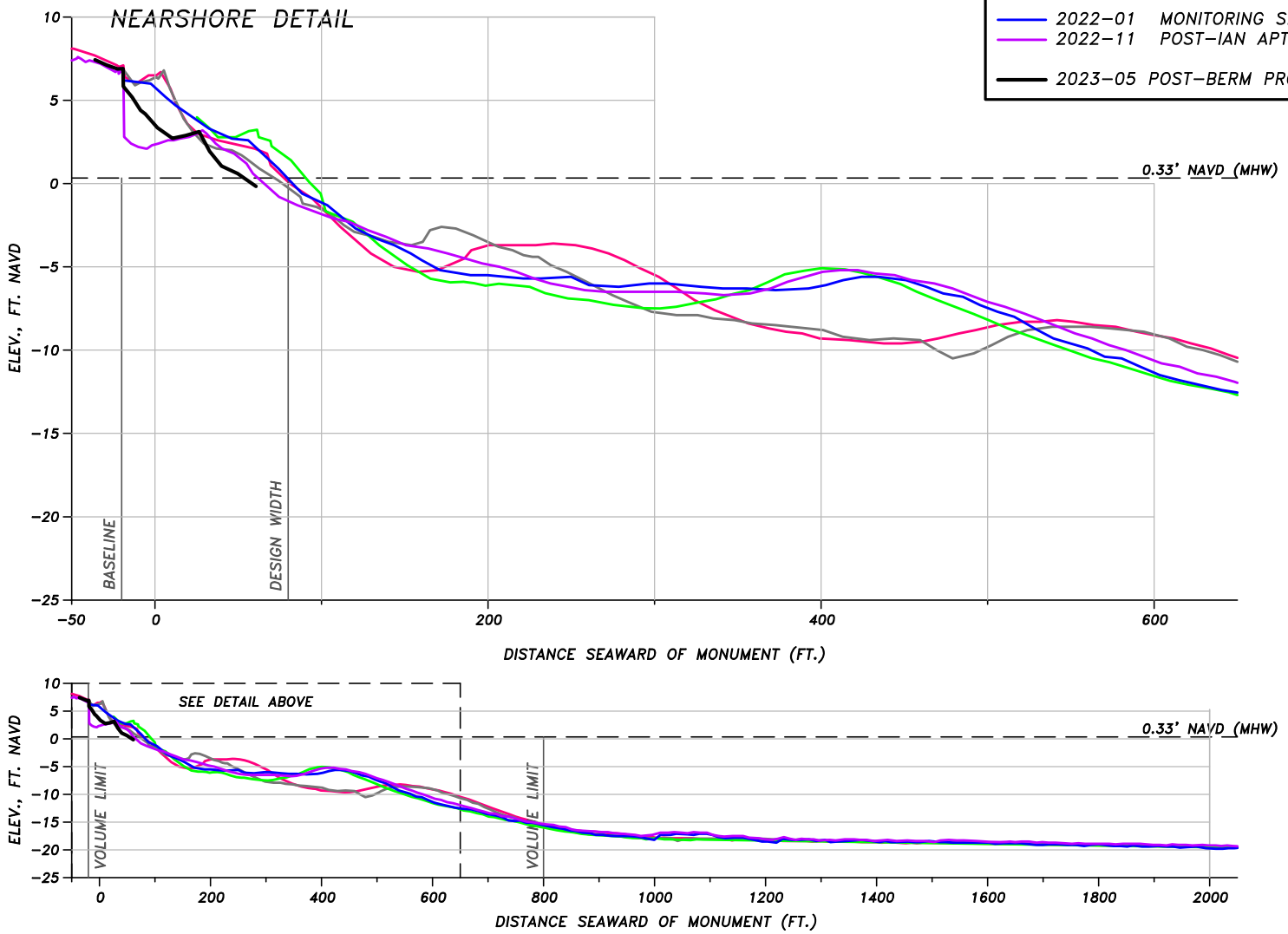
BEACH PROFILE: R-81



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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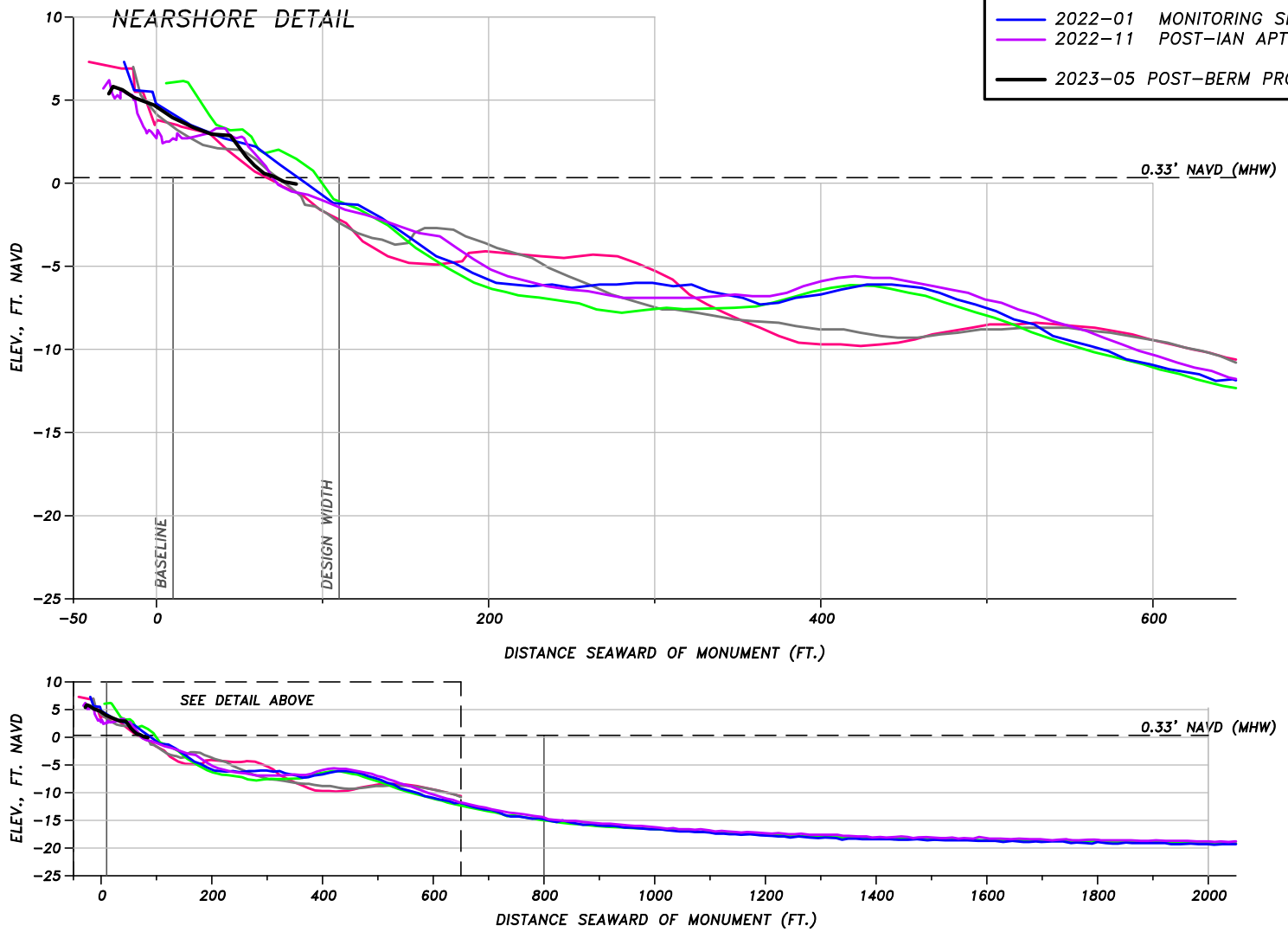
BEACH PROFILE: R-82



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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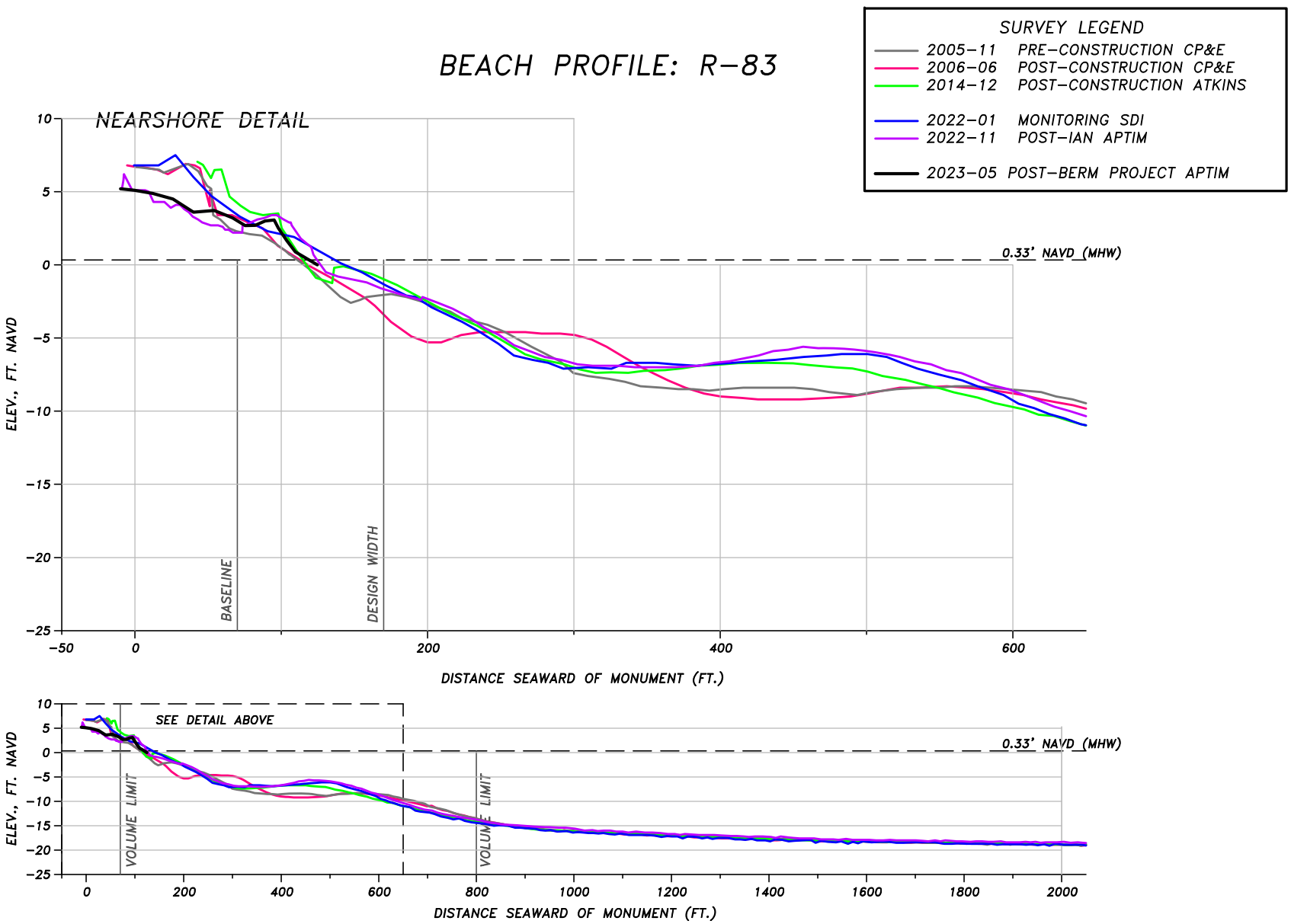
BEACH PROFILE: R-83



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	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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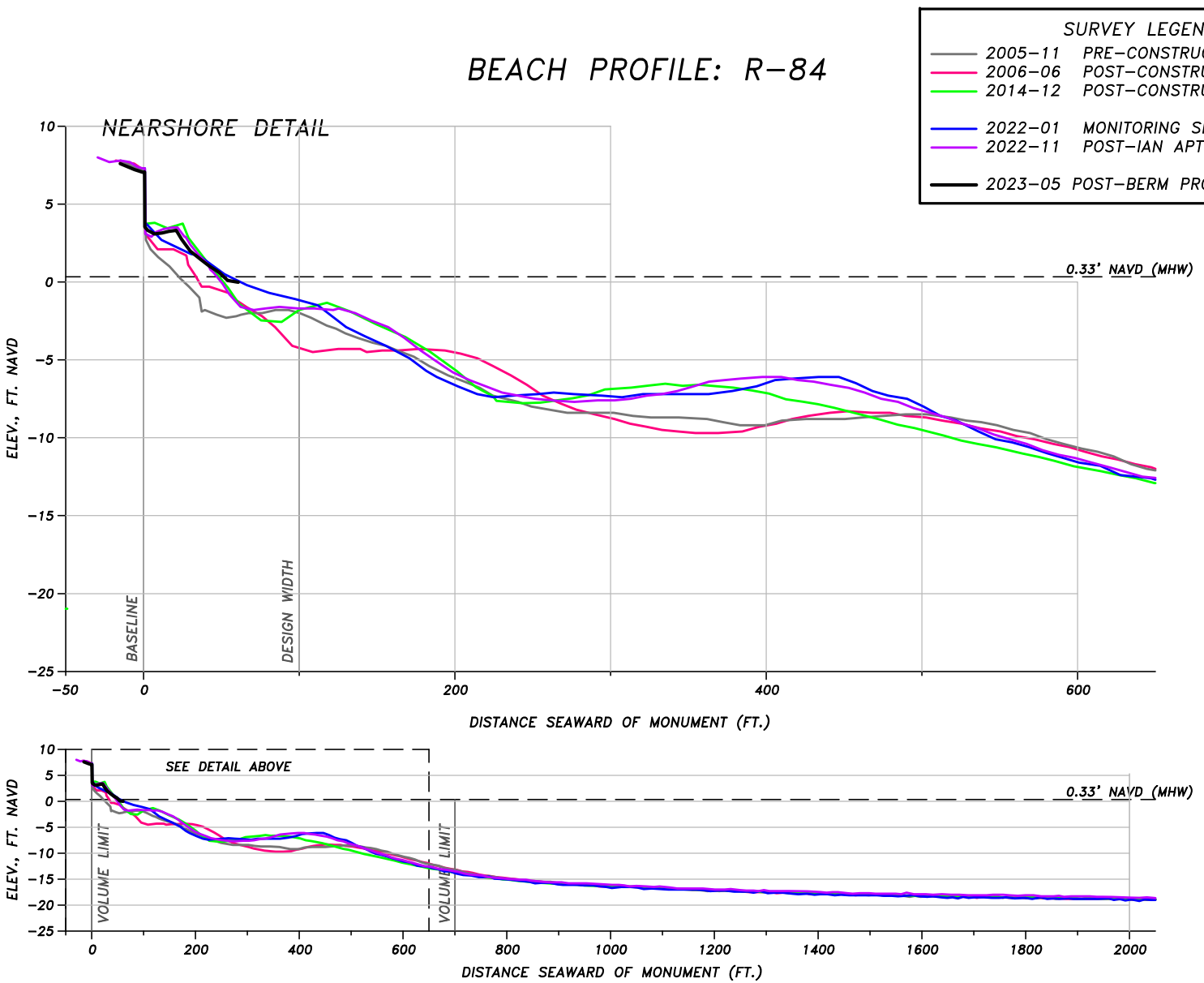
BEACH PROFILE: R-84



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	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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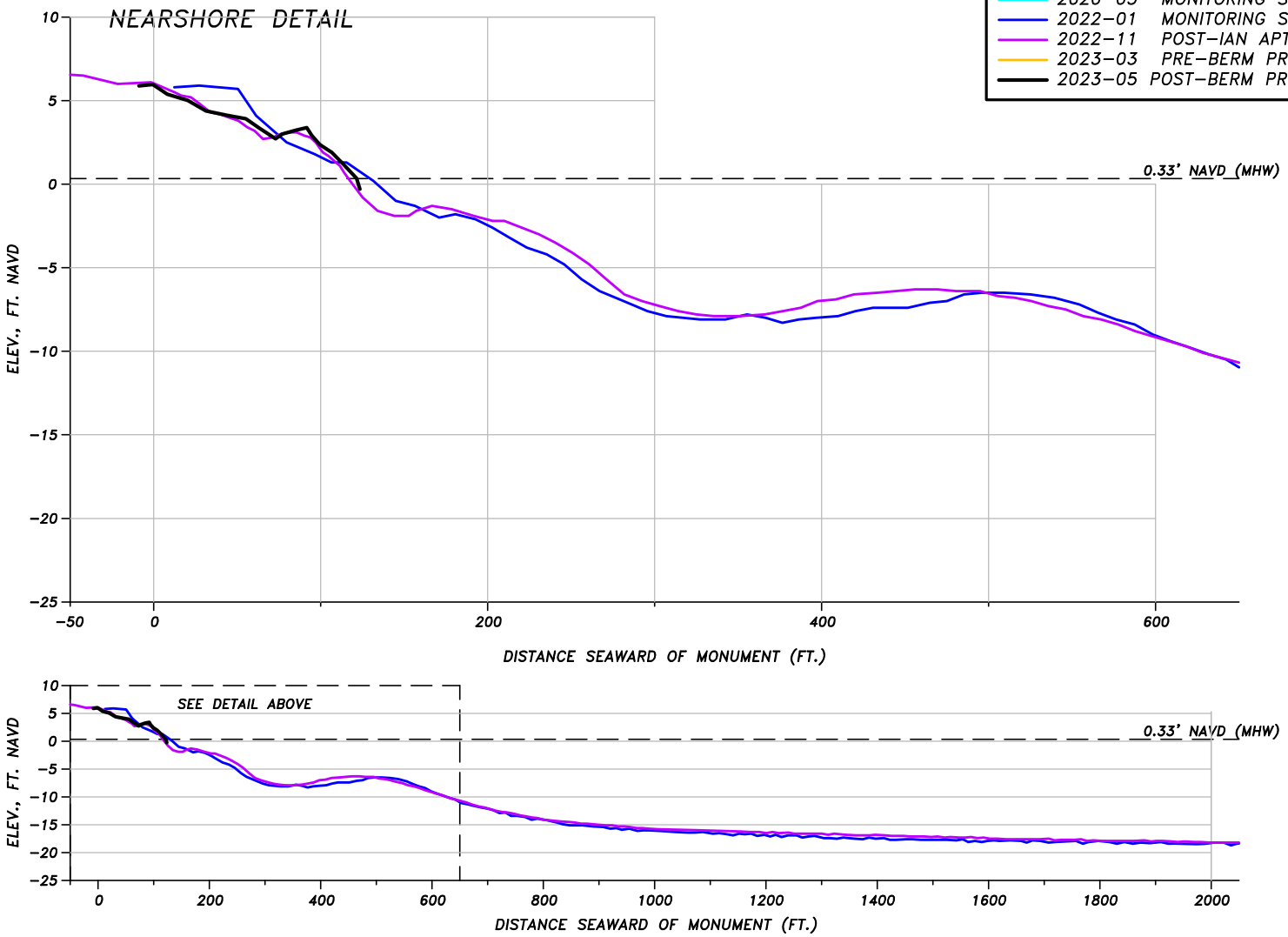
BEACH PROFILE: U-85



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
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PHONE: (239) 594-2021
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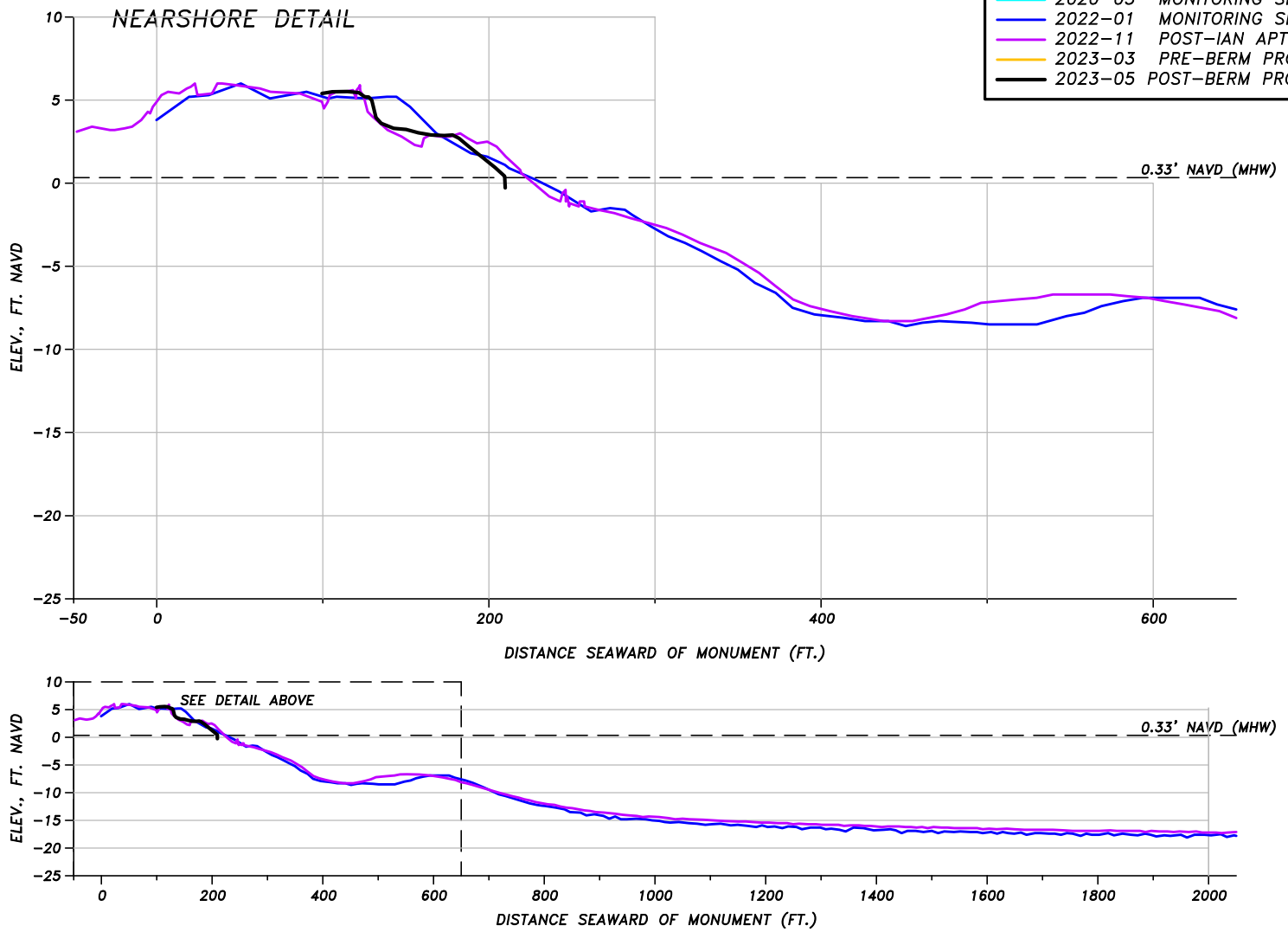
BEACH PROFILE: T-86



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 2/2/22	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

5679 STRAND COURT
NAPLES, FL 34110
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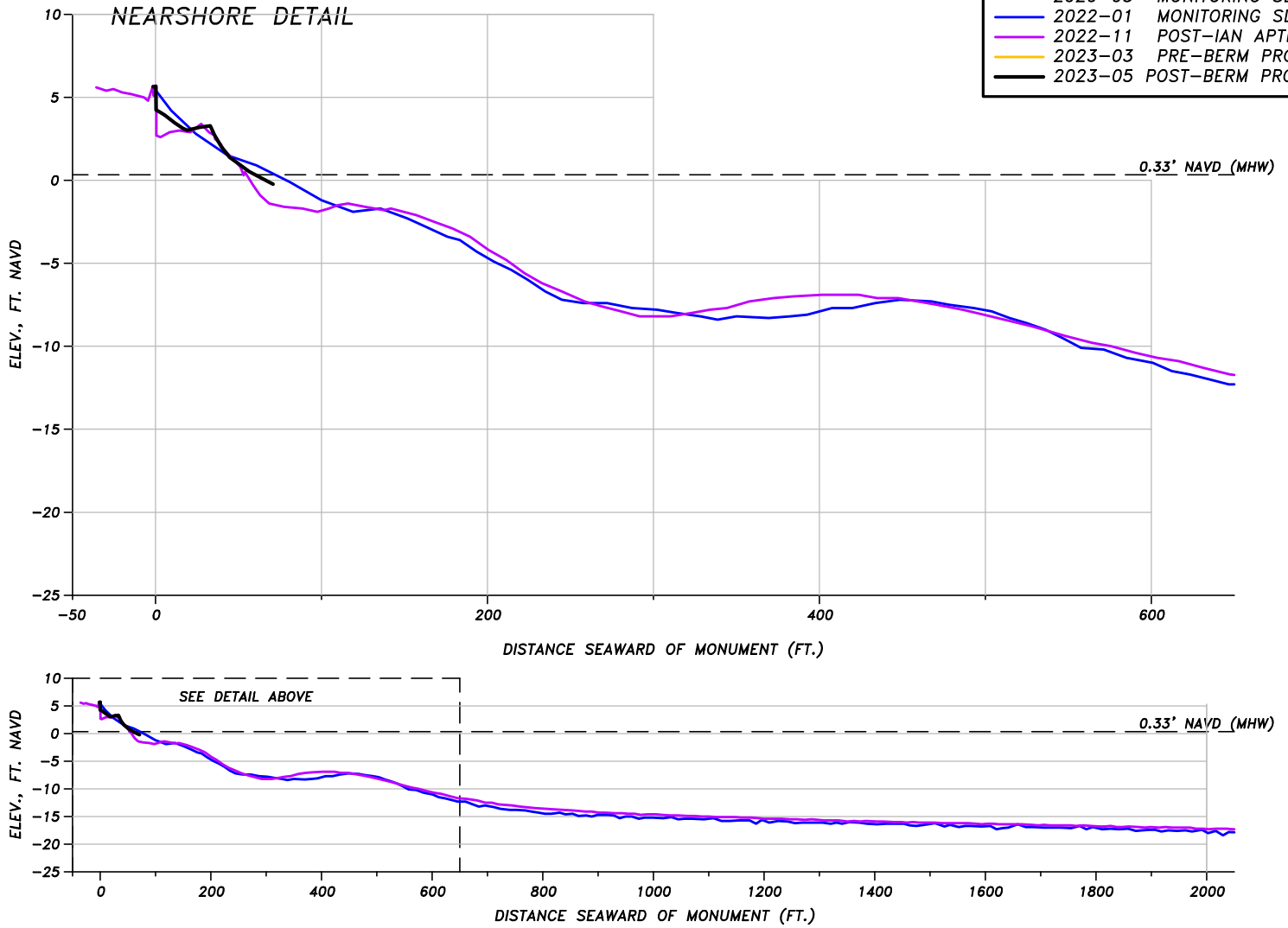
BEACH PROFILE: R-87



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 4/7/15	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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NAPLES, FL 34110
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PHONE: (239) 594-2021
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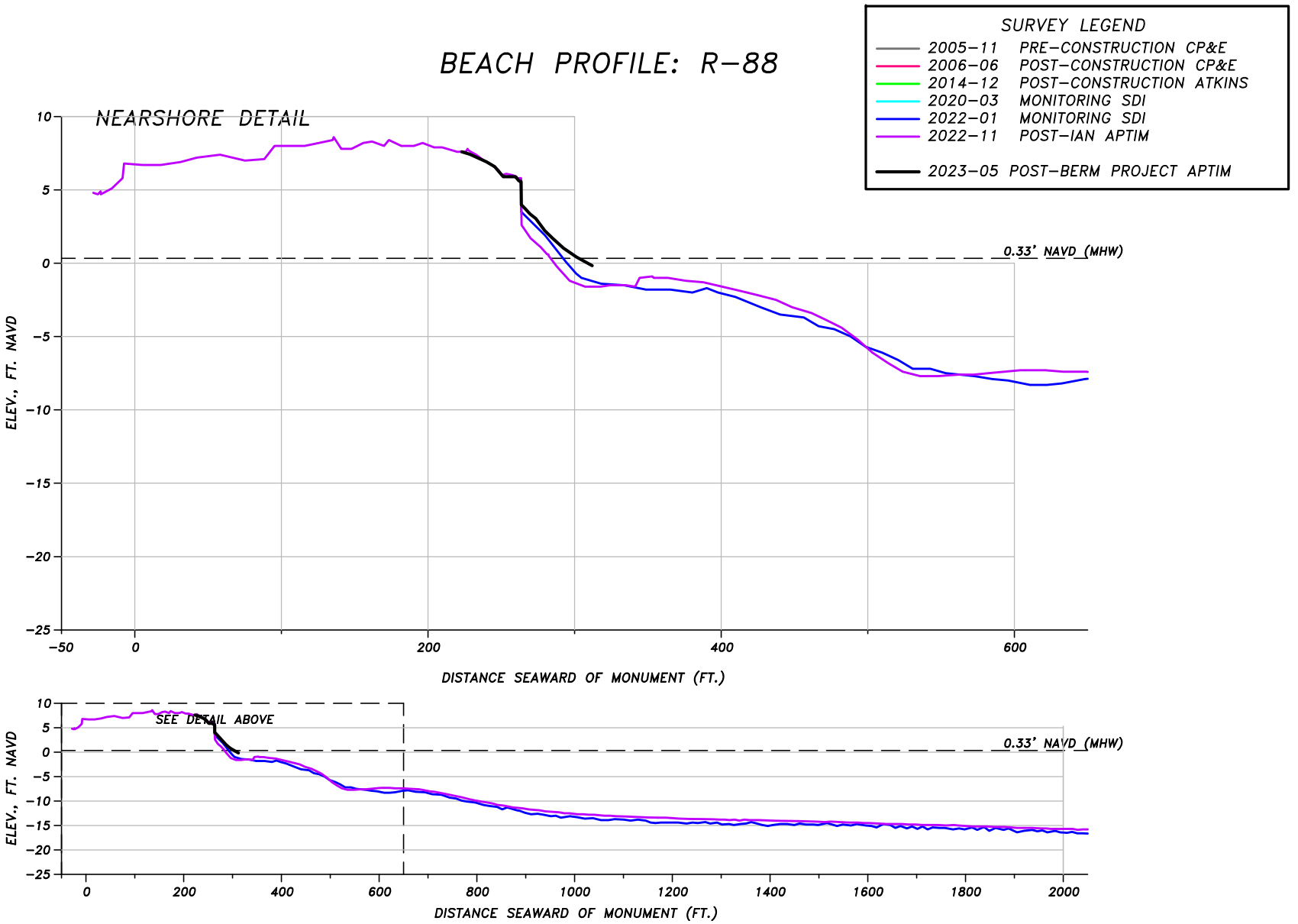
BEACH PROFILE: R-88



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 4/7/15	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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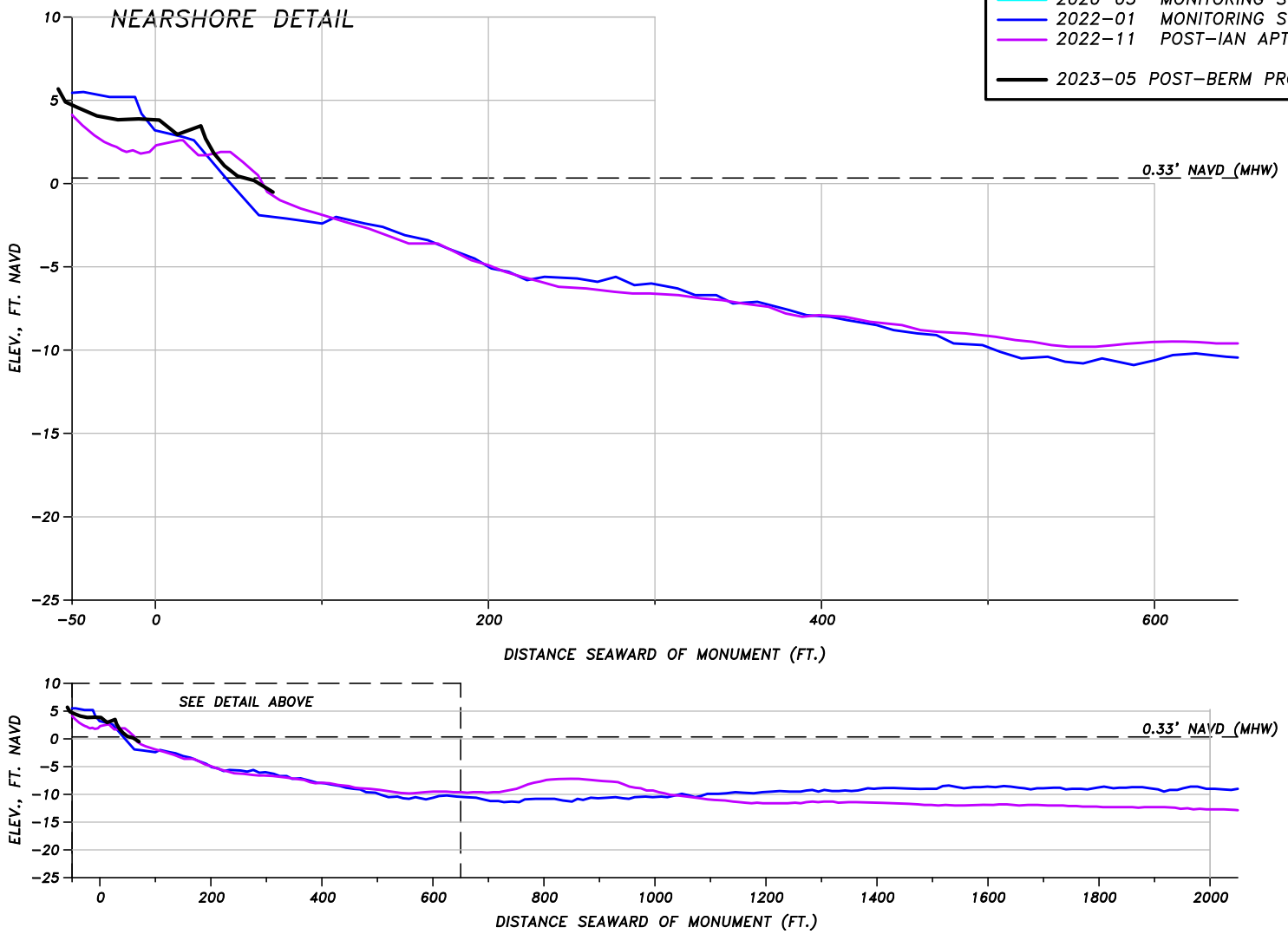
BEACH PROFILE: R-89



HUMISTON & MOORE ENGINEERS COASTAL ENGINEERING DESIGN AND PERMITTING	COLLIER COUNTY BEACH MONITORING BEACH PROFILE		
	FOR: COLLIER COUNTY		
	DATE: 4/7/15	FILE: SECTION	SCALE: SHOWN
	JOB: 18022	DATUM: NAVD	FIGURE:

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Appendix E

2006 Post Construction Volume and Shoreline Change (CP&E)

TABLE 3
VANDERBILT BEACH AND PELICAN BAY
MHW SHORELINE CHANGES AND ADDED BEACH WIDTH

PROFILE AREA	AS BUILT	SEPT. 05 to JUN. 06	NOV. 05 to JUN. 06
WIGGINS PASS			
R-17		26.6	
R-18		7.6	
R-19		-11.0	
R-20		5.8	
R-21		16.3	
R-22		-1.2	1.3
R-23	24.6	25.4	23.3
R-24	32.7	14.5	19.0
R-25	45.3	49.4	43.9
R-26	57.0	42.7	44.4
R-27	66.2	53.2	44.9
R-28	51.7	44.8	48.1
R-29	67.0	67.3	61.1
R-30	39.7	35.1	33.9
R-31	36.4	25.2	27.4
R-32	44.2	37.3	28.3
R-33	38.0	14.7	12.0
R-34	47.3	31.5	20.8
R-35	43.1	33.6	22.3
R-36	40.7	21.3	12.2
R-37		10.7	-9.6
R-38		-3.0	-22.4
R-39		18.3	-4.2
R-40		21.6	6.3
R-41		-7.3	2.0
CLAM PASS			
VANDERBILT R-22 TO R-31	**48.0**	**41.6**	**39.8**
PELICAN BAY R-31 TO R-37	**41.6**	**27.3**	**20.5**
MONITORING AREA R-17 TO R-41		**23.2**	**20.8**

TABLE 4
NORTH PARK SHORE AND PARK SHORE
MHW SHORELINE CHANGES AND ADDED BEACH WIDTH

PROFILE AREA	AS BUILT	SEPT. 05 to JUN. 06	NOV. 05 to JUN. 06
CLAM PASS			
R-42		-4.6	-7.1
R-43		-8.7	-13.0
R-44		26.2	12.3
R-45		0.6	-7.8
R-46	44.5	-0.6	-3.7
R-47	30.7	12.4	10.7
R-48	46.5	19.0	17.7
R-49	43.3	6.4	-2.7
R-50	57.0	40.4	30.0
R-51	86.4	68.8	63.7
R-52	99.2	88.6	69.1
R-53	45.7	49.3	49.8
R-54	48.3	43.5	42.3
R-55		-5.9	-20.7
R-56		-5.2	-9.3
R-57		39.7	12.7
DOCTORS PASS			
PROJECT AREA R-46 TO R-54	**55.7**	**36.4**	**30.8**
MONITORING AREA R-42 TO R-57		**23.1**	**15.3**

TABLE 5
NAPLES BEACH
MHW SHORELINE CHANGES AND ADDED BEACH WIDTH

PROFILE AREA	AS BUILT	SEPT. 05 to JUN. 06	NOV. 05 to JUN. 06
DOCTORS PASS			
R-58A	118.4	66.7	63.3
R-58	96.8	77.5	59.4
R-59	59.9	86.9	71.5
R-60	41.9	51.1	44.5
R-61	12.6	41.3	48.9
R-62	49.9	68.3	70.1
R-63	93.7	49.7	38.7
R-64	47.9	19.9	14.8
R-65	36.0	50.5	30.5
R-66	60.6	53.6	36.2
R-67	43.8	67.7	30.7
R-68	35.2	38.0	2.2
R-69	51.4	43.3	31.6
R-70	109.9	106.7	100.2
R-71	123.5	123.4	120.7
R-72	136.3	127.8	126.2
R-73	54.7	53.7	50.0
R-74	76.8	78.3	86.4
R-75	52.4	70.4	51.4
R-76	64.5	93.2	76.3
R-77	47.7	59.6	61.3
R-78	40.6	54.3	44.0
R-79	2.6	4.1	0.8
R-80		28.5	17.8
R-81		10.4	9.2
R-82		15.7	0.7
R-83		16.0	8.8
R-84		15.4	18.5
PROJECT AREA R-58A TO R-78	**66.1**	**67.4**	**57.2**
MONITORING AREA R-58A TO R-84		**56.1**	**47.0**

TABLE 6
VANDERBILT BEACH AND PELICAN BAY VOLUMETRIC CHANGES (CY)

PROFILE AREA FROM / TO	EFFECTIVE DISTANCE(FT)	DESIGN	AS-BUILT	SEPT. 05 to JUN. 06	NOV. 05 to JUN. 06
WIGGINS PASS					
R-17 TO R-18	1,002			2,229	
R-18 TO R-19	1,047			-258	
R-19 TO R-20	1,029			-3,088	
R-20 TO R-21	1,030			1,896	
R-21 TO R-22	1,040			2,489	
R-22 TO R-23	568	3,706	4,515	3,790	2,986
R-23 TO R-24	1,057	8,662	8,336	5,557	7,007
R-24 TO R-25	1,082	12,893	13,698	9,690	12,529
R-25 TO R-26	983	15,963	15,892	15,819	16,983
R-26 TO R-27	993	18,856	18,425	16,754	18,293
R-27 TO R-28	1,195	23,327	22,519	19,783	19,538
R-28 TO R-29	855	14,093	14,383	14,833	15,215
R-29 TO R-30	1,028	13,436	14,662	15,549	15,122
R-30 TO R-31	1,037	10,753	9,057	8,372	5,083
R-31 TO R-32	1,006	10,207	8,957	11,916	9,931
R-32 TO R-33	1,017	10,174	9,093	14,588	15,641
R-33 TO R-34	1,026	10,799	10,881	13,058	15,598
R-34 TO R-35	997	11,177	11,277	16,466	16,440
R-35 TO R-36	999	11,245	12,993	13,544	14,369
R-36 TO R-37	1,057	3,623	3,754	8,014	9,132
R-37 TO R-38	976			-350	1,977
R-38 TO R-39	1,022			-2,089	3,417
R-39 TO R-40	1,009			2,255	8,839
R-40 TO R-41	1,012			-1,032	9,435
CLAM PASS					
VANDERBILT R-22 TO R-31	**8,798**	**121,689**	**121,487**	**110,147**	**112,756**
PELICAN BAY R-31 TO R-37	**6,102**	**57,225**	**56,955**	**77,586**	**81,111**
MONITORING AREA R-17 TO R-41	**24,067**			**189,785**	**217,535**

TABLE 7
NORTH PARK SHORE AND PARK SHORE VOLUMETRIC CHANGES

PROFILE AREA FROM / TO	EFFECTIVE DISTANCE(FT)	DESIGN	AS-BUILT	SEPT. 05 to JUN. 06	NOV. 05 to JUN. 06
CLAM PASS					
R-42 TO R-43	1,039			-5,456	-6,534
R-43 TO R-44	997			-690	1,022
R-44 TO R-45	1,048			3,178	-320
R-45 TO R-46	1,106	6,551	8,478	-2,357	-5,071
R-46 TO R-47	973	11,890	10,040	-3,011	-1,948
R-47 TO R-48	933	9,337	9,187	2,982	4,122
R-48 TO R-49	1,067	11,040	11,604	2,770	4,770
R-49 TO R-50	1,086	12,062	11,608	6,150	9,768
R-50 TO R-51	1,329	26,096	26,745	24,038	28,411
R-51 TO R-52	885	23,669	23,960	21,004	20,654
R-52 TO R-53	1,048	24,766	24,719	19,332	16,803
R-53 TO R-54	1,070	13,220	13,412	11,757	10,173
R-54 TO R-55	1,046	1,593	1,986	6,710	3,941
R-55 TO R-56	923			-1,950	-2,338
R-56 TO R-57	768			-23	2,647
DOCTORS PASS					
N. PARK SHORE R-45 TO R-48	**3,012**	**27,778**	**27,705**	**-2,386**	**-2,897**
PARK SHORE R-48 TO R-55	**7,531**	**112,446**	**114,034**	**91,761**	**94,520**
MONITORING AREA R-42 TO R-57	**15,318**	**140,224**	**141,739**	**84,434**	**86,100**

TABLE 8
NAPLES BEACH VOLUMETRIC CHANGES

PROFILE AREA FROM / TO	EFFECTIVE DISTANCE(FT)	DESIGN	AS-BUILT	SEPT. 05 to JUN. 06	NOV. 05 to JUN. 06
DOCTORS PASS					
R-58A TO R-58	521	22,602	21,736	6,838	4,747
R-58 TO R-59	985	23,123	22,219	22,905	18,219
R-59 TO R-60	1,085	17,447	17,238	16,723	16,192
R-60 TO R-61	1,077	9,591	8,356	21,169	19,194
R-61 TO R-62	1,020	6,192	7,037	24,388	27,401
R-62 TO R-63	1,008	18,303	18,615	20,628	22,986
R-63 TO R-64	926	19,227	18,918	11,100	12,282
R-64 TO R-65	782	9,586	8,688	5,438	6,052
R-65 TO R-66	825	10,404	10,419	11,509	11,201
R-66 TO R-67	800	11,404	12,854	13,959	15,865
R-67 TO R-68	809	8,334	8,879	8,538	10,789
R-68 TO R-69	811	9,378	9,548	3,630	7,166
R-69 TO R-70	798	18,059	16,945	10,186	10,899
R-70 TO R-71	802	31,932	32,220	18,091	18,652
R-71 TO R-72	803	33,727	33,305	21,132	25,950
R-72 TO R-73	811	22,423	22,798	15,331	18,544
R-73 TO R-74	815	16,037	14,982	7,388	14,346
R-74 TO R-75	789	10,498	13,124	10,498	8,505
R-75 TO R-76	800	14,614	15,105	13,492	7,992
R-76 TO R-77	798	16,766	18,147	8,390	14,859
R-77 TO R-78	765	11,433	12,199	2,843	8,279
R-78 TO R-79	1,105	4,203	4,049	-5,264	2,100
R-79 TO R-80	1,150			-8,438	-1,570
R-80 TO R-81	1,077			-2,809	3,070
R-81 TO R-82	874			-1,676	2,774
R-82 TO R-83	1,047			-2,640	194
R-83 TO R-84	960			-5,118	395
NAPLES BEACH R-58A TO R-79	**18,935**	**345,283**	**347,381**	**268,912**	**302,220**
MONITORING AREA R-58A TO R-84	**24,043**			**248,231**	**307,083**

Appendix F

Historical Shoreline Change for R-17 through R-84

(Beach Width Comparisons)

Wiggins to Clam Pass Historical Beach Widths (R-17 to R-41)

DEP Mon.	Design Standard	Beach Width (Feet)																			
		2005	2006	2007	2008	2009	2010	2011	2012	4/2013	2/2014	4/2015	1/2016	1/2017	10/2017	3/2019	3/2020	1/2021	1/2022	11/2022	5/2023
Wiggins Pass																					
R-17	-	51	77	44	78		180		113	172	127	68	-13	17	-19	-79	-95	-93	-107	-112	
R-18	-	97	108	172	148		130		106	102	87	94	67	46	52	64	90	80	56	77	
R-19	-	112	99	182	149	**No Data**	127	**No Data**	90	103	94	81	83	77	78	140	136	126	104	143	**No**
R-20	-	98	103	107	118		107		75	72	81	81	71	67	63	67	79	80	78	118	**Data**
R-21	-	87	102	99	108		99		83	94	94	93	85	69	67	63	79	77	74	93	
R-22	100	107	107	120	112	112	124	118	108	118	120	112	105	103	101	96	109	109	102	120	100
R-23	100	100	121	129	116	118	113	122	116	110	117	114	107	105	106	106	112	115	127	138	111
R-24	100	114	130	138	119	116	135	124	125	99	114	112	112	117	116	123	124	112	136	150	130
R-25	100	95	135	136	112	112	124	112	113	93	108	106	98	116	111	114	114	108	130	138	122
R-26	100	109	147	148	123	123	135	121	123	107	140	127	117	133	124	122	117	116	149	151	134
R-27	100	79	121	117	98	96	97	89	91	90	123	109	98	115	94	107	99	93	128	123	95
R-28	100	97	138	123	112	108	112	111	99	88	120	119	108	119	110	102	105	89	139	131	112
R-29	100	86	143	120	105	108	107	106	98	93	123	119	109	119	106	109	110	103	135	143	113
R-30	100	110	141	131	109	125	113	108	117	110	125	123	113	116	116	117	114	112	142	143	121
R-31	100	109	132	121	117	136	131	124	117	102	130	131	123	125	115	121	123	111	140	148	129
R-32	100	107	139	123	109	127	126	131	120	115	122	129	119	118	119	117	122	107	120	133	116
R-33	100	91	104	96	99	108	111	113	105	95	103	105	102	105	103	100	90	90	103	112	100
R-34	100	80	104	103	87	93	110	100	102	89	100	95	94	95	89	105	101	80	106	111	101
R-35	100	79	103	98	79	94	97	94	87	82	104	94	83	89	84	78	85	78	104	98	87
R-36	100	81	96	92	79	82	92	90	90	78	96	90	81	87	83	87	80	68	88	88	81
R-37	100	99	92	99	92	98	95	83	95	85	93	95	91	96	93	87	98	83	89	94	89
R-38	-	106	88	116	104	104	101	77	109	93	101	104	102	110	104	94	111	84	94	102	
R-39	-	97	93	104	88	80	111	94	107	97	107	110	107	111	95	93	84	96	86	90	**No**
R-40	-	71	80	81	76	73	107	118	83	114	98	125	115	93	87	87	73	59	72	101	**Data**
R-41	-	104	108	112	138	173	99	131	80	158	157	193	146	141	118	101	75	178	110	108	

Notes:

- Beach widths shown in red based on pre-construction survey dated 3/2023.
- Beach widths outlined in bold shown on following charts and graphs for 2023.
- Beach widths from 2005 to 2014 for monuments R-17 to R-21 by Humiston & Moore Engineers.
- Beach widths shown from 2005 to 2014 for monuments R-22 to R-41 based on: 2005 to 2014 Historical Beach Analysis, Atkins, July 2014.
- Beach widths for 2005 R-17 to R-21 based on September 2005 survey.
- Shaded portion of table represents the 2005/2006 project area.

Clam to Doctors Pass Historical Beach Widths (R-42 to R-57)

DEP	Design	Beach Width (Feet)																			
Mon.	Standard	2005	2006	2007	2008	2009	2010	2011	2012	2013	2/2014	4/2015	1/2016	1/2017	10/2017	3/2019	3/2020	1/2021	1/2022	11/2022	5/2023
Clam Pass																					
R-42	85	103	97	79	63	82	87	52	88	47	73	33	53	46	78	108	108	108	101	73	89
R-43	85	64	52	79	67	73	57	55	61	39	73	54	47	62	63	69	66	106	90	93	68
R-44	85	74	84	64	67	65	63	62	35	60	76	80	70	75	59	64	91	85	95	95	80
R-45	85	76	67	61	65	69	63	74	30	78	99	96	84	96	67	75	132	103	97	90	88
R-46	85	88	84	64	71	84	67	78	82	61	98	88	82	87	72	76	97	89	84	96	86
R-47	85	103	114	99	99	103	88	80	97	84	101	105	104	113	98	102	116	116	121	127	124
R-48	85	82	99	101	89	91	88	88	104	82	84	98	96	99	79	88	109	98	99	122	109
R-49	85	99	96	97	90	93	104	106	108	92	97	88	90	99	93	80	104	98	92	115	112
T-50	85	87	116	129	108	123	126	143	122	97	120	117	115	110	101	114	128	113	123	132	126
R-51	85	64	126	112	102	96	97	108	90	90	123	106	97	93	84	87	111	103	96	101	88
R-52	85	59	125	94	84	85	57	76	79	56	110	100	86	91	68	69	113	93	82	83	69
R-53	85	64	114	97	89	83	80	64	84	83	99	95	96	94	78	85	99	95	95	97	87
T-54	85	83	126	101	99	93	94	98	104	95	124	113	114	118	109	100	121	118	114	119	112
U-55	-	93	73	93	91	98	99	105	115	111	108	122	121	125	120	125	138	126	118	122	129
R-56	-	103	91	101	108	115	113	129	123	108	113	151	153	147	138	136	145	134	119	131	141
T-57	-	110	123	109	109	103	109	138	99	146	150	198	167	163	126	143	152	111	124	140	151
Doctors Pass																					
S. of Clam Pass Avg. Beach Width R-42 to R-43		84	74	79	65	77	72	53	75	43	73	44	50	54	71	88	87	107	95	83	79
Park Shore Beach Avg. Beach Width R-44 to R-55		80	105	93	88	90	84	89	85	80	103	99	94	98	83	85	111	101	100	107	98
N. of Doctors Pass Avg. Beach Width R-56 to R-57		102	95	101	102	105	107	124	112	121	124	157	147	145	128	135	145	124	120	131	140

Notes:

- Beach widths shown in red based on pre-construction survey dated 3/2023.
- Beach widths outlined in bold shown on following charts and graphs for 2023.
- Beach widths shown from 2005 to 2014 based on: 2005 to 2014 Historical Beach Analysis, Atkins, July 2014.
- Shaded portion of table represents the 2005/2006 project area.

Doctors to Gordon Pass Historical Beach Widths (R-58A to R-84)

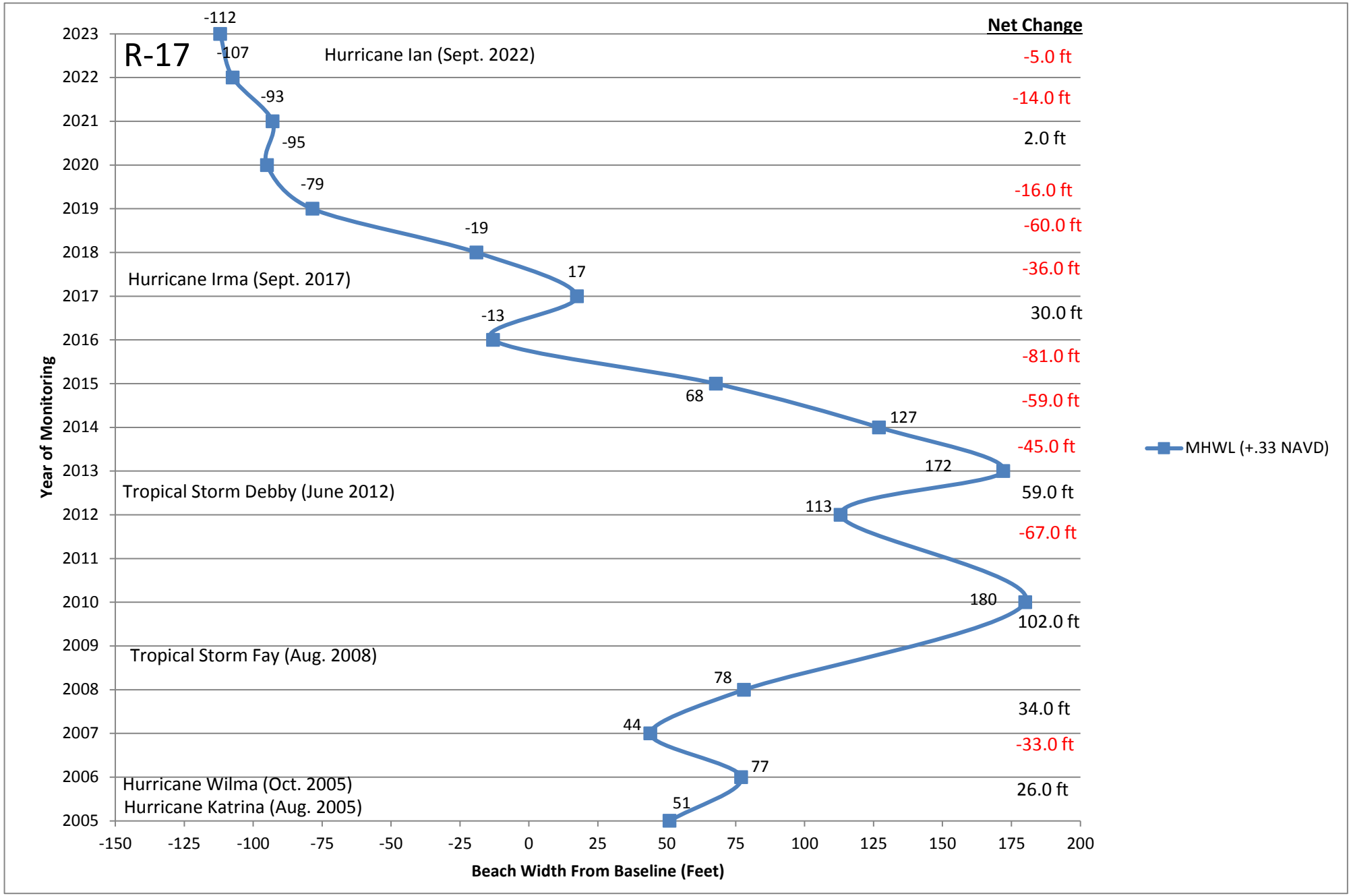
DEP Mon.	Design Standard	Beach Width (Feet)																			
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2/2014	4/2015	1/2016	1/2017	10/2017	3/2019	3/2020	1/2021	1/2022	11/2022	5/2023
Doctors Pass																					
R-58A	100	13	78	24	21	35	50	57	6	12	140	52	40	32	55	104	105	179	178	182	177
R-58	100	70	134	105	82	75	74	79	54	83	144	125	103	90	82	58	61	124	90	94	100
R-59	100	71	146	124	103	99	97	101	84	101	121	122	115	107	97	104	94	152	124	117	104
R-60	100	68	108	115	103	115	112	109	100	104	109	107	98	102	99	108	106	119	115	114	108
R-61	100	82	129	127	118	150	138	140	132	111	125	139	138	153	133	164	141	141	153	156	145
T-62	100	57	123	111	90	100	86	103	104	97	105	145	102	118	98	104	122	106	125	108	105
R-63	100	87	120	96	99	106	88	89	106	72	116	106	113	98	102	91	104	95	124	105	96
R-64	100	103	119	110	112	122	110	107	122	96	107	96	91	102	99	77	86	108	121	118	115
R-65	100	106	135	116	115	122	115	103	127	128	125	120	112	108	105	104	99	98	124	128	116
R-66	100	112	147	136	129	131	124	115	131	122	129	126	127	124	126	143	114	130	149	143	141
R-67	100	153	184	177	160	152	151	152	164	172	174	172	171	163	157	173	160	160	187	187	179
R-68	100	144	146	165	163	150	152	152	151	151	162	167	166	143	147	138	138	140	161	166	155
T-69	100	107	140	151	140	124	130	132	116	136	149	156	137	128	136	112	108	113	134	138	118
R-70	100	69	168	140	139	123	130	120	109	130	140	136	133	122	124	107	99	100	123	118	120
R-71	100	62	178	145	139	129	132	125	112	123	144	147	139	124	137	125	129	121	147	133	139
R-72	100	73	195	167	156	154	150	149	128	122	155	172	170	147	155	145	151	146	167	156	163
R-73	100	85	129	155	157	150	150	147	125	127	153	186	178	145	156	154	156	142	157	155	164
R-74	100	68	157	155	147	138	142	145	136	140	144	176	187	149	157	158	164	146	182	183	174
R-75	100	84	135	111	126	140	140	128	135	134	116	147	115	121	152	145	136	125	140	118	125
R-76	100	60	138	117	110	98	108	100	104	78	113	94	111	103	113	127	135	113	132	110	115
R-77	100	78	137	124	116	108	111	124	132	108	116	111	119	114	127	142	162	135	123	127	132
R-78	100	86	124	118	109	110	115	134	126	92	100	103	101	106	135	105	115	116	110	105	130
R-79	100	80	82	100	81	100	110	101	109	126	105	99	89	98	108	79	82	105	88	67	89
R-80	-	86	101	96	90	88	117	111	105	117	112	100	99	93	94	76	84	97	87	60	57
R-81	-	92	99	95	86	92	89	97	98	117	115	107	111	102	99	89	84	89	100	82	74
R-82	-	63	58	70	69	81	60	64	73	89	83	89	85	75	78	63	76	62	75	60	62
R-83	-	41	43	51	62	67	58	45	51	71	56	81	79	70	75	54	79	62	67	55	49
R-84	-	23	34	43	45	53	52	67	44	59	53	72	67	47	68	57	58	66	55	47	52
R-85	-	Not Analyzed as Part of This Report - Shown for Reference Only																			
R-86	-																				
R-87	-																				
R-88	-																				
R-89	-																				
Gordon Pass																					
Naples Beach Avg. Beach Width R-58A to R-79		83	137	126	118	119	118	118	114	111	130	131	124	117	122	120	120	127	137	132	131
Naples Beach Avg. Beach Width R-80 to R-84		61	67	71	70	76	75	77	74	91	84	90	88	77	83	68	76	75	77	61	59

Notes:

- Beach widths outlined in bold shown on following charts and graphs for 2023.
- Average width for Naples Beach project area does not include the width shown for monument R-58A
- Beach widths shown from 2005 to 2014 based on: 2005 to 2014 Historical Beach Analysis, Atkins, July 2014.
- Shaded portion of table represents the 2005/2006 project area.

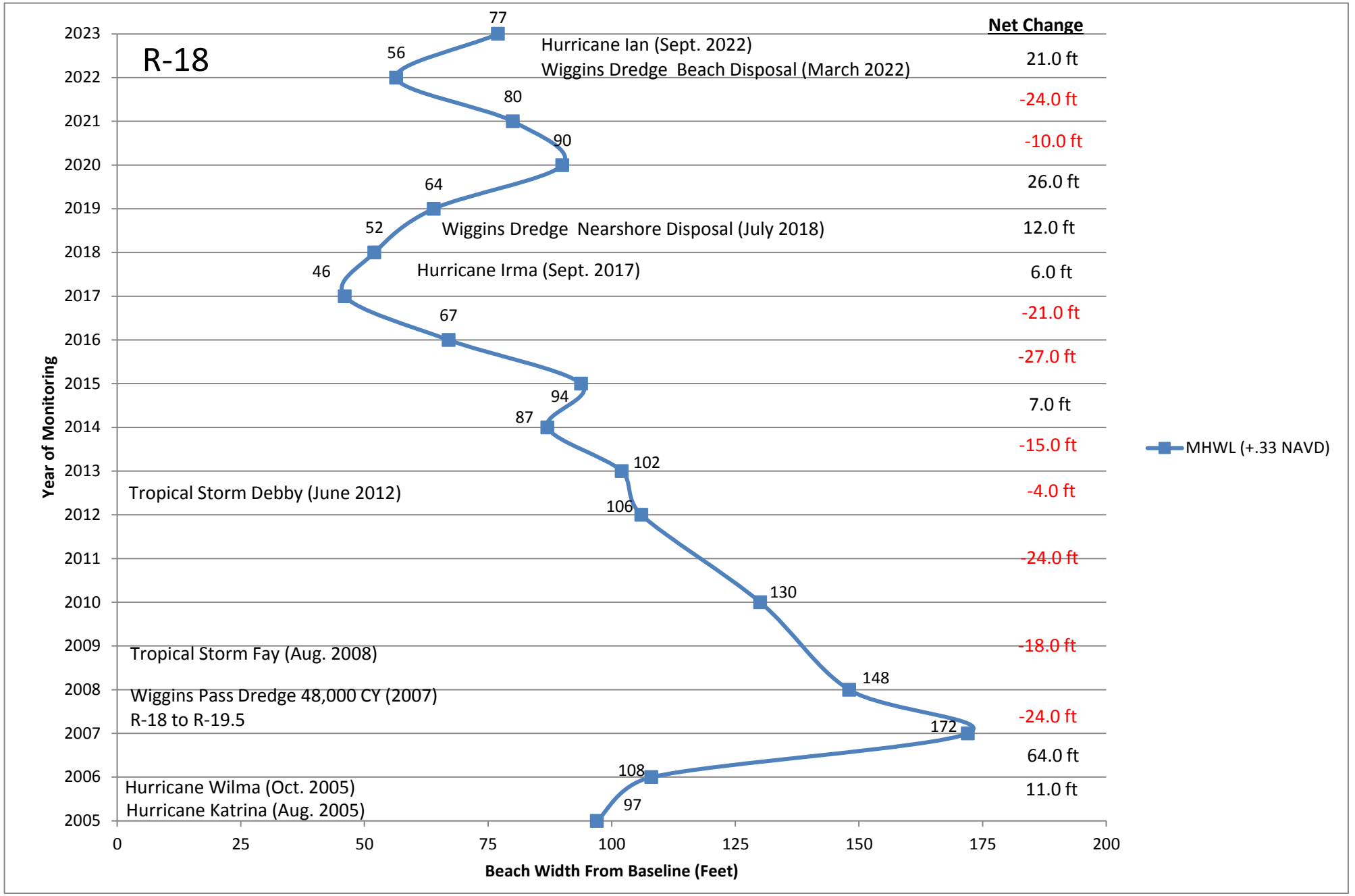
R-17

	2005 Beach Width=	51			
2006	Beginning Width=		2015	Beginning Width=	127
	Annual Erosion=			Annual Erosion=	-59
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	77		End Beach Width=	68
2007	Beginning Width=	77	2016	Beginning Width=	68
	Annual Erosion=	-33		Annual Erosion=	-81
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	44		End Beach Width=	-13
2008	Beginning Width=	44	2017	Beginning Width=	-13
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	34		Annual Accretion=	30
	End Beach Width=	78		End Beach Width=	17
2009	Beginning Width=	78	2018	Beginning Width=	17
	Annual Erosion=			Annual Erosion=	-36
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	78		End Beach Width=	-19
2010	Beginning Width=	78	2019	Beginning Width=	-19
	Annual Erosion=			Annual Erosion=	-60
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	180		End Beach Width=	-79
2011	Beginning Width=	180	2020	Beginning Width=	-79
	Annual Erosion=			Annual Erosion=	-16
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	180		End Beach Width=	-95
2012	Beginning Width=	180	2021	Beginning Width=	-95
	Annual Erosion=	-67		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	2
	End Beach Width=	113		End Beach Width=	-93
2013	Beginning Width=	113	2022	Beginning Width=	-93
	Annual Erosion=			Annual Erosion=	-14
	Annual Accretion=	59		Annual Accretion=	
	End Beach Width=	172		End Beach Width=	-107
2014	Beginning Width=	172	2023	Beginning Width=	-107
	Annual Erosion=	-45		Annual Erosion=	-5
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	127		End Beach Width=	-112


R-17
Hurricane Ian (Sept. 2022)
Hurricane Irma (Sept. 2017)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (Aug. 2008)
Hurricane Wilma (Oct. 2005)
Hurricane Katrina (Aug. 2005)
Net Change
-5.0 ft
-14.0 ft
2.0 ft
-16.0 ft
-60.0 ft
-36.0 ft
30.0 ft
-81.0 ft
-59.0 ft
-45.0 ft
59.0 ft
-67.0 ft
102.0 ft
34.0 ft
-33.0 ft
26.0 ft
-112
-107
-93
-95
-79
-19
17
-13
68
127
172
113
180
78
44
77
51
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
-150
-125
-100
-75
-50
-25
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
MHWL (+.33 NAVD)

R-18

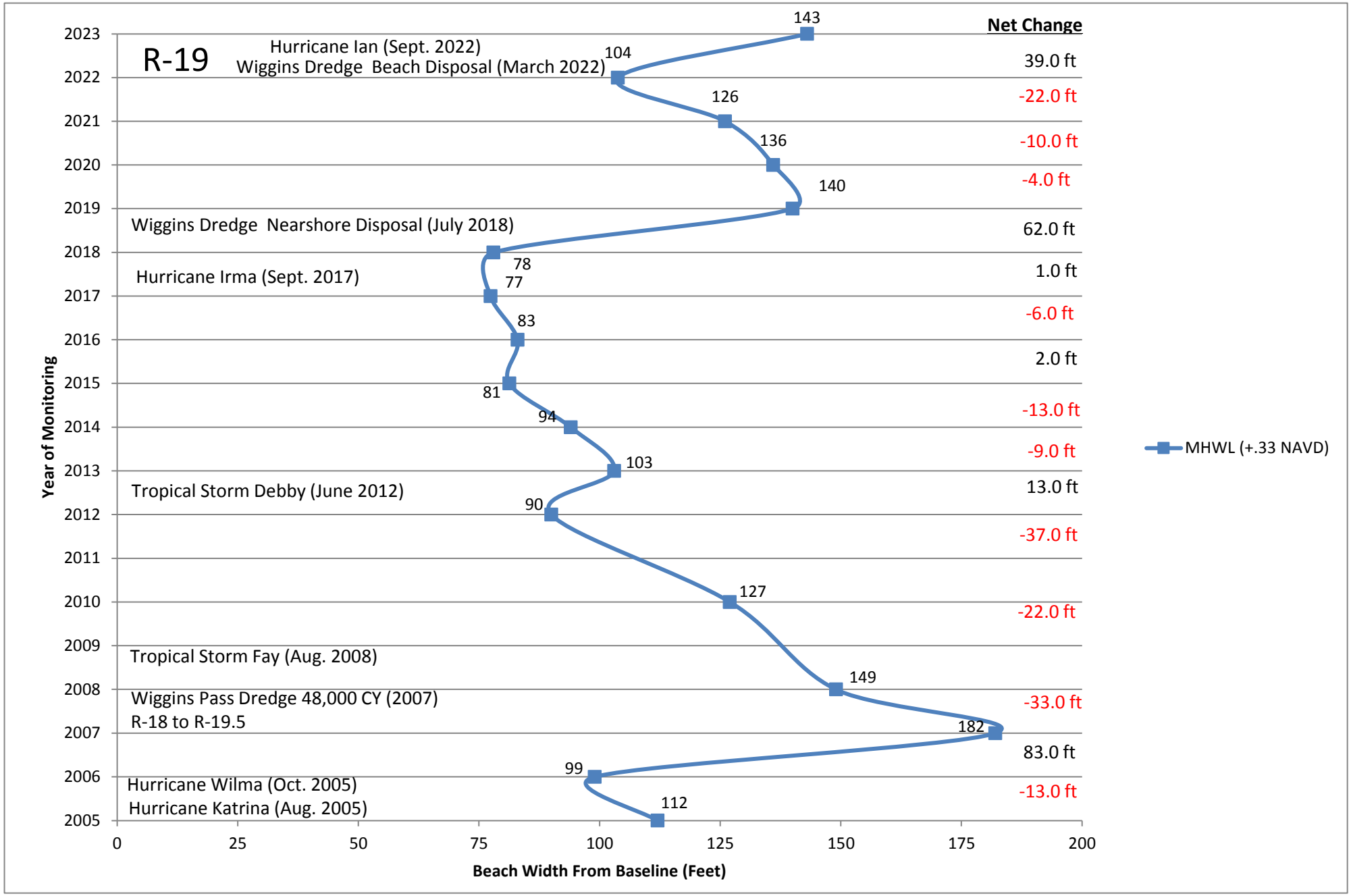
	2005 Beach Width=	97			
2006	Beginning Width=	97	2015	Beginning Width=	87
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	11		Annual Accretion=	7
	End Beach Width=	108		End Beach Width=	94
2007	Beginning Width=	108	2016	Beginning Width=	94
	Annual Erosion=			Annual Erosion=	-27
	Annual Accretion=	64		Annual Accretion=	
	End Beach Width=	172		End Beach Width=	67
2008	Beginning Width=	172	2017	Beginning Width=	67
	Annual Erosion=	-24		Annual Erosion=	-21
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	148		End Beach Width=	46
2009	Beginning Width=	148	2018	Beginning Width=	46
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=			Annual Accretion=	6
	End Beach Width=	148		End Beach Width=	52
2010	Beginning Width=	148	2019	Beginning Width=	52
	Annual Erosion=	-18		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	12
	End Beach Width=	130		End Beach Width=	64
2011	Beginning Width=	130	2020	Beginning Width=	64
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	10		Annual Accretion=	26
	End Beach Width=	140		End Beach Width=	90
2012	Beginning Width=	130	2021	Beginning Width=	90
	Annual Erosion=	-24		Annual Erosion=	-10
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	106		End Beach Width=	80
2013	Beginning Width=	106	2022	Beginning Width=	80
	Annual Erosion=	-4		Annual Erosion=	-24
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	102		End Beach Width=	56
2014	Beginning Width=	102	2023	Beginning Width=	56
	Annual Erosion=	-15		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	21
	End Beach Width=	87		End Beach Width=	77


R-18
Net Change
Hurricane Ian (Sept. 2022)
Wiggins Dredge Beach Disposal (March 2022)
Wiggins Dredge Nearshore Disposal (July 2018)
Hurricane Irma (Sept. 2017)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (Aug. 2008)
Wiggins Pass Dredge 48,000 CY (2007)
R-18 to R-19.5
Hurricane Wilma (Oct. 2005)
Hurricane Katrina (Aug. 2005)
77
56
80
90
64
52
46
67
94
87
102
106
130
148
172
108
97
21.0 ft
-24.0 ft
-10.0 ft
26.0 ft
12.0 ft
6.0 ft
-21.0 ft
-27.0 ft
7.0 ft
-15.0 ft
-4.0 ft
-24.0 ft
-18.0 ft
-24.0 ft
64.0 ft
11.0 ft
MHWL (+.33 NAVD)
Year of Monitoring
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)

R-19

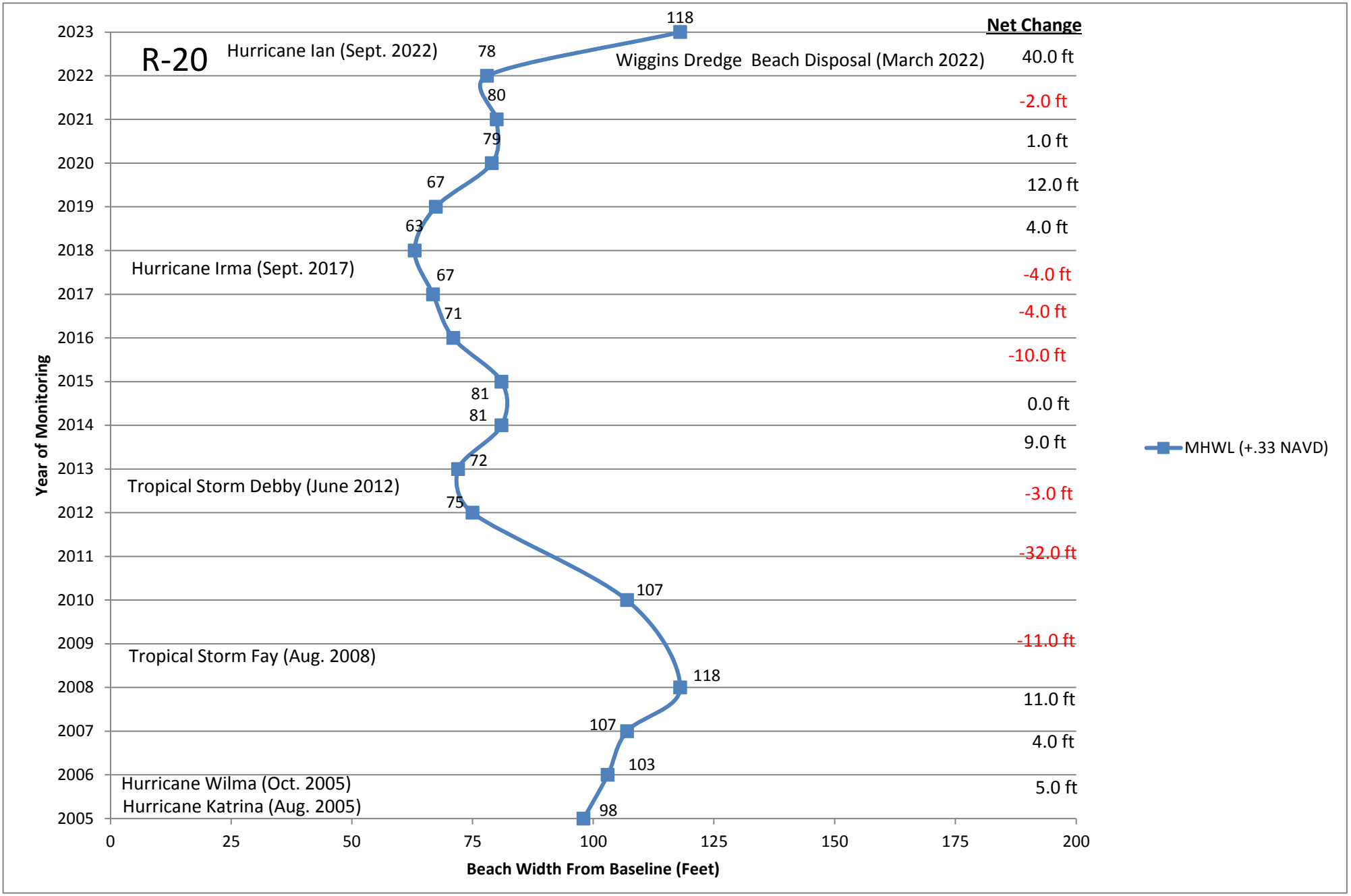
2005 Beach Width=	112	

2006	Beginning Width=	112	2015	Beginning Width=	94
	Annual Erosion=	-13		Annual Erosion=	-13
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	99		End Beach Width=	81
2007	Beginning Width=	99	2016	Beginning Width=	81
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	83		Annual Accretion=	2
	End Beach Width=	182		End Beach Width=	83
2008	Beginning Width=	182	2017	Beginning Width=	83
	Annual Erosion=	-33		Annual Erosion=	-6
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	149		End Beach Width=	77
2009	Beginning Width=	149	2018	Beginning Width=	77
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=			Annual Accretion=	1
	End Beach Width=	149		End Beach Width=	78
2010	Beginning Width=	149	2019	Beginning Width=	78
	Annual Erosion=	-22		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	62
	End Beach Width=	127		End Beach Width=	140
2011	Beginning Width=	127	2020	Beginning Width=	140
	Annual Erosion=			Annual Erosion=	-4
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	127		End Beach Width=	136
2012	Beginning Width=	127	2021	Beginning Width=	136
	Annual Erosion=	-37		Annual Erosion=	-10
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	90		End Beach Width=	126
2013	Beginning Width=	90	2022	Beginning Width=	126
	Annual Erosion=			Annual Erosion=	-22
	Annual Accretion=	13		Annual Accretion=	
	End Beach Width=	103		End Beach Width=	104
2014	Beginning Width=	103	2023	Beginning Width=	104
	Annual Erosion=	-9		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	39
	End Beach Width=	94		End Beach Width=	143


R-19
Hurricane Ian (Sept. 2022)
Wiggins Dredge Beach Disposal (March 2022)
Wiggins Dredge Nearshore Disposal (July 2018)
Hurricane Irma (Sept. 2017)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (Aug. 2008)
Wiggins Pass Dredge 48,000 CY (2007)
R-18 to R-19.5
Hurricane Wilma (Oct. 2005)
Hurricane Katrina (Aug. 2005)
Net Change
39.0 ft
-22.0 ft
-10.0 ft
-4.0 ft
62.0 ft
1.0 ft
-6.0 ft
2.0 ft
-13.0 ft
-9.0 ft
13.0 ft
-37.0 ft
-22.0 ft
-33.0 ft
83.0 ft
-13.0 ft
143
104
126
136
140
78
77
83
81
94
103
90
127
149
182
99
112
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
MHWL (+.33 NAVD)

R-20

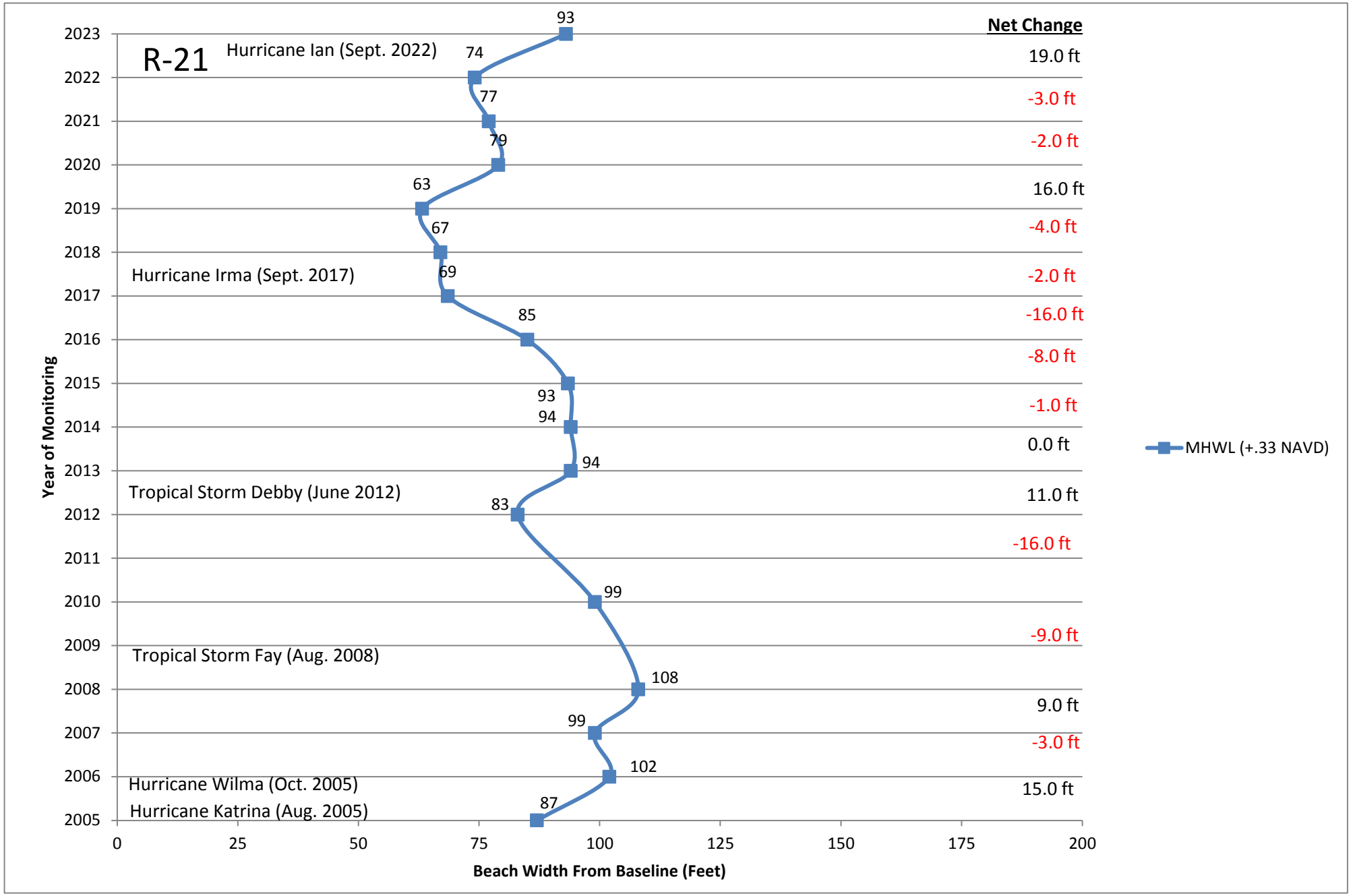
	2005 Beach Width=	98			
2006	Beginning Width=	98	2015	Beginning Width=	81
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	5		Annual Accretion=	
	End Beach Width=	103		End Beach Width=	81
2007	Beginning Width=	103	2016	Beginning Width=	81
	Annual Erosion=			Annual Erosion=	-10
	Annual Accretion=	4		Annual Accretion=	
	End Beach Width=	107		End Beach Width=	71
2008	Beginning Width=	107	2017	Beginning Width=	71
	Annual Erosion=			Annual Erosion=	-4
	Annual Accretion=	11		Annual Accretion=	
	End Beach Width=	118		End Beach Width=	67
2009	Beginning Width=	118	2018	Beginning Width=	67
	Annual Erosion=			Annual Erosion=	-4
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	118		End Beach Width=	63
2010	Beginning Width=	118	2019	Beginning Width=	63
	Annual Erosion=	-11		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	4
	End Beach Width=	107		End Beach Width=	67
2011	Beginning Width=	107	2020	Beginning Width=	67
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=			Annual Accretion=	12
	End Beach Width=	107		End Beach Width=	79
2012	Beginning Width=	107	2021	Beginning Width=	79
	Annual Erosion=	-32		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	1
	End Beach Width=	75		End Beach Width=	80
2013	Beginning Width=	75	2022	Beginning Width=	80
	Annual Erosion=	-3		Annual Erosion=	-2
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	72		End Beach Width=	78
2014	Beginning Width=	72	2023	Beginning Width=	78
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	9		Annual Accretion=	40
	End Beach Width=	81		End Beach Width=	118


R-20
Hurricane Ian (Sept. 2022)
Wiggins Dredge Beach Disposal (March 2022)
Hurricane Irma (Sept. 2017)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (Aug. 2008)
Hurricane Wilma (Oct. 2005)
Hurricane Katrina (Aug. 2005)
Net Change
40.0 ft
-2.0 ft
1.0 ft
12.0 ft
4.0 ft
-4.0 ft
-4.0 ft
-10.0 ft
0.0 ft
9.0 ft
-3.0 ft
-32.0 ft
-11.0 ft
11.0 ft
4.0 ft
5.0 ft
118
78
80
79
67
63
67
71
81
81
72
75
107
118
107
103
98
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
MHWL (+.33 NAVD)

R-21

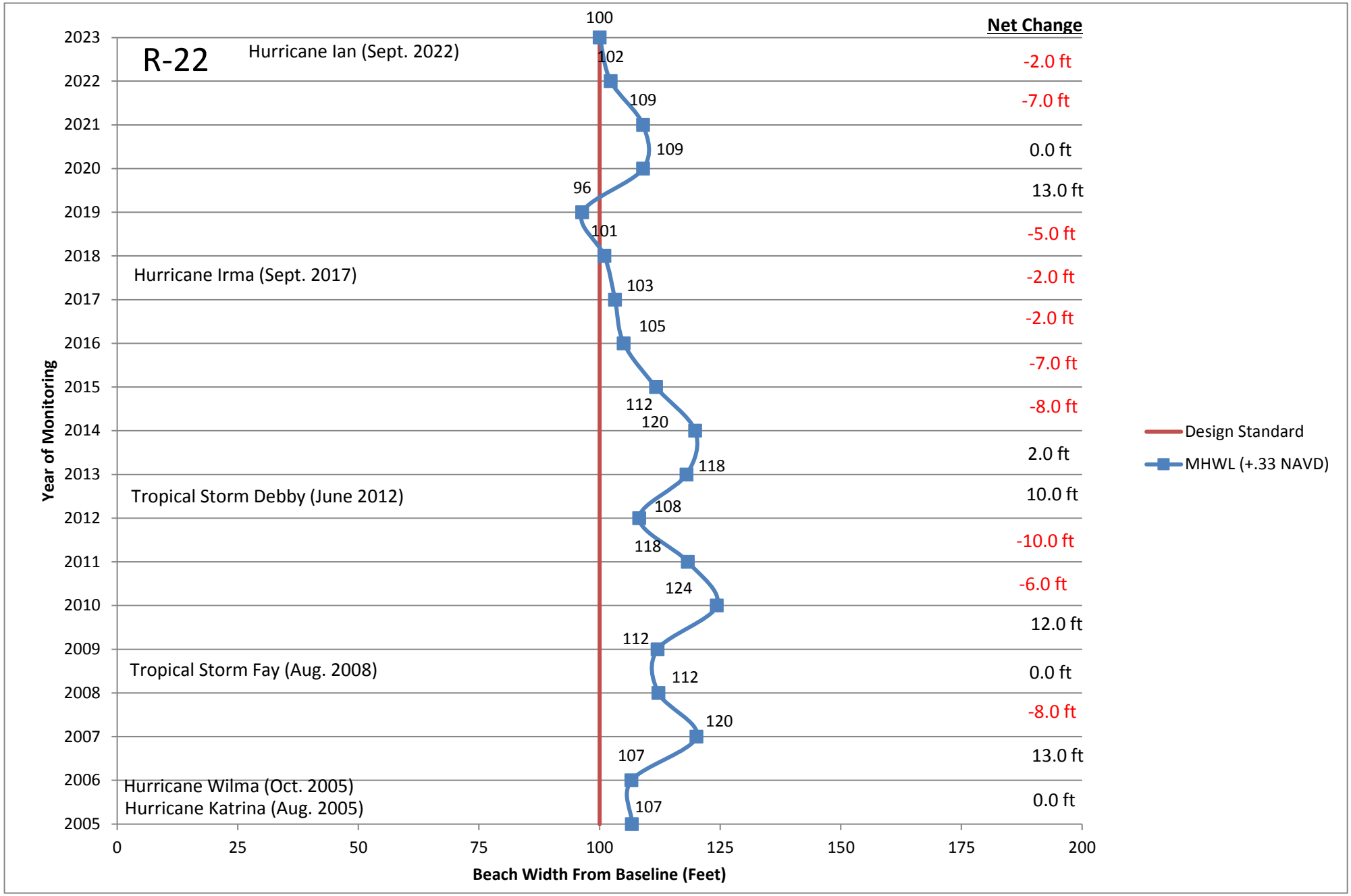
2005 Beach Width=	87	

2006	Beginning Width=	87	2015	Beginning Width=	94
	Annual Erosion=			Annual Erosion=	-1
	Annual Accretion=	15		Annual Accretion=	
	End Beach Width=	102		End Beach Width=	93
2007	Beginning Width=	102	2016	Beginning Width=	93
	Annual Erosion=	-3		Annual Erosion=	-8
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	99		End Beach Width=	85
2008	Beginning Width=	99	2017	Beginning Width=	85
	Annual Erosion=			Annual Erosion=	-17
	Annual Accretion=	9		Annual Accretion=	
	End Beach Width=	108		End Beach Width=	69
2009	Beginning Width=	108	2018	Beginning Width=	69
	Annual Erosion=			Annual Erosion=	-2
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	108		End Beach Width=	67
2010	Beginning Width=	108	2019	Beginning Width=	67
	Annual Erosion=	-9		Annual Erosion=	-4
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	99		End Beach Width=	63
2011	Beginning Width=	99	2020	Beginning Width=	63
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=			Annual Accretion=	16
	End Beach Width=	99		End Beach Width=	79
2012	Beginning Width=	99	2021	Beginning Width=	79
	Annual Erosion=	-16		Annual Erosion=	-2
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	83		End Beach Width=	77
2013	Beginning Width=	83	2022	Beginning Width=	77
	Annual Erosion=			Annual Erosion=	-3
	Annual Accretion=	11		Annual Accretion=	
	End Beach Width=	94		End Beach Width=	74
2014	Beginning Width=	94	2023	Beginning Width=	74
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=			Annual Accretion=	19
	End Beach Width=	94		End Beach Width=	93


R-21
Hurricane Ian (Sept. 2022)
Hurricane Irma (Sept. 2017)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (Aug. 2008)
Hurricane Wilma (Oct. 2005)
Hurricane Katrina (Aug. 2005)
Net Change
19.0 ft
-3.0 ft
-2.0 ft
16.0 ft
-4.0 ft
-2.0 ft
-16.0 ft
-8.0 ft
-1.0 ft
0.0 ft
11.0 ft
-16.0 ft
-9.0 ft
9.0 ft
-3.0 ft
15.0 ft
93
74
77
79
63
67
69
85
93
94
94
83
99
108
99
102
87
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
MHWL (+.33 NAVD)

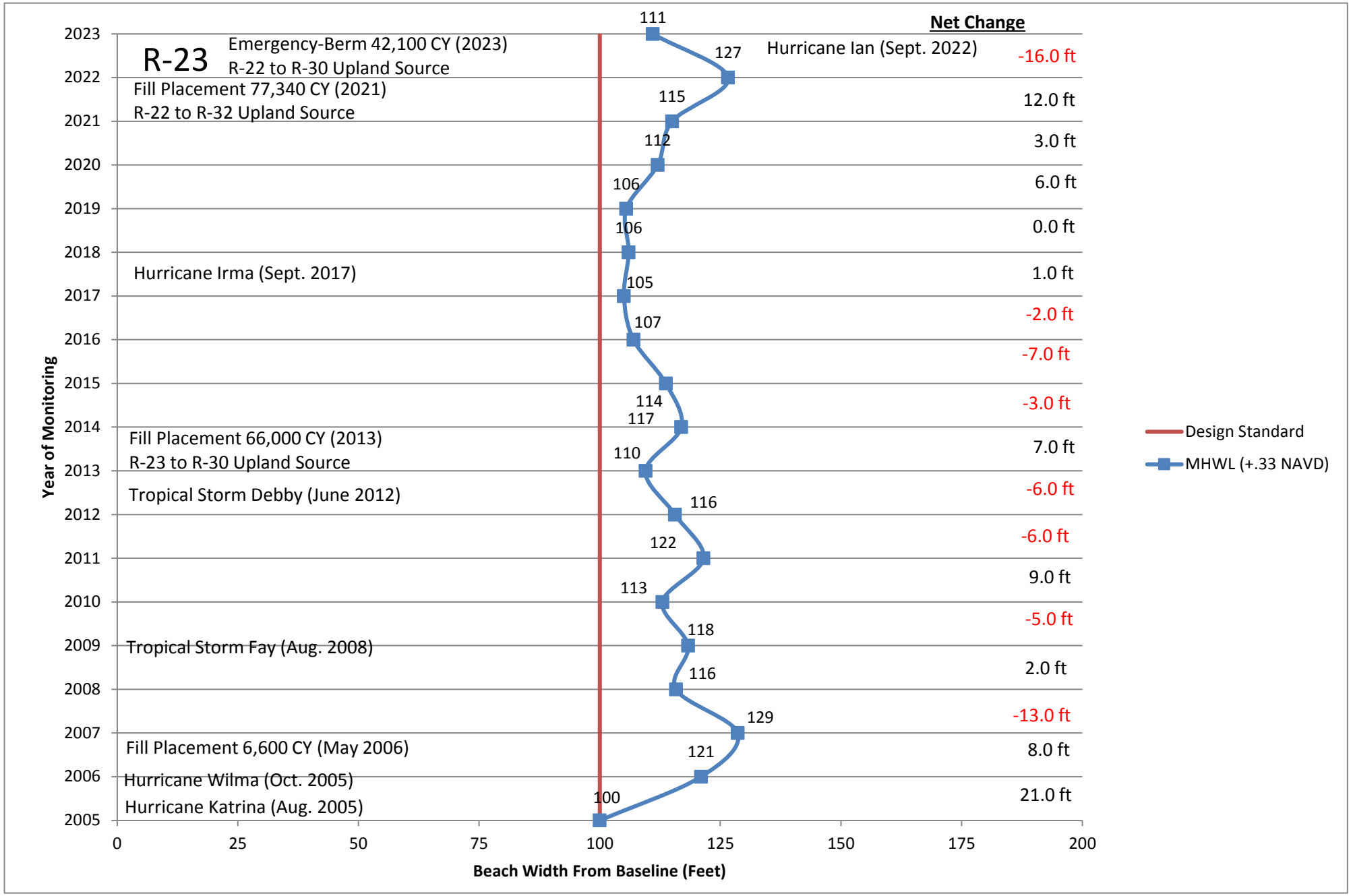
R-22

	2005 Beach Width=	107			
2006	Beginning Width=	107	2015	Beginning Width=	120
	Annual Erosion=			Annual Erosion=	-8
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	107		End Beach Width=	112
2007	Beginning Width=	107	2016	Beginning Width=	112
	Annual Erosion=			Annual Erosion=	-7
	Annual Accretion=	13		Annual Accretion=	
	End Beach Width=	120		End Beach Width=	105
2008	Beginning Width=	120	2017	Beginning Width=	105
	Annual Erosion=	-8		Annual Erosion=	-2
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	112		End Beach Width=	103
2009	Beginning Width=	112	2018	Beginning Width=	103
	Annual Erosion=			Annual Erosion=	-2
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	112		End Beach Width=	101
2010	Beginning Width=	112	2019	Beginning Width=	101
	Annual Erosion=			Annual Erosion=	-5
	Annual Accretion=	12		Annual Accretion=	
	End Beach Width=	124		End Beach Width=	96
2011	Beginning Width=	124	2020	Beginning Width=	96
	Annual Erosion=	-6		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	13
	End Beach Width=	118		End Beach Width=	109
2012	Beginning Width=	118	2021	Beginning Width=	109
	Annual Erosion=	-10		Annual Erosion=	0
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	108		End Beach Width=	109
2013	Beginning Width=	108	2022	Beginning Width=	109
	Annual Erosion=			Annual Erosion=	-7
	Annual Accretion=	10		Annual Accretion=	
	End Beach Width=	118		End Beach Width=	102
2014	Beginning Width=	118	2023	Beginning Width=	102
	Annual Erosion=			Annual Erosion=	-2
	Annual Accretion=	2		Annual Accretion=	
	End Beach Width=	120		End Beach Width=	100


R-22
Hurricane Ian (Sept. 2022)
Hurricane Irma (Sept. 2017)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (Aug. 2008)
Hurricane Wilma (Oct. 2005)
Hurricane Katrina (Aug. 2005)
Net Change
-2.0 ft
-7.0 ft
0.0 ft
13.0 ft
-5.0 ft
-2.0 ft
-2.0 ft
-7.0 ft
-8.0 ft
2.0 ft
10.0 ft
-10.0 ft
-6.0 ft
12.0 ft
0.0 ft
-8.0 ft
13.0 ft
0.0 ft
100
102
109
109
96
101
103
105
112
120
118
108
118
124
112
112
120
107
107
Year of Monitoring
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

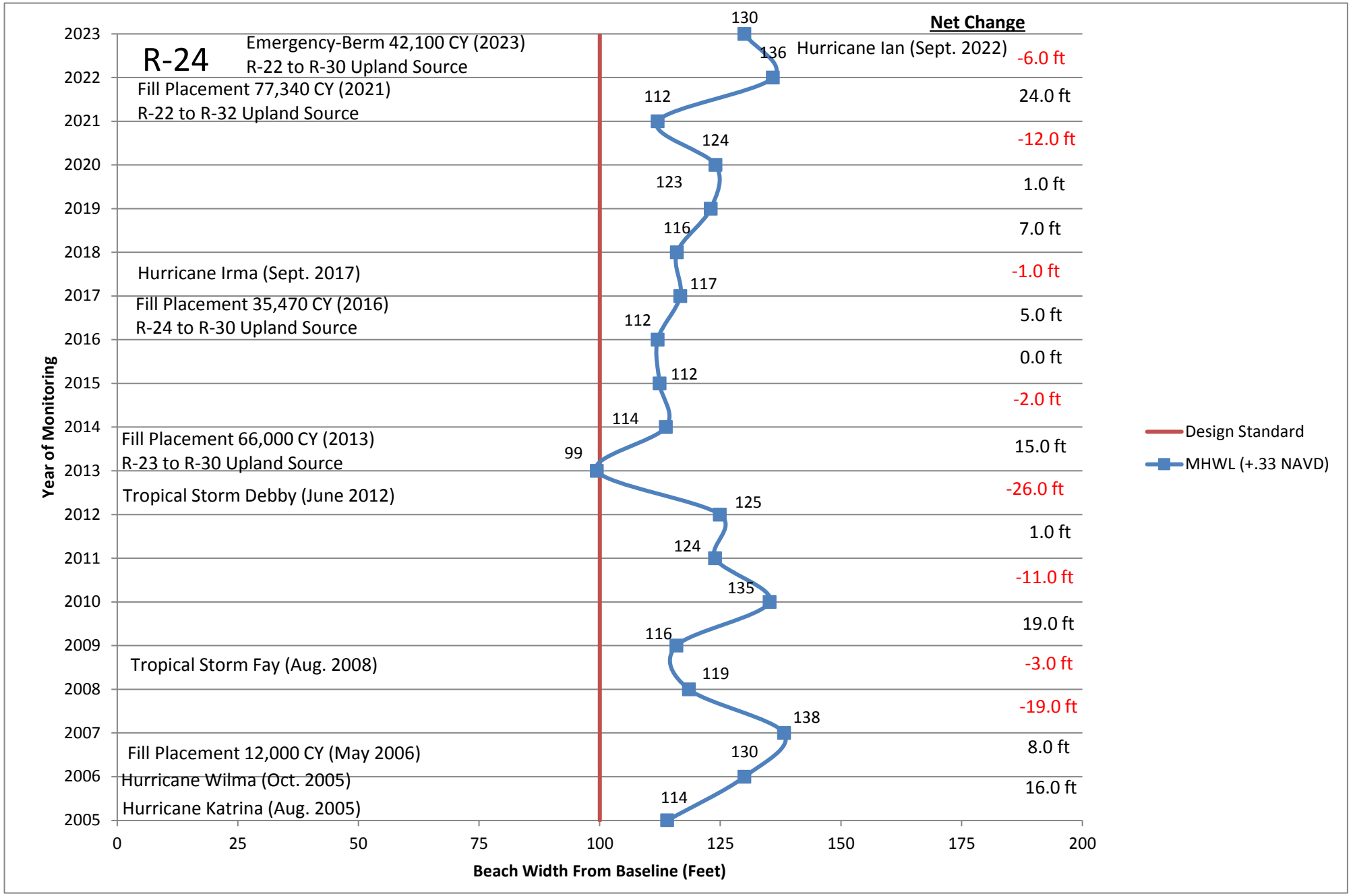
R-23

	2005 Beach Width=	100			
2006	Beginning Width=	100	2015	Beginning Width=	117
	Annual Erosion=			Annual Erosion=	-3
	Annual Accretion=	21		Annual Accretion=	
	End Beach Width=	121		End Beach Width=	114
2007	Beginning Width=	121	2016	Beginning Width=	114
	Annual Erosion=			Annual Erosion=	-7
	Annual Accretion=	8		Annual Accretion=	
	End Beach Width=	129		End Beach Width=	107
2008	Beginning Width=	129	2017	Beginning Width=	107
	Annual Erosion=	-13		Annual Erosion=	-2
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	116		End Beach Width=	105
2009	Beginning Width=	116	2018	Beginning Width=	105
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	2		Annual Accretion=	1
	End Beach Width=	118		End Beach Width=	106
2010	Beginning Width=	118	2019	Beginning Width=	106
	Annual Erosion=	-5		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	0
	End Beach Width=	113		End Beach Width=	106
2011	Beginning Width=	113	2020	Beginning Width=	106
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	9		Annual Accretion=	6
	End Beach Width=	122		End Beach Width=	112
2012	Beginning Width=	122	2021	Beginning Width=	112
	Annual Erosion=	-6		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	3
	End Beach Width=	116		End Beach Width=	115
2013	Beginning Width=	116	2022	Beginning Width=	115
	Annual Erosion=	-6		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	12
	End Beach Width=	110		End Beach Width=	127
2014	Beginning Width=	110	2023	Beginning Width=	127
	Annual Erosion=			Annual Erosion=	-16
	Annual Accretion=	7		Annual Accretion=	
	End Beach Width=	117		End Beach Width=	111


R-23
Emergency-Berm 42,100 CY (2023)
R-22 to R-30 Upland Source
Fill Placement 77,340 CY (2021)
R-22 to R-32 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 66,000 CY (2013)
R-23 to R-30 Upland Source
Tropical Storm Debby (June 2012)
Tropical Storm Fay (Aug. 2008)
Fill Placement 6,600 CY (May 2006)
Hurricane Wilma (Oct. 2005)
Hurricane Katrina (Aug. 2005)
Net Change
Hurricane Ian (Sept. 2022)
-16.0 ft
12.0 ft
3.0 ft
6.0 ft
0.0 ft
1.0 ft
-2.0 ft
-7.0 ft
-3.0 ft
7.0 ft
-6.0 ft
-6.0 ft
9.0 ft
-5.0 ft
2.0 ft
-13.0 ft
8.0 ft
21.0 ft
111
127
115
112
106
106
105
107
114
117
110
116
122
113
118
116
129
121
100
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

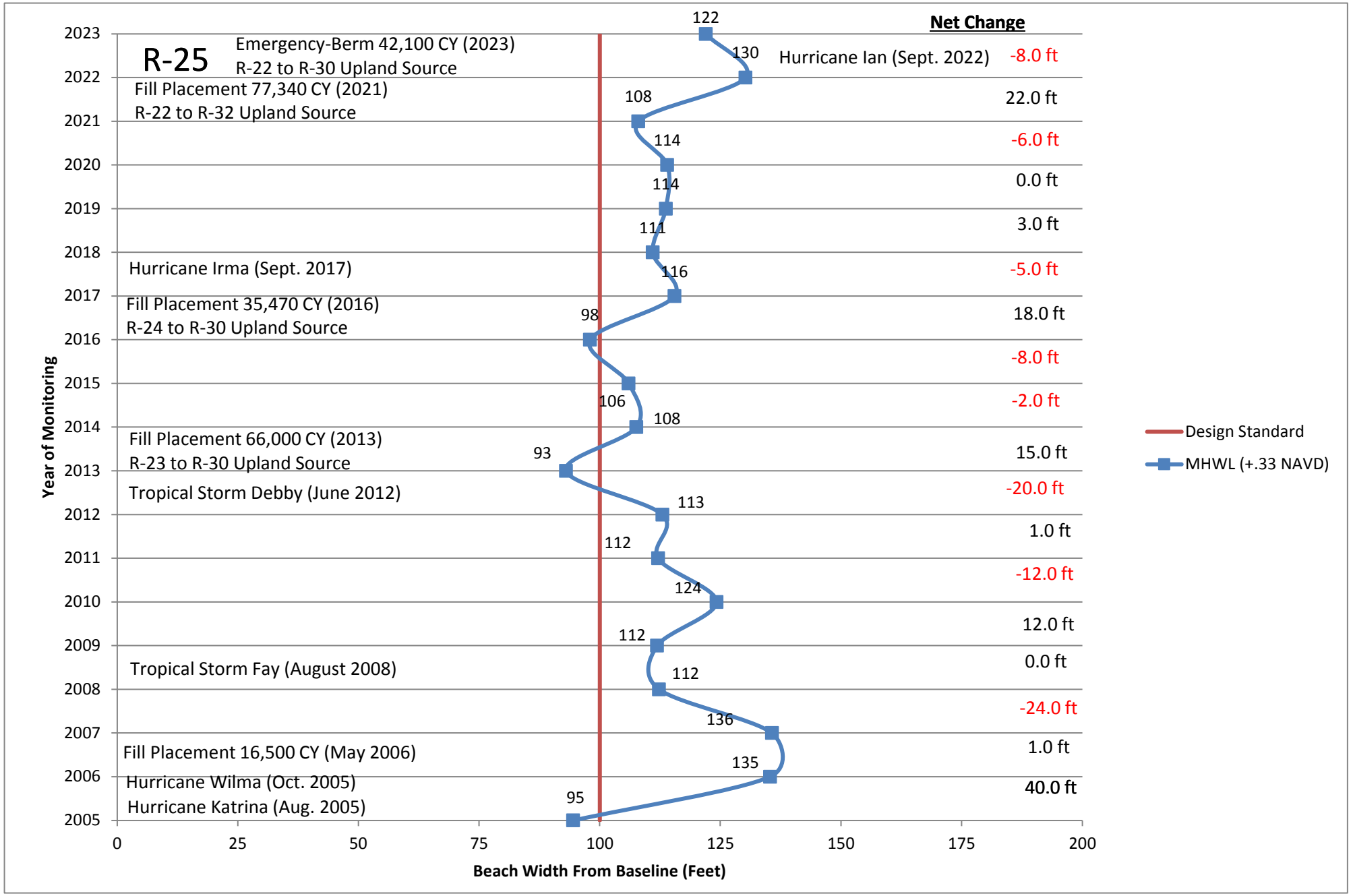
R-24

	2005 Beach Width=	114			
2006	Beginning Width=	114	2015	Beginning Width=	114
	Annual Erosion=			Annual Erosion=	-2
	Annual Accretion=	16		Annual Accretion=	
	End Beach Width=	130		End Beach Width=	112
2007	Beginning Width=	130	2016	Beginning Width=	112
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	8		Annual Accretion=	
	End Beach Width=	138		End Beach Width=	112
2008	Beginning Width=	138	2017	Beginning Width=	112
	Annual Erosion=	-19		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	5
	End Beach Width=	119		End Beach Width=	117
2009	Beginning Width=	119	2018	Beginning Width=	117
	Annual Erosion=	-3		Annual Erosion=	-1
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	116		End Beach Width=	116
2010	Beginning Width=	116	2019	Beginning Width=	116
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	19		Annual Accretion=	7
	End Beach Width=	135		End Beach Width=	123
2011	Beginning Width=	135	2020	Beginning Width=	123
	Annual Erosion=	-11		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	1
	End Beach Width=	124		End Beach Width=	124
2012	Beginning Width=	124	2021	Beginning Width=	124
	Annual Erosion=			Annual Erosion=	-12
	Annual Accretion=	1		Annual Accretion=	
	End Beach Width=	125		End Beach Width=	112
2013	Beginning Width=	125	2022	Beginning Width=	112
	Annual Erosion=	-26		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	24
	End Beach Width=	99		End Beach Width=	136
2014	Beginning Width=	99	2023	Beginning Width=	136
	Annual Erosion=			Annual Erosion=	-6
	Annual Accretion=	15		Annual Accretion=	
	End Beach Width=	114		End Beach Width=	130


R-24
Emergency-Berm 42,100 CY (2023)
R-22 to R-30 Upland Source
Fill Placement 77,340 CY (2021)
R-22 to R-32 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 35,470 CY (2016)
R-24 to R-30 Upland Source
Fill Placement 66,000 CY (2013)
R-23 to R-30 Upland Source
Tropical Storm Debby (June 2012)
Tropical Storm Fay (Aug. 2008)
Fill Placement 12,000 CY (May 2006)
Hurricane Wilma (Oct. 2005)
Hurricane Katrina (Aug. 2005)
Net Change
Hurricane Ian (Sept. 2022)
-6.0 ft
24.0 ft
-12.0 ft
1.0 ft
7.0 ft
-1.0 ft
5.0 ft
0.0 ft
-2.0 ft
15.0 ft
-26.0 ft
1.0 ft
-11.0 ft
19.0 ft
-3.0 ft
-19.0 ft
8.0 ft
16.0 ft
130
136
112
124
123
116
117
112
112
114
99
125
124
135
116
119
138
130
114
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

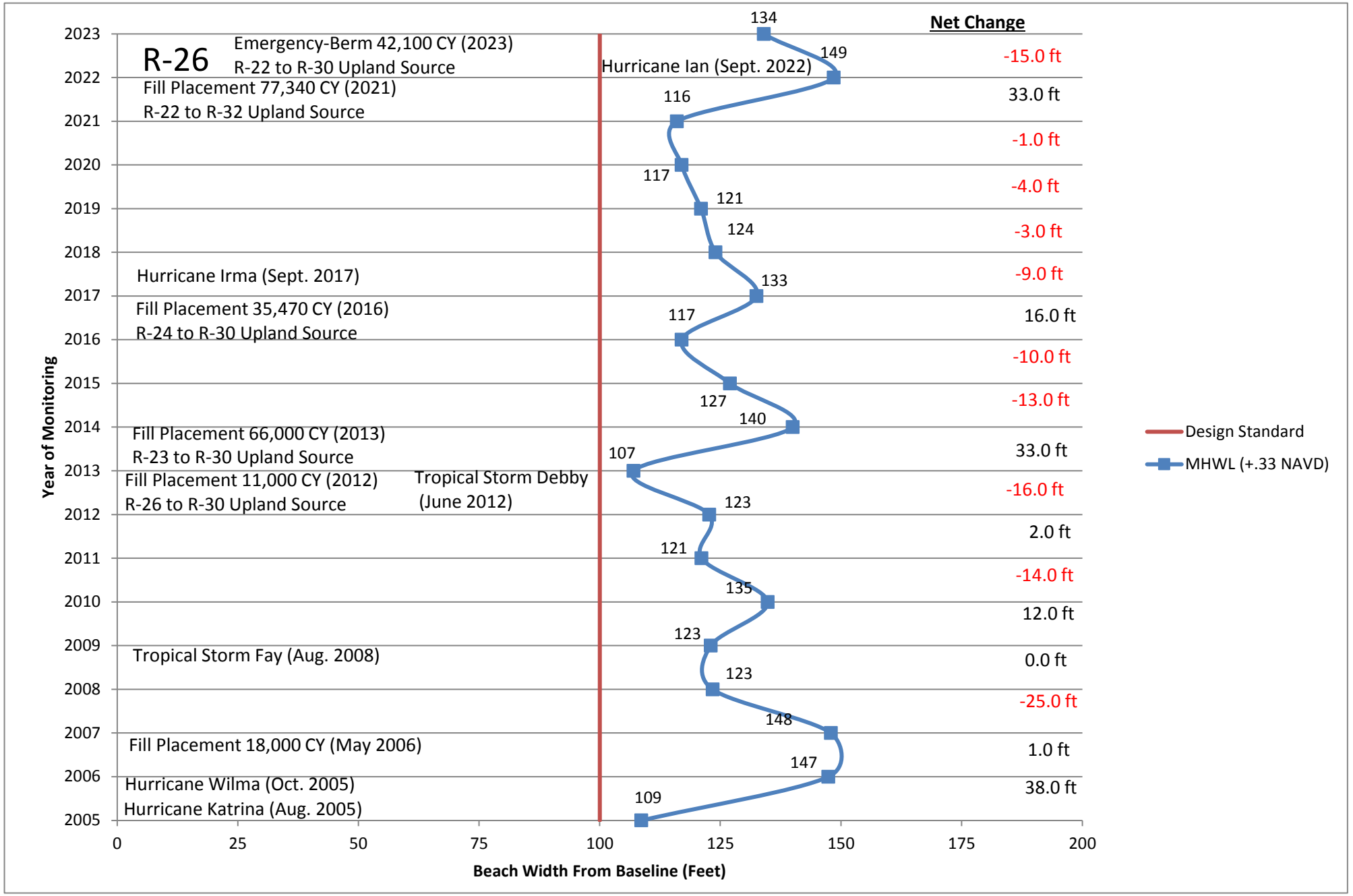
R-25

	2005 Beach Width=	95			
2006	Beginning Width=	95	2015	Beginning Width=	108
	Annual Erosion=			Annual Erosion=	-2
	Annual Accretion=	40		Annual Accretion=	
	End Beach Width=	135		End Beach Width=	106
2007	Beginning Width=	135	2016	Beginning Width=	106
	Annual Erosion=			Annual Erosion=	-8
	Annual Accretion=	1		Annual Accretion=	
	End Beach Width=	136		End Beach Width=	98
2008	Beginning Width=	136	2017	Beginning Width=	98
	Annual Erosion=	-24		Annual Erosion=	18
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	112		End Beach Width=	116
2009	Beginning Width=	112	2018	Beginning Width=	116
	Annual Erosion=			Annual Erosion=	-5
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	112		End Beach Width=	111
2010	Beginning Width=	112	2019	Beginning Width=	111
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	12		Annual Accretion=	3
	End Beach Width=	124		End Beach Width=	114
2011	Beginning Width=	124	2020	Beginning Width=	114
	Annual Erosion=	-12		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	0
	End Beach Width=	112		End Beach Width=	114
2012	Beginning Width=	112	2021	Beginning Width=	114
	Annual Erosion=			Annual Erosion=	-6
	Annual Accretion=	1		Annual Accretion=	
	End Beach Width=	113		End Beach Width=	108
2013	Beginning Width=	113	2022	Beginning Width=	108
	Annual Erosion=	-20		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	22
	End Beach Width=	93		End Beach Width=	130
2014	Beginning Width=	93	2023	Beginning Width=	130
	Annual Erosion=			Annual Erosion=	-8
	Annual Accretion=	15		Annual Accretion=	
	End Beach Width=	108		End Beach Width=	122


R-25
Emergency-Berm 42,100 CY (2023)
R-22 to R-30 Upland Source
Fill Placement 77,340 CY (2021)
R-22 to R-32 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 35,470 CY (2016)
R-24 to R-30 Upland Source
Fill Placement 66,000 CY (2013)
R-23 to R-30 Upland Source
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 16,500 CY (May 2006)
Hurricane Wilma (Oct. 2005)
Hurricane Katrina (Aug. 2005)
Net Change
Hurricane Ian (Sept. 2022) -8.0 ft
22.0 ft
-6.0 ft
0.0 ft
3.0 ft
-5.0 ft
18.0 ft
-8.0 ft
-2.0 ft
15.0 ft
-20.0 ft
1.0 ft
-12.0 ft
12.0 ft
0.0 ft
-24.0 ft
1.0 ft
40.0 ft
122
130
108
114
114
111
116
98
106
108
93
113
112
124
112
112
136
135
95
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

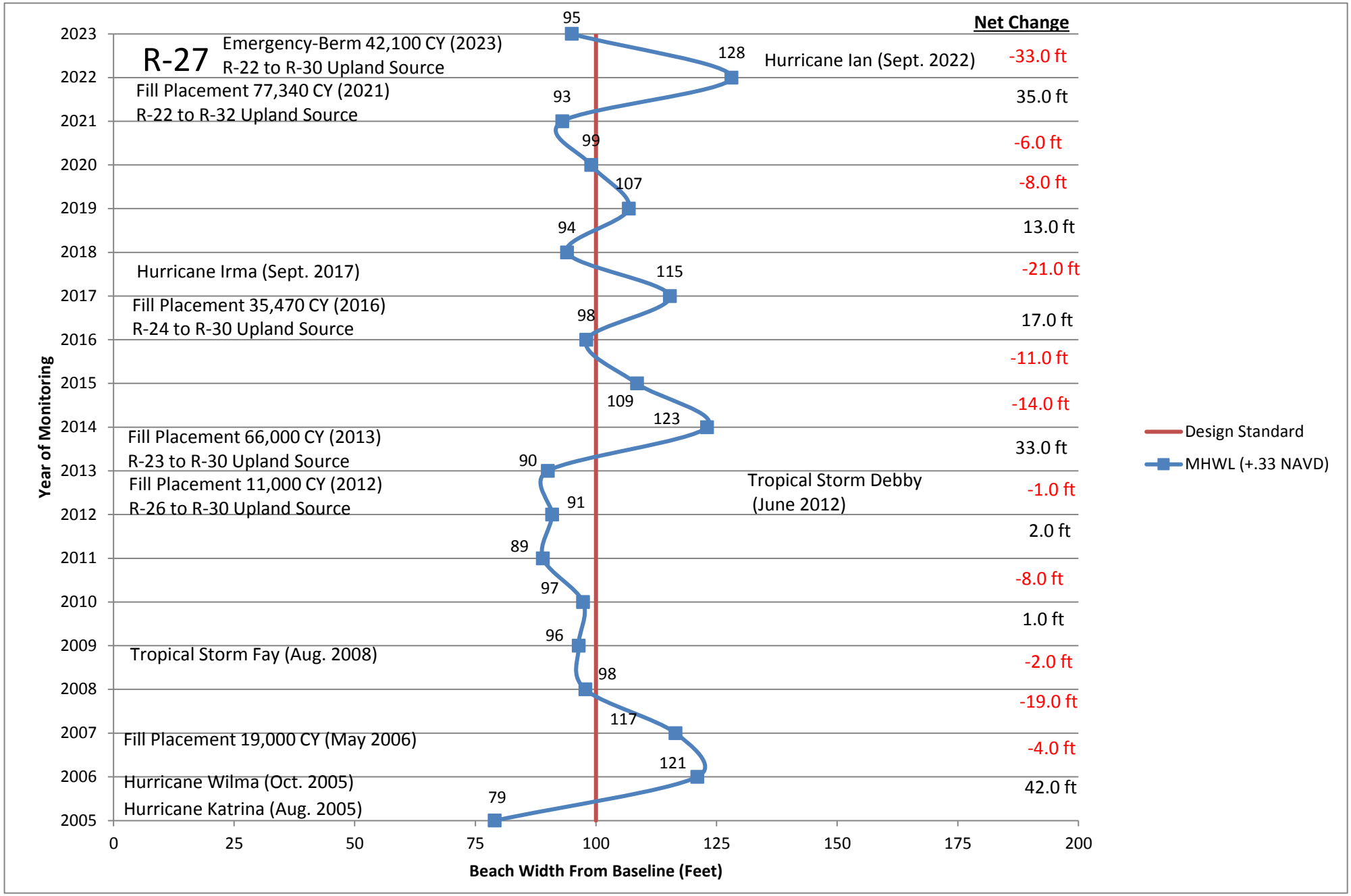
R-26

	2005 Beach Width=	109			
2006	Beginning Width=	109	2015	Beginning Width=	140
	Annual Erosion=			Annual Erosion=	-13
	Annual Accretion=	38		Annual Accretion=	
	End Beach Width=	147		End Beach Width=	127
2007	Beginning Width=	147	2016	Beginning Width=	127
	Annual Erosion=			Annual Erosion=	-10
	Annual Accretion=	1		Annual Accretion=	
	End Beach Width=	148		End Beach Width=	117
2008	Beginning Width=	148	2017	Beginning Width=	117
	Annual Erosion=	-25		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	16
	End Beach Width=	123		End Beach Width=	133
2009	Beginning Width=	123	2018	Beginning Width=	133
	Annual Erosion=			Annual Erosion=	-9
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	123		End Beach Width=	124
2010	Beginning Width=	123	2019	Beginning Width=	124
	Annual Erosion=			Annual Erosion=	-3
	Annual Accretion=	12		Annual Accretion=	
	End Beach Width=	135		End Beach Width=	121
2011	Beginning Width=	135	2020	Beginning Width=	121
	Annual Erosion=	-14		Annual Erosion=	-4
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	121		End Beach Width=	117
2012	Beginning Width=	121	2021	Beginning Width=	117
	Annual Erosion=			Annual Erosion=	-1
	Annual Accretion=	2		Annual Accretion=	
	End Beach Width=	123		End Beach Width=	116
2013	Beginning Width=	123	2022	Beginning Width=	116
	Annual Erosion=	-16		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	33
	End Beach Width=	107		End Beach Width=	149
2014	Beginning Width=	107	2023	Beginning Width=	149
	Annual Erosion=			Annual Erosion=	-15
	Annual Accretion=	33		Annual Accretion=	
	End Beach Width=	140		End Beach Width=	134


R-26
Emergency-Berm 42,100 CY (2023)
R-22 to R-30 Upland Source
Fill Placement 77,340 CY (2021)
R-22 to R-32 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 35,470 CY (2016)
R-24 to R-30 Upland Source
Fill Placement 66,000 CY (2013)
R-23 to R-30 Upland Source
Fill Placement 11,000 CY (2012)
R-26 to R-30 Upland Source
Tropical Storm Debby
(June 2012)
Tropical Storm Fay (Aug. 2008)
Fill Placement 18,000 CY (May 2006)
Hurricane Wilma (Oct. 2005)
Hurricane Katrina (Aug. 2005)
Hurricane Ian (Sept. 2022)
Net Change
-15.0 ft
33.0 ft
-1.0 ft
-4.0 ft
-3.0 ft
-9.0 ft
16.0 ft
-10.0 ft
-13.0 ft
33.0 ft
-16.0 ft
2.0 ft
-14.0 ft
12.0 ft
0.0 ft
-25.0 ft
1.0 ft
38.0 ft
134
149
116
117
121
124
133
117
127
140
107
123
121
135
123
123
148
147
109
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

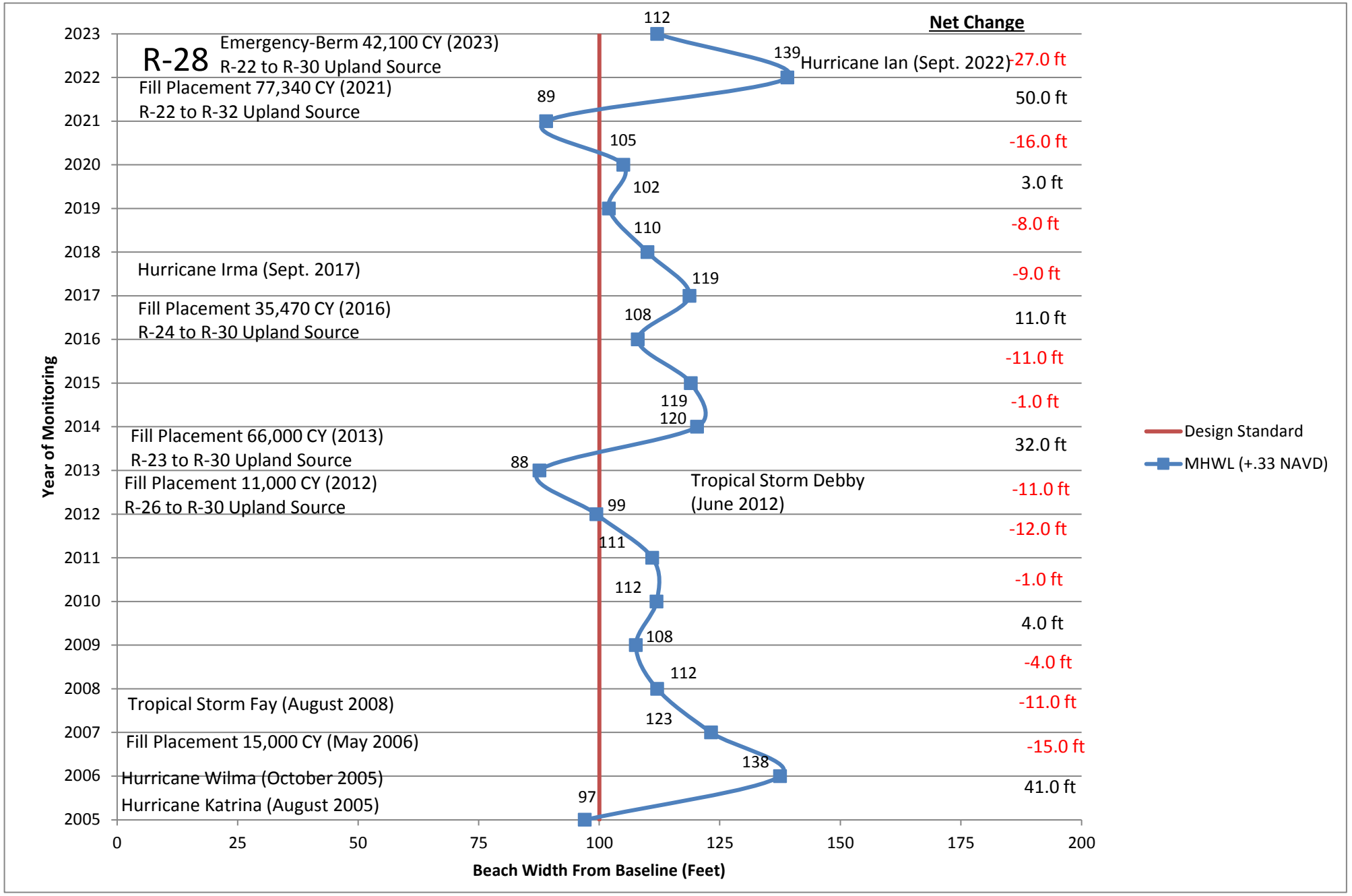
R-27

	2005 Beach Width=	79			
2006	Beginning Width=	79	2015	Beginning Width=	123
	Annual Erosion=			Annual Erosion=	-14
	Annual Accretion=	42		Annual Accretion=	
	End Beach Width=	121		End Beach Width=	109
2007	Beginning Width=	121	2016	Beginning Width=	109
	Annual Erosion=	-4		Annual Erosion=	-11
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	117		End Beach Width=	98
2008	Beginning Width=	117	2017	Beginning Width=	98
	Annual Erosion=	-19		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	17
	End Beach Width=	98		End Beach Width=	115
2009	Beginning Width=	98	2018	Beginning Width=	115
	Annual Erosion=	-2		Annual Erosion=	-21
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	96		End Beach Width=	94
2010	Beginning Width=	96	2019	Beginning Width=	94
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	1		Annual Accretion=	13
	End Beach Width=	97		End Beach Width=	107
2011	Beginning Width=	97	2020	Beginning Width=	107
	Annual Erosion=	-8		Annual Erosion=	-8
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	89		End Beach Width=	99
2012	Beginning Width=	89	2021	Beginning Width=	99
	Annual Erosion=			Annual Erosion=	-6
	Annual Accretion=	2		Annual Accretion=	
	End Beach Width=	91		End Beach Width=	93
2013	Beginning Width=	91	2022	Beginning Width=	93
	Annual Erosion=	-1		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	35
	End Beach Width=	90		End Beach Width=	128
2014	Beginning Width=	90	2022	Beginning Width=	128
	Annual Erosion=			Annual Erosion=	-33
	Annual Accretion=	33		Annual Accretion=	
	End Beach Width=	123		End Beach Width=	95


R-27
Emergency-Berm 42,100 CY (2023)
R-22 to R-30 Upland Source
Fill Placement 77,340 CY (2021)
R-22 to R-32 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 35,470 CY (2016)
R-24 to R-30 Upland Source
Fill Placement 66,000 CY (2013)
R-23 to R-30 Upland Source
Fill Placement 11,000 CY (2012)
R-26 to R-30 Upland Source
Tropical Storm Fay (Aug. 2008)
Fill Placement 19,000 CY (May 2006)
Hurricane Wilma (Oct. 2005)
Hurricane Katrina (Aug. 2005)
Hurricane Ian (Sept. 2022)
Tropical Storm Debby
(June 2012)
Net Change
-33.0 ft
35.0 ft
-6.0 ft
-8.0 ft
13.0 ft
-21.0 ft
17.0 ft
-11.0 ft
-14.0 ft
33.0 ft
-1.0 ft
2.0 ft
-8.0 ft
1.0 ft
-2.0 ft
-19.0 ft
-4.0 ft
42.0 ft
95
128
93
99
107
94
115
98
109
123
90
91
89
97
96
98
117
121
79
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

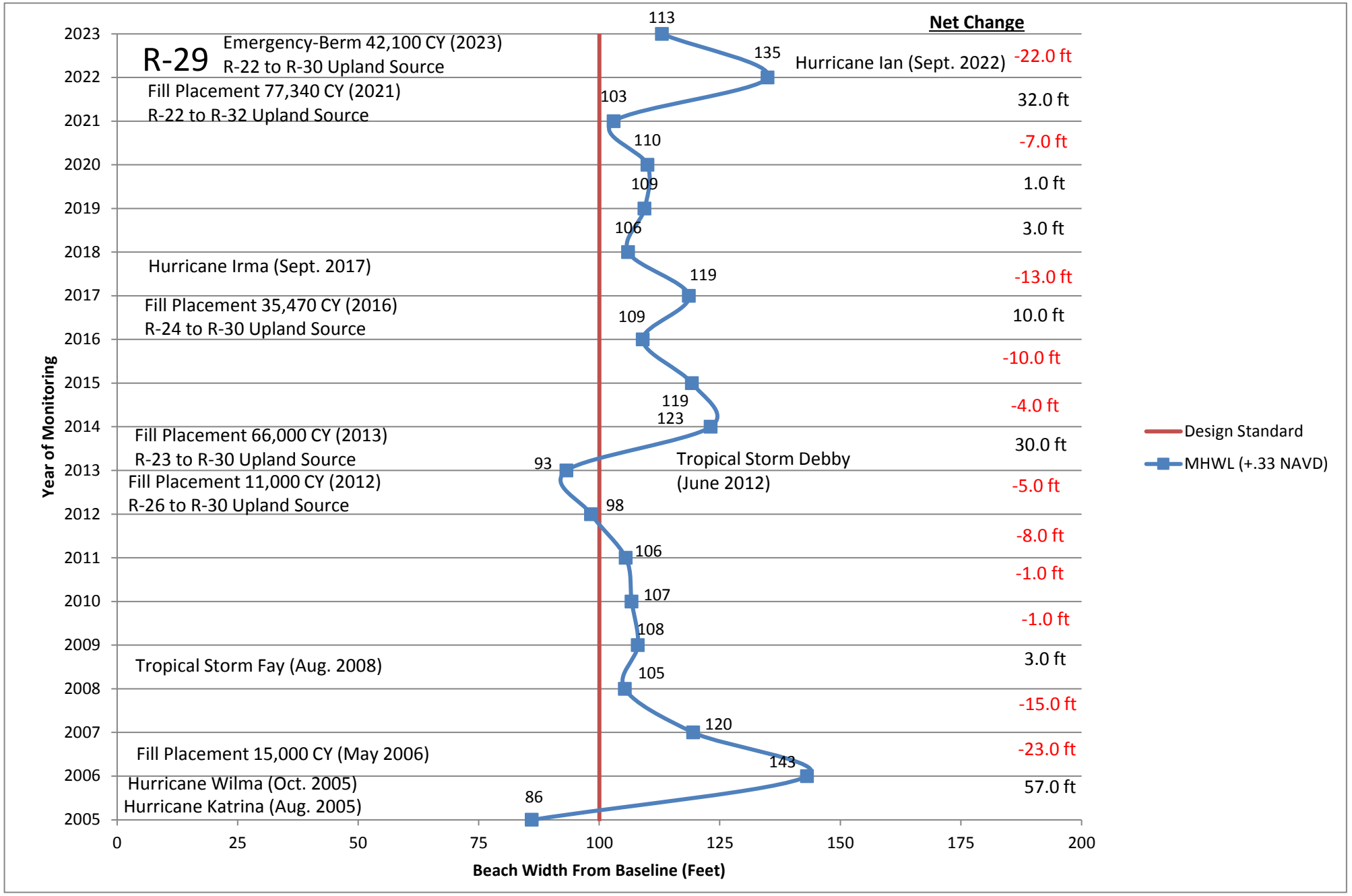
R-28

	2005 Beach Width=	97			
2006	Beginning Width=	97	2015	Beginning Width=	120
	Annual Erosion=			Annual Erosion=	-1
	Annual Accretion=	41		Annual Accretion=	
	End Beach Width=	138		End Beach Width=	119
2007	Beginning Width=	138	2016	Beginning Width=	119
	Annual Erosion=	-15		Annual Erosion=	-11
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	123		End Beach Width=	108
2008	Beginning Width=	123	2017	Beginning Width=	108
	Annual Erosion=	-11		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	11
	End Beach Width=	112		End Beach Width=	119
2009	Beginning Width=	112	2018	Beginning Width=	119
	Annual Erosion=	-4		Annual Erosion=	-9
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	108		End Beach Width=	110
2010	Beginning Width=	108	2019	Beginning Width=	110
	Annual Erosion=			Annual Erosion=	-8
	Annual Accretion=	4		Annual Accretion=	
	End Beach Width=	112		End Beach Width=	102
2011	Beginning Width=	112	2020	Beginning Width=	102
	Annual Erosion=	-1		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	3
	End Beach Width=	111		End Beach Width=	105
2012	Beginning Width=	111	2021	Beginning Width=	105
	Annual Erosion=	-12		Annual Erosion=	-16
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	99		End Beach Width=	89
2013	Beginning Width=	99	2022	Beginning Width=	89
	Annual Erosion=	-11		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	50
	End Beach Width=	88		End Beach Width=	139
2014	Beginning Width=	88	2023	Beginning Width=	139
	Annual Erosion=			Annual Erosion=	-27
	Annual Accretion=	32		Annual Accretion=	
	End Beach Width=	120		End Beach Width=	112


R-28
Emergency-Berm 42,100 CY (2023)
R-22 to R-30 Upland Source
Fill Placement 77,340 CY (2021)
R-22 to R-32 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 35,470 CY (2016)
R-24 to R-30 Upland Source
Fill Placement 66,000 CY (2013)
R-23 to R-30 Upland Source
Fill Placement 11,000 CY (2012)
R-26 to R-30 Upland Source
Tropical Storm Debby
(June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 15,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Hurricane Ian (Sept. 2022)
Net Change
112
139
89
105
102
110
119
108
119
120
88
99
111
112
108
112
123
138
97
-27.0 ft
50.0 ft
-16.0 ft
3.0 ft
-8.0 ft
-9.0 ft
11.0 ft
-11.0 ft
-1.0 ft
32.0 ft
-11.0 ft
-12.0 ft
-1.0 ft
4.0 ft
-4.0 ft
-11.0 ft
-15.0 ft
41.0 ft
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-29

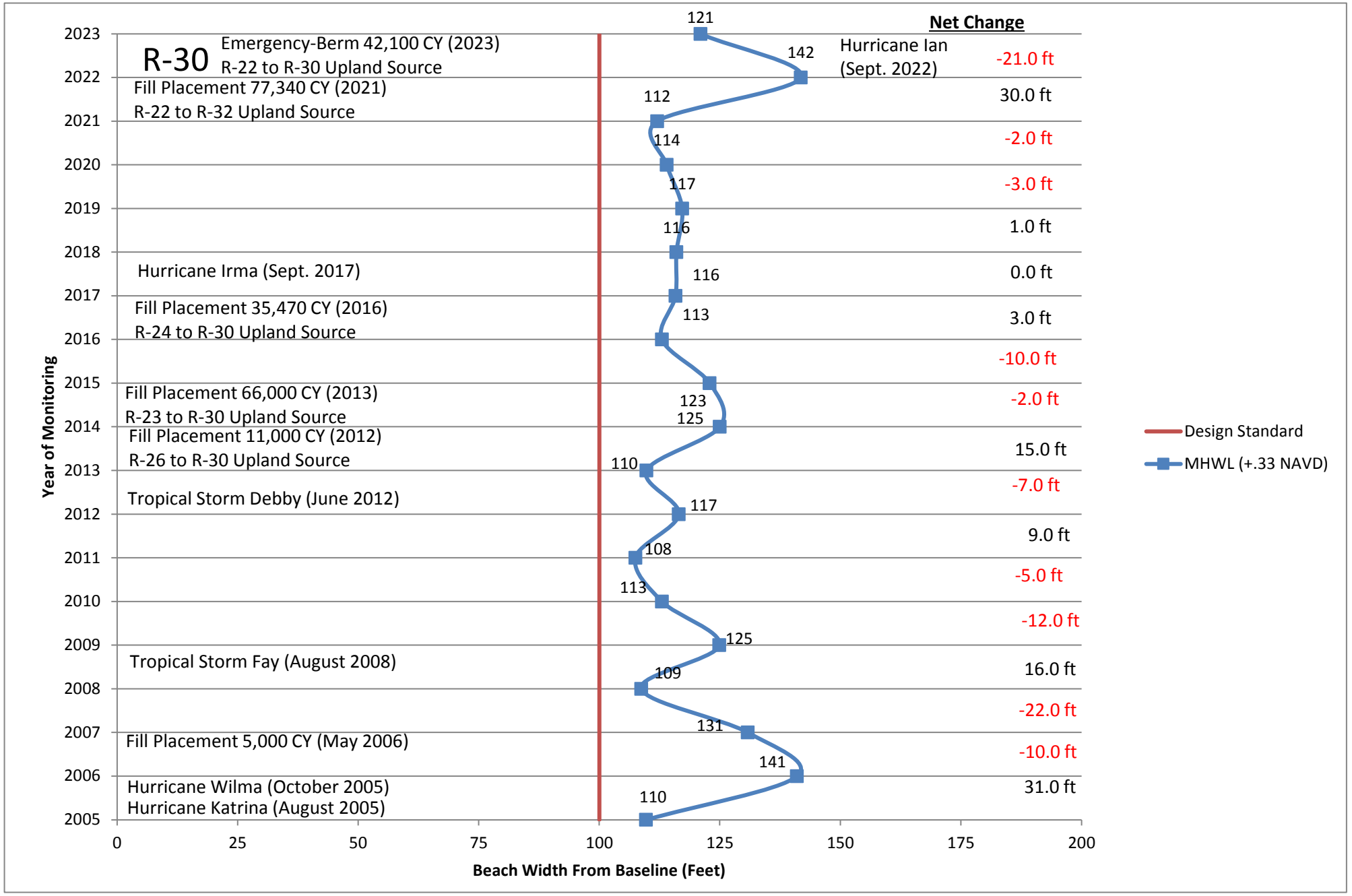
	2005 Beach Width=	86			
2006	Beginning Width=	86	2015	Beginning Width=	123
	Annual Erosion=			Annual Erosion=	-4
	Annual Accretion=	57		Annual Accretion=	
	End Beach Width=	143		End Beach Width=	119
2007	Beginning Width=	143	2016	Beginning Width=	119
	Annual Erosion=	-23		Annual Erosion=	-10
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	120		End Beach Width=	109
2008	Beginning Width=	120	2017	Beginning Width=	109
	Annual Erosion=	-15		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	10
	End Beach Width=	105		End Beach Width=	119
2009	Beginning Width=	105	2018	Beginning Width=	119
	Annual Erosion=			Annual Erosion=	-13
	Annual Accretion=	3		Annual Accretion=	
	End Beach Width=	108		End Beach Width=	106
2010	Beginning Width=	108	2019	Beginning Width=	106
	Annual Erosion=	-1		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	3
	End Beach Width=	107		End Beach Width=	109
2011	Beginning Width=	107	2020	Beginning Width=	109
	Annual Erosion=	-1		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	1
	End Beach Width=	106		End Beach Width=	110
2012	Beginning Width=	106	2021	Beginning Width=	110
	Annual Erosion=	-8		Annual Erosion=	-7
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	98		End Beach Width=	103
2013	Beginning Width=	98	2022	Beginning Width=	103
	Annual Erosion=	-5		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	32
	End Beach Width=	93		End Beach Width=	135
2014	Beginning Width=	93	2023	Beginning Width=	135
	Annual Erosion=			Annual Erosion=	-22
	Annual Accretion=	30		Annual Accretion=	
	End Beach Width=	123		End Beach Width=	113


R-29
Emergency-Berm 42,100 CY (2023)
R-22 to R-30 Upland Source
Fill Placement 77,340 CY (2021)
R-22 to R-32 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 35,470 CY (2016)
R-24 to R-30 Upland Source
Fill Placement 66,000 CY (2013)
R-23 to R-30 Upland Source
Fill Placement 11,000 CY (2012)
R-26 to R-30 Upland Source
Tropical Storm Fay (Aug. 2008)
Fill Placement 15,000 CY (May 2006)
Hurricane Wilma (Oct. 2005)
Hurricane Katrina (Aug. 2005)
Tropical Storm Debby
(June 2012)
Hurricane Ian (Sept. 2022)
Net Change
-22.0 ft
32.0 ft
-7.0 ft
1.0 ft
3.0 ft
-13.0 ft
10.0 ft
-10.0 ft
-4.0 ft
30.0 ft
-5.0 ft
-8.0 ft
-1.0 ft
-1.0 ft
3.0 ft
-15.0 ft
-23.0 ft
57.0 ft
113
135
103
110
109
106
119
109
119
123
93
98
106
107
108
105
120
143
86
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-30

	2005 Beach Width=	110

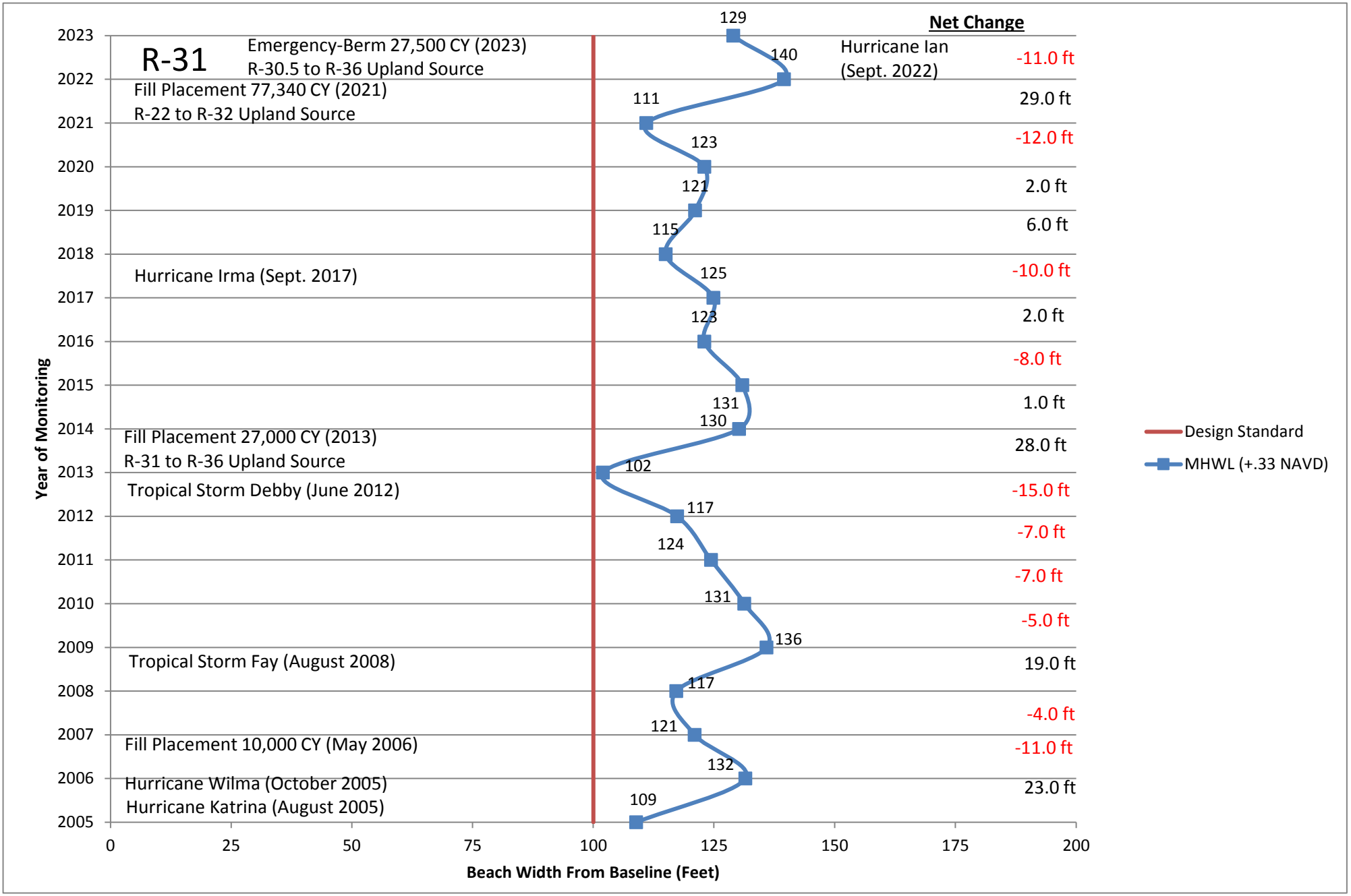
2006	Beginning Width=	110	2015	Beginning Width=	125
	Annual Erosion=			Annual Erosion=	-2
	Annual Accretion=	31		Annual Accretion=	
	End Beach Width=	141		End Beach Width=	123
2007	Beginning Width=	141	2016	Beginning Width=	123
	Annual Erosion=	-10		Annual Erosion=	-10
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	131		End Beach Width=	113
2008	Beginning Width=	131	2017	Beginning Width=	113
	Annual Erosion=	-22		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	3
	End Beach Width=	109		End Beach Width=	116
2009	Beginning Width=	109	2018	Beginning Width=	116
	Annual Erosion=			Annual Erosion=	0
	Annual Accretion=	16		Annual Accretion=	0
	End Beach Width=	125		End Beach Width=	116
2010	Beginning Width=	125	2019	Beginning Width=	116
	Annual Erosion=	-12		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	1
	End Beach Width=	113		End Beach Width=	117
2011	Beginning Width=	113	2020	Beginning Width=	117
	Annual Erosion=	-5		Annual Erosion=	-3
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	108		End Beach Width=	114
2012	Beginning Width=	108	2021	Beginning Width=	114
	Annual Erosion=			Annual Erosion=	-2
	Annual Accretion=	9		Annual Accretion=	
	End Beach Width=	117		End Beach Width=	112
2013	Beginning Width=	117	2022	Beginning Width=	112
	Annual Erosion=	-7		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	30
	End Beach Width=	110		End Beach Width=	142
2014	Beginning Width=	110	2023	Beginning Width=	142
	Annual Erosion=			Annual Erosion=	-21
	Annual Accretion=	15		Annual Accretion=	
	End Beach Width=	125		End Beach Width=	121


R-30
Emergency-Berm 42,100 CY (2023)
R-22 to R-30 Upland Source
Fill Placement 77,340 CY (2021)
R-22 to R-32 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 35,470 CY (2016)
R-24 to R-30 Upland Source
Fill Placement 66,000 CY (2013)
R-23 to R-30 Upland Source
Fill Placement 11,000 CY (2012)
R-26 to R-30 Upland Source
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 5,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Hurricane Ian
(Sept. 2022)
Net Change
-21.0 ft
30.0 ft
-2.0 ft
-3.0 ft
1.0 ft
0.0 ft
3.0 ft
-10.0 ft
-2.0 ft
15.0 ft
-7.0 ft
9.0 ft
-5.0 ft
-12.0 ft
16.0 ft
-22.0 ft
-10.0 ft
31.0 ft
121
142
112
114
117
116
116
113
123
125
110
117
108
113
125
109
131
141
110
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-31

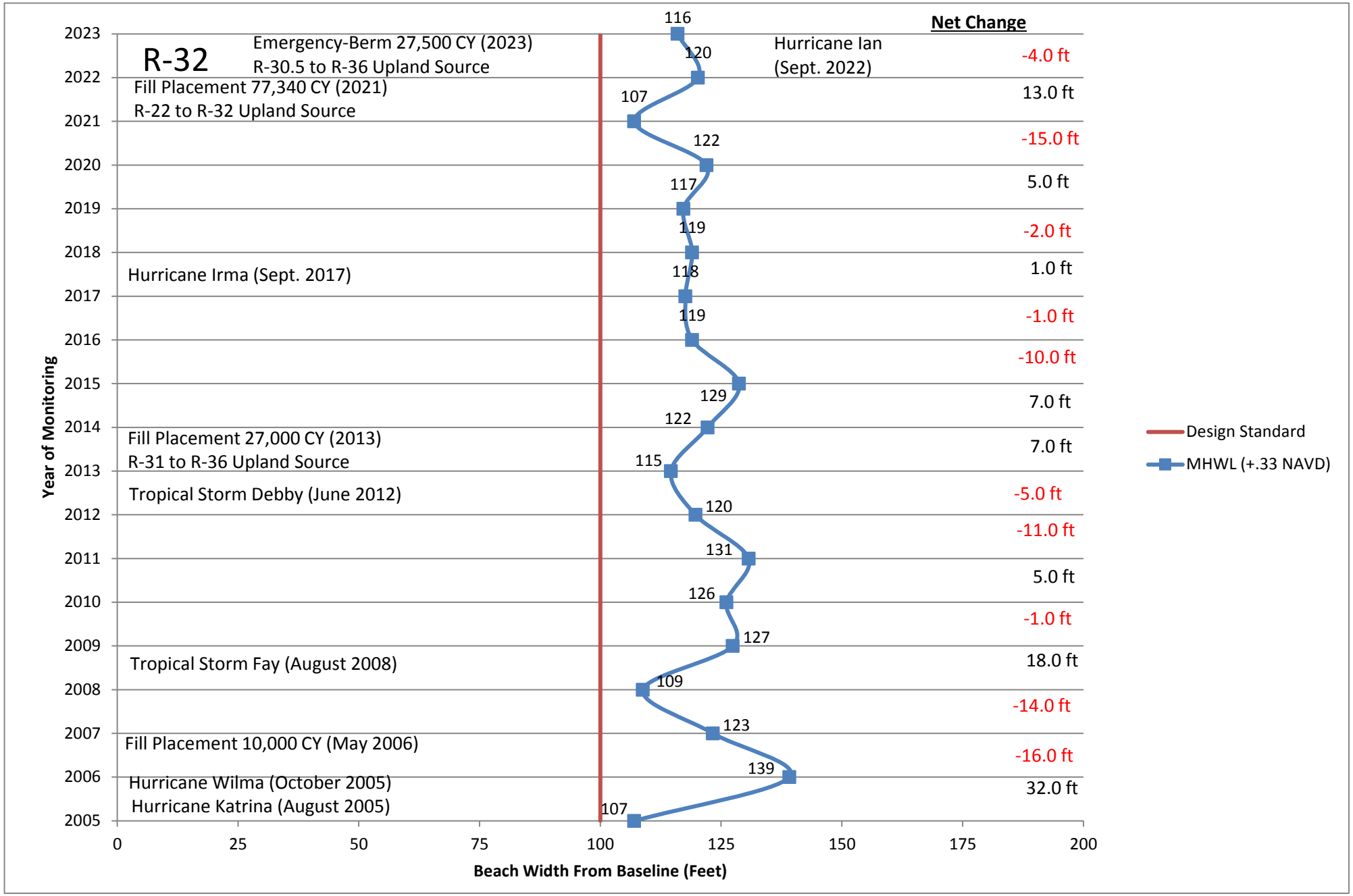
	2005 Beach Width=	109

2006	Beginning Width=	109	2015	Beginning Width=	130
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	23		Annual Accretion=	1
	End Beach Width=	132		End Beach Width=	131
2007	Beginning Width=	132	2016	Beginning Width=	131
	Annual Erosion=	-11		Annual Erosion=	-8
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	121		End Beach Width=	123
2008	Beginning Width=	121	2017	Beginning Width=	123
	Annual Erosion=	-4		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	2
	End Beach Width=	117		End Beach Width=	125
2009	Beginning Width=	117	2018	Beginning Width=	125
	Annual Erosion=			Annual Erosion=	-10
	Annual Accretion=	19		Annual Accretion=	
	End Beach Width=	136		End Beach Width=	115
2010	Beginning Width=	136	2019	Beginning Width=	115
	Annual Erosion=	-5		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	6
	End Beach Width=	131		End Beach Width=	121
2011	Beginning Width=	131	2020	Beginning Width=	121
	Annual Erosion=	-7		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	2
	End Beach Width=	124		End Beach Width=	123
2012	Beginning Width=	124	2021	Beginning Width=	123
	Annual Erosion=	-7		Annual Erosion=	-12
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	117		End Beach Width=	111
2013	Beginning Width=	117	2022	Beginning Width=	111
	Annual Erosion=	-15		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	29
	End Beach Width=	102		End Beach Width=	140
2014	Beginning Width=	102	2023	Beginning Width=	140
	Annual Erosion=			Annual Erosion=	-11
	Annual Accretion=	28		Annual Accretion=	
	End Beach Width=	130		End Beach Width=	129


R-31
Emergency-Berm 27,500 CY (2023)
R-30.5 to R-36 Upland Source
Fill Placement 77,340 CY (2021)
R-22 to R-32 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 27,000 CY (2013)
R-31 to R-36 Upland Source
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 10,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Hurricane Ian
(Sept. 2022)
Net Change
-11.0 ft
29.0 ft
-12.0 ft
2.0 ft
6.0 ft
-10.0 ft
2.0 ft
-8.0 ft
1.0 ft
28.0 ft
-15.0 ft
-7.0 ft
-7.0 ft
-5.0 ft
19.0 ft
-4.0 ft
-11.0 ft
23.0 ft
129
140
111
123
121
115
125
123
131
130
102
117
124
131
136
117
121
132
109
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-32

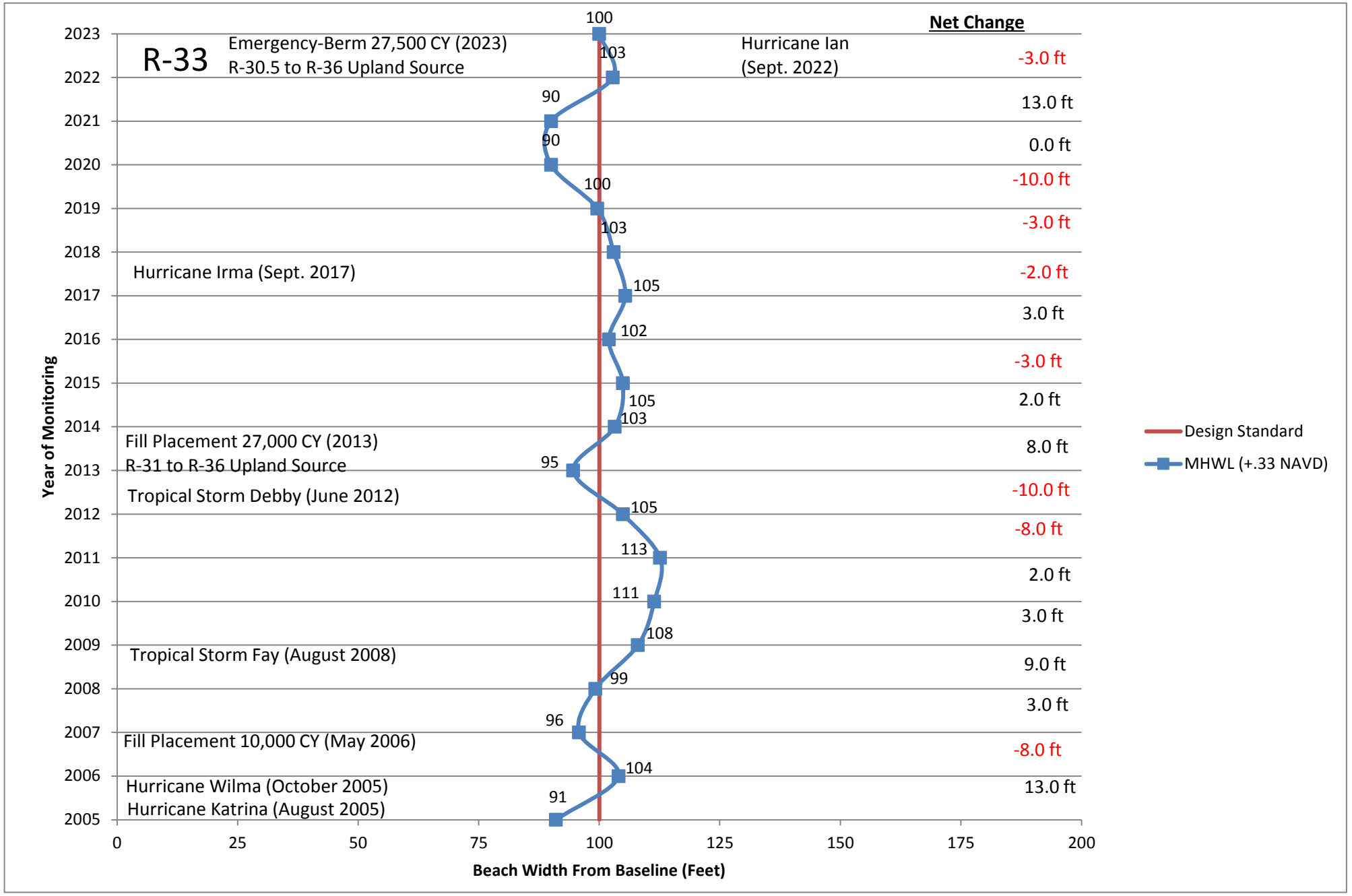
	2005 Beach Width=	107			
2006	Beginning Width=	107	2015	Beginning Width=	122
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	32		Annual Accretion=	7
	End Beach Width=	139		End Beach Width=	129
2007	Beginning Width=	139	2016	Beginning Width=	129
	Annual Erosion=	-16		Annual Erosion=	-10
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	123		End Beach Width=	119
2008	Beginning Width=	123	2017	Beginning Width=	119
	Annual Erosion=	-14		Annual Erosion=	-1
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	109		End Beach Width=	118
2009	Beginning Width=	109	2018	Beginning Width=	118
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	18		Annual Accretion=	1
	End Beach Width=	127		End Beach Width=	119
2010	Beginning Width=	127	2019	Beginning Width=	119
	Annual Erosion=	-1		Annual Erosion=	-2
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	126		End Beach Width=	117
2011	Beginning Width=	126	2020	Beginning Width=	117
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	5		Annual Accretion=	5
	End Beach Width=	131		End Beach Width=	122
2012	Beginning Width=	131	2021	Beginning Width=	122
	Annual Erosion=	-11		Annual Erosion=	-15
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	120		End Beach Width=	107
2013	Beginning Width=	120	2022	Beginning Width=	107
	Annual Erosion=	-5		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	13
	End Beach Width=	115		End Beach Width=	120
2014	Beginning Width=	115	2022	Beginning Width=	120
	Annual Erosion=			Annual Erosion=	-4
	Annual Accretion=	7		Annual Accretion=	
	End Beach Width=	122		End Beach Width=	116


R-32
Emergency-Berm 27,500 CY (2023)
R-30.5 to R-36 Upland Source
Fill Placement 77,340 CY (2021)
R-22 to R-32 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 27,000 CY (2013)
R-31 to R-36 Upland Source
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 10,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Hurricane Ian
(Sept. 2022)
Net Change
-4.0 ft
13.0 ft
-15.0 ft
5.0 ft
-2.0 ft
1.0 ft
-1.0 ft
-10.0 ft
7.0 ft
7.0 ft
-5.0 ft
-11.0 ft
5.0 ft
-1.0 ft
18.0 ft
-14.0 ft
-16.0 ft
32.0 ft
116
120
107
122
117
119
118
119
129
122
115
120
131
126
127
109
123
139
107
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-33

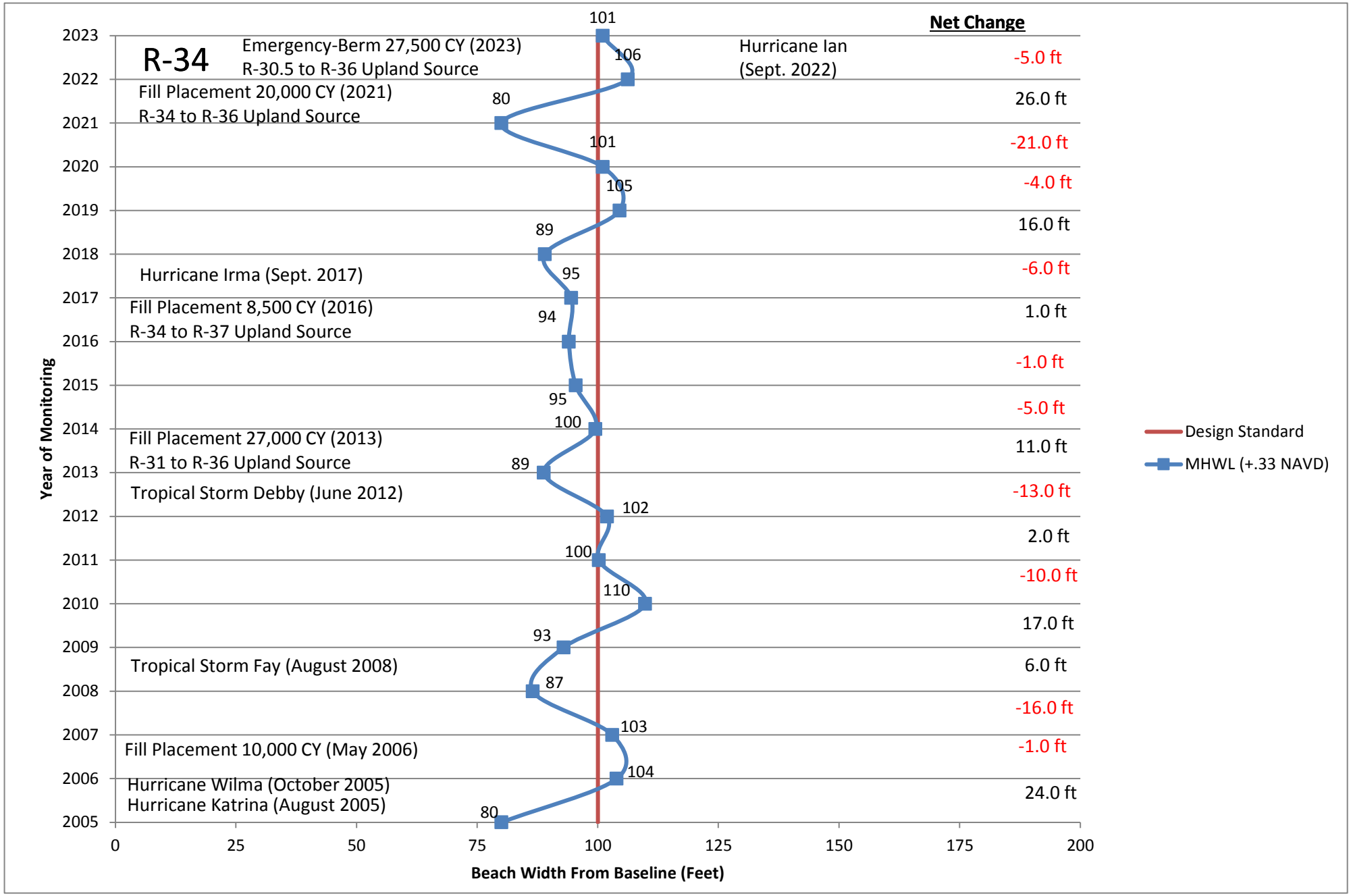
	2005 Beach Width=	91

2006	Beginning Width=	91	2015	Beginning Width=	103
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	13		Annual Accretion=	2
	End Beach Width=	104		End Beach Width=	105
2007	Beginning Width=	104	2016	Beginning Width=	105
	Annual Erosion=	-8		Annual Erosion=	-3
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	96		End Beach Width=	102
2008	Beginning Width=	96	2017	Beginning Width=	102
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	3		Annual Accretion=	3
	End Beach Width=	99		End Beach Width=	105
2009	Beginning Width=	99	2018	Beginning Width=	105
	Annual Erosion=			Annual Erosion=	-2
	Annual Accretion=	9		Annual Accretion=	
	End Beach Width=	108		End Beach Width=	103
2010	Beginning Width=	108	2019	Beginning Width=	103
	Annual Erosion=			Annual Erosion=	-3
	Annual Accretion=	3		Annual Accretion=	
	End Beach Width=	111		End Beach Width=	100
2011	Beginning Width=	111	2020	Beginning Width=	100
	Annual Erosion=			Annual Erosion=	-10
	Annual Accretion=	2		Annual Accretion=	
	End Beach Width=	113		End Beach Width=	90
2012	Beginning Width=	113	2021	Beginning Width=	90
	Annual Erosion=	-8		Annual Erosion=	0
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	105		End Beach Width=	90
2013	Beginning Width=	105	2022	Beginning Width=	90
	Annual Erosion=	-10		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	13
	End Beach Width=	95		End Beach Width=	103
2014	Beginning Width=	95	2023	Beginning Width=	103
	Annual Erosion=			Annual Erosion=	-3
	Annual Accretion=	8		Annual Accretion=	
	End Beach Width=	103		End Beach Width=	100


R-33
Emergency-Berm 27,500 CY (2023)
R-30.5 to R-36 Upland Source
Hurricane Ian
(Sept. 2022)
Hurricane Irma (Sept. 2017)
Fill Placement 27,000 CY (2013)
R-31 to R-36 Upland Source
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 10,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
-3.0 ft
13.0 ft
0.0 ft
-10.0 ft
-3.0 ft
-2.0 ft
3.0 ft
-3.0 ft
2.0 ft
8.0 ft
-10.0 ft
-8.0 ft
2.0 ft
3.0 ft
9.0 ft
3.0 ft
-8.0 ft
13.0 ft
100
103
90
90
100
103
105
102
105
103
95
105
113
111
108
99
96
104
91
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

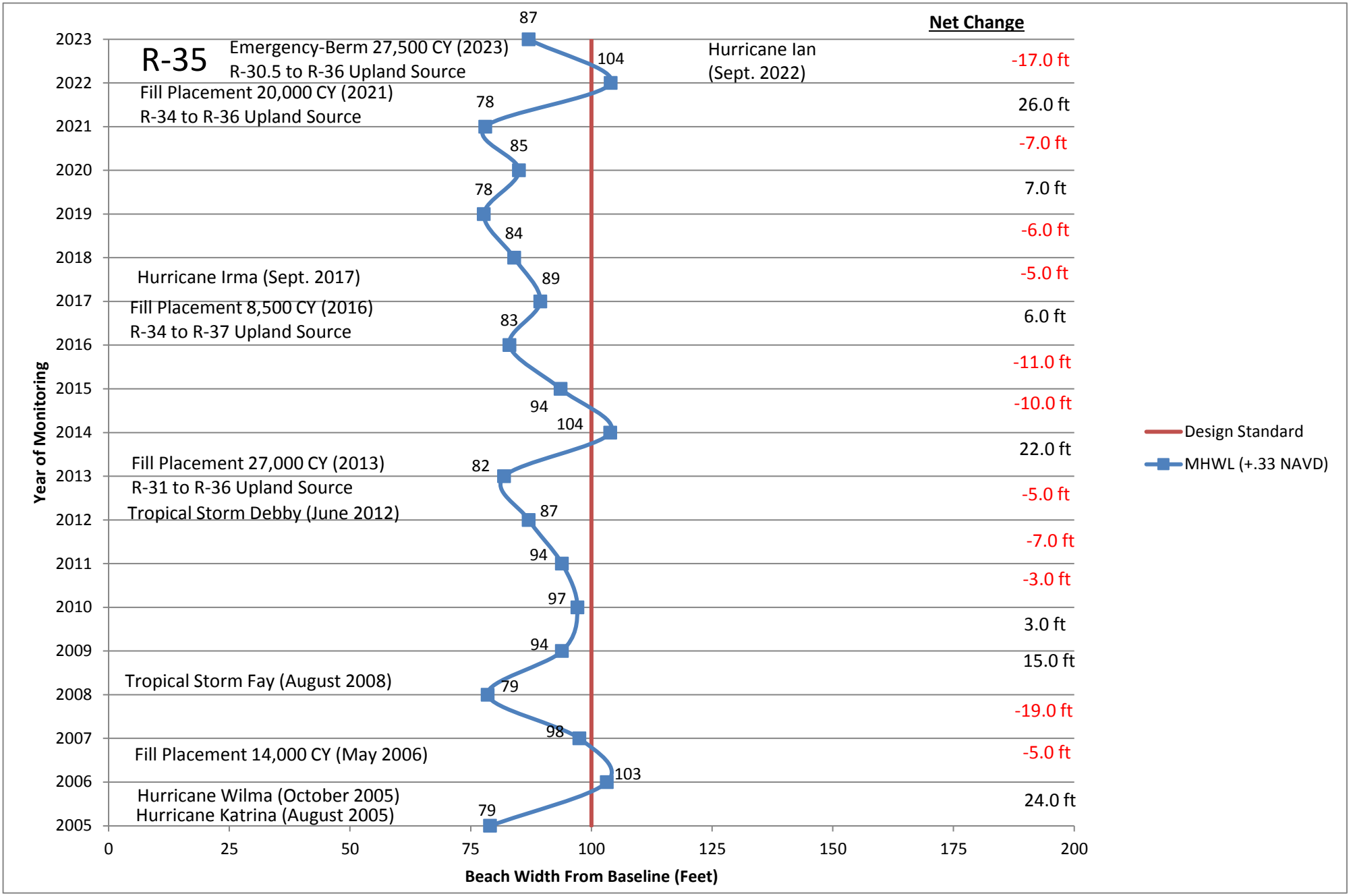
R-34

	2005 Beach Width=	80			
2006	Beginning Width=	80	2015	Beginning Width=	100
	Annual Erosion=			Annual Erosion=	-5
	Annual Accretion=	24		Annual Accretion=	
	End Beach Width=	104		End Beach Width=	95
2007	Beginning Width=	104	2016	Beginning Width=	95
	Annual Erosion=	-1		Annual Erosion=	-1
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	103		End Beach Width=	94
2008	Beginning Width=	103	2017	Beginning Width=	94
	Annual Erosion=	-16		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	1
	End Beach Width=	87		End Beach Width=	95
2009	Beginning Width=	87	2018	Beginning Width=	95
	Annual Erosion=			Annual Erosion=	-6
	Annual Accretion=	6		Annual Accretion=	
	End Beach Width=	93		End Beach Width=	89
2010	Beginning Width=	93	2019	Beginning Width=	89
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	17		Annual Accretion=	16
	End Beach Width=	110		End Beach Width=	105
2011	Beginning Width=	110	2020	Beginning Width=	105
	Annual Erosion=	-10		Annual Erosion=	-4
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	100		End Beach Width=	101
2012	Beginning Width=	100	2021	Beginning Width=	101
	Annual Erosion=			Annual Erosion=	-21
	Annual Accretion=	2		Annual Accretion=	
	End Beach Width=	102		End Beach Width=	80
2013	Beginning Width=	102	2022	Beginning Width=	80
	Annual Erosion=	-13		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	26
	End Beach Width=	89		End Beach Width=	106
2014	Beginning Width=	89	2023	Beginning Width=	106
	Annual Erosion=			Annual Erosion=	-5
	Annual Accretion=	11		Annual Accretion=	
	End Beach Width=	100		End Beach Width=	101


R-34
Emergency-Berm 27,500 CY (2023)
R-30.5 to R-36 Upland Source
Fill Placement 20,000 CY (2021)
R-34 to R-36 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 8,500 CY (2016)
R-34 to R-37 Upland Source
Fill Placement 27,000 CY (2013)
R-31 to R-36 Upland Source
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 10,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Hurricane Ian
(Sept. 2022)
Net Change
-5.0 ft
26.0 ft
-21.0 ft
-4.0 ft
16.0 ft
-6.0 ft
1.0 ft
-1.0 ft
-5.0 ft
11.0 ft
-13.0 ft
2.0 ft
-10.0 ft
17.0 ft
6.0 ft
-16.0 ft
-1.0 ft
24.0 ft
101
106
80
101
105
89
95
94
95
100
89
102
100
110
93
87
103
104
80
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-35

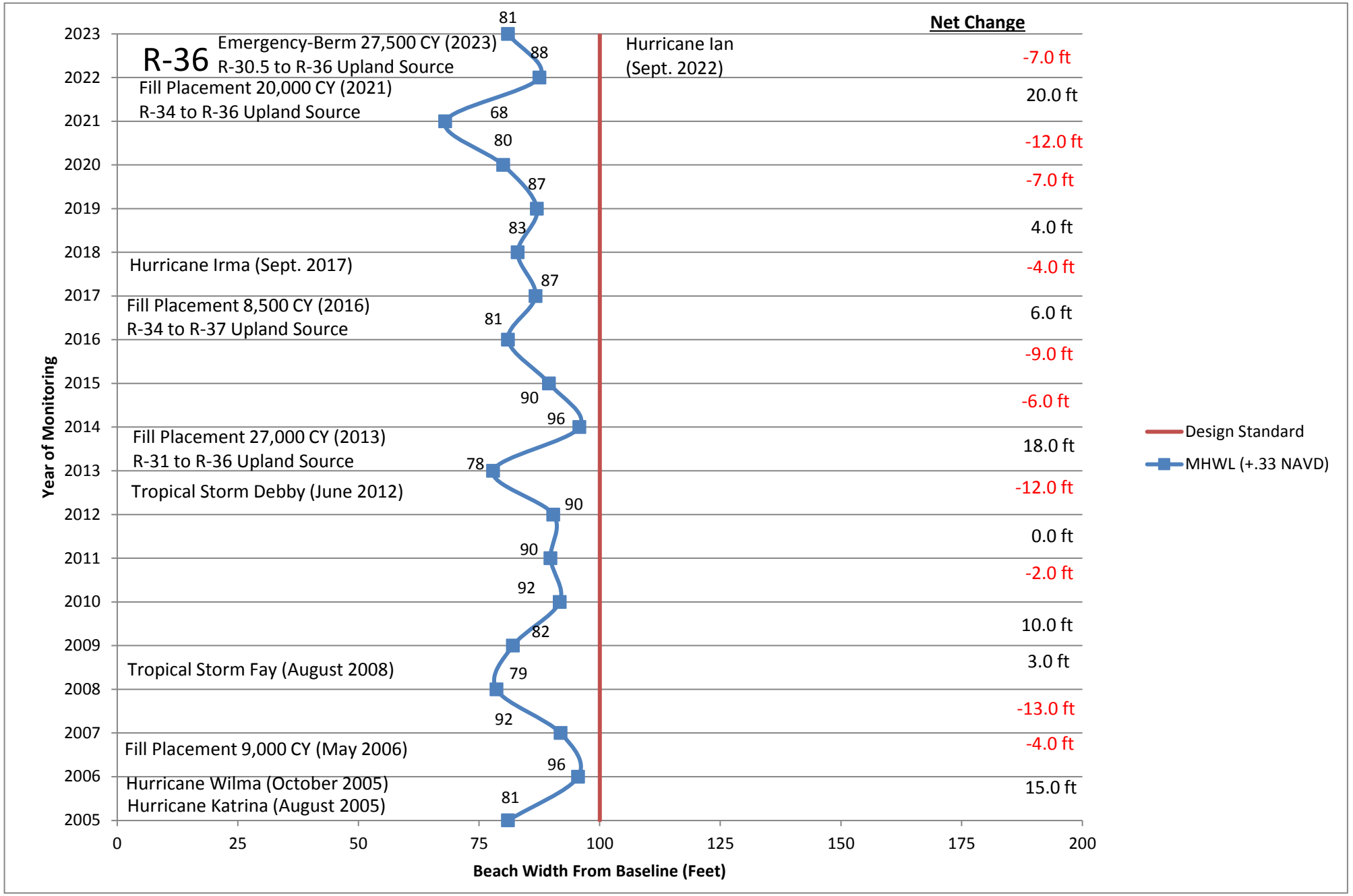
	2005 Beach Width=	79			
2006	Beginning Width=	79	2015	Beginning Width=	104
	Annual Erosion=			Annual Erosion=	-10
	Annual Accretion=	24		Annual Accretion=	
	End Beach Width=	103		End Beach Width=	94
2007	Beginning Width=	103	2016	Beginning Width=	94
	Annual Erosion=	-5		Annual Erosion=	-11
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	98		End Beach Width=	83
2008	Beginning Width=	98	2017	Beginning Width=	83
	Annual Erosion=	-19		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	6
	End Beach Width=	79		End Beach Width=	89
2009	Beginning Width=	79	2018	Beginning Width=	89
	Annual Erosion=			Annual Erosion=	-5
	Annual Accretion=	15		Annual Accretion=	
	End Beach Width=	94		End Beach Width=	84
2010	Beginning Width=	94	2019	Beginning Width=	84
	Annual Erosion=			Annual Erosion=	-6
	Annual Accretion=	3		Annual Accretion=	
	End Beach Width=	97		End Beach Width=	78
2011	Beginning Width=	97	2020	Beginning Width=	78
	Annual Erosion=	-3		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	7
	End Beach Width=	94		End Beach Width=	85
2012	Beginning Width=	94	2021	Beginning Width=	85
	Annual Erosion=	-7		Annual Erosion=	-7
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	87		End Beach Width=	78
2013	Beginning Width=	87	2022	Beginning Width=	78
	Annual Erosion=	-5		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	26
	End Beach Width=	82		End Beach Width=	104
2014	Beginning Width=	82	2023	Beginning Width=	104
	Annual Erosion=			Annual Erosion=	-17
	Annual Accretion=	22		Annual Accretion=	
	End Beach Width=	104		End Beach Width=	87


R-35
Emergency-Berm 27,500 CY (2023)
R-30.5 to R-36 Upland Source
Fill Placement 20,000 CY (2021)
R-34 to R-36 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 8,500 CY (2016)
R-34 to R-37 Upland Source
Fill Placement 27,000 CY (2013)
R-31 to R-36 Upland Source
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 14,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Hurricane Ian
(Sept. 2022)
Net Change
-17.0 ft
26.0 ft
-7.0 ft
7.0 ft
-6.0 ft
-5.0 ft
6.0 ft
-11.0 ft
-10.0 ft
22.0 ft
-5.0 ft
-7.0 ft
-3.0 ft
3.0 ft
15.0 ft
-19.0 ft
-5.0 ft
24.0 ft
87
104
78
85
78
84
89
83
94
104
82
87
94
97
94
79
98
103
79
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-36

	2005 Beach Width=	81

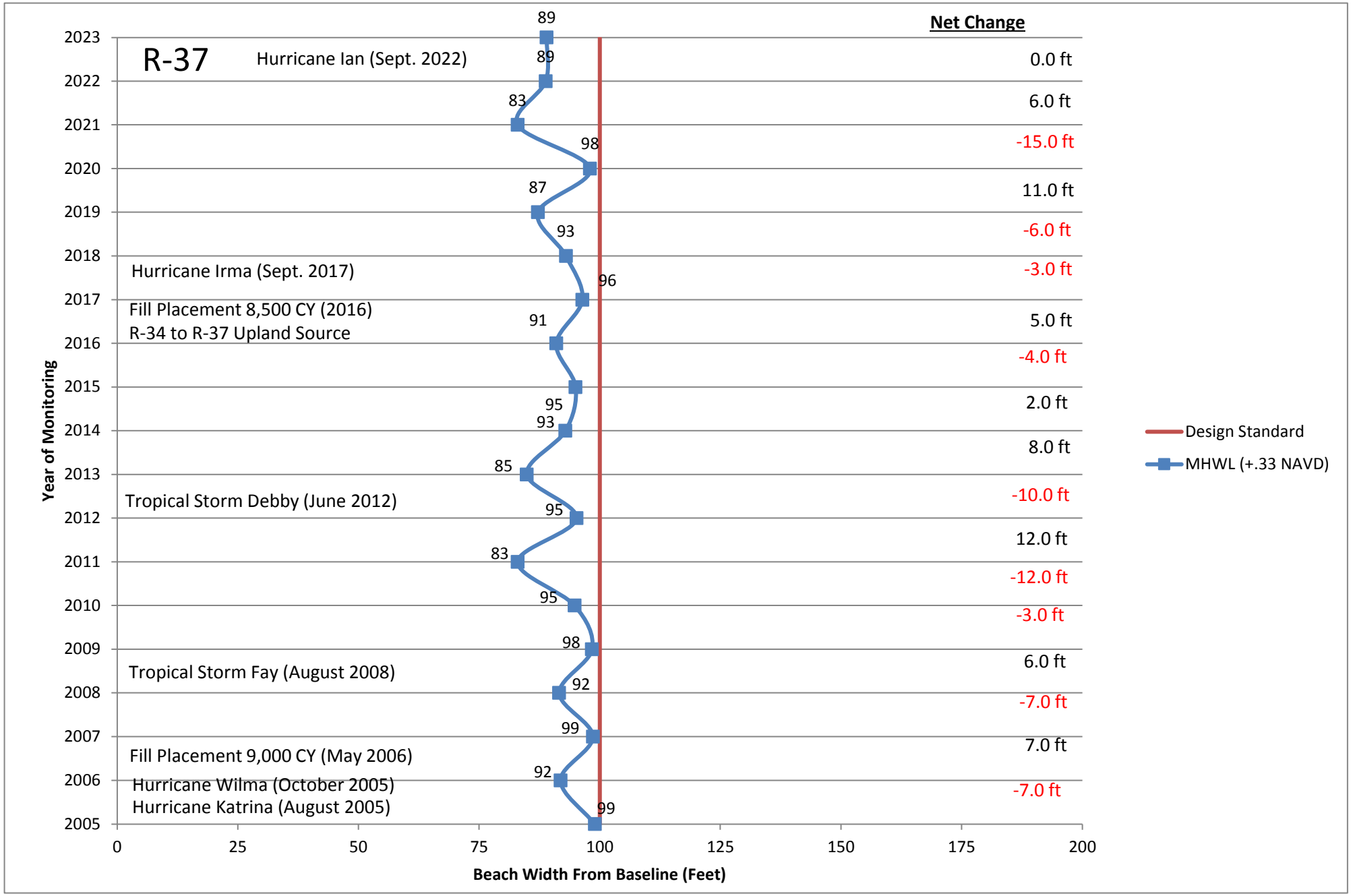
2006	Beginning Width=	81	2015	Beginning Width=	96
	Annual Erosion=			Annual Erosion=	-6
	Annual Accretion=	15		Annual Accretion=	
	End Beach Width=	96		End Beach Width=	90
2007	Beginning Width=	96	2016	Beginning Width=	90
	Annual Erosion=	-4		Annual Erosion=	-9
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	92		End Beach Width=	81
2008	Beginning Width=	92	2017	Beginning Width=	81
	Annual Erosion=	-13		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	6
	End Beach Width=	79		End Beach Width=	87
2009	Beginning Width=	79	2018	Beginning Width=	87
	Annual Erosion=			Annual Erosion=	-4
	Annual Accretion=	3		Annual Accretion=	
	End Beach Width=	82		End Beach Width=	83
2010	Beginning Width=	82	2019	Beginning Width=	83
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	10		Annual Accretion=	4
	End Beach Width=	92		End Beach Width=	87
2011	Beginning Width=	92	2020	Beginning Width=	87
	Annual Erosion=	-2		Annual Erosion=	-7
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	90		End Beach Width=	80
2012	Beginning Width=	90	2021	Beginning Width=	80
	Annual Erosion=			Annual Erosion=	-12
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	90		End Beach Width=	68
2013	Beginning Width=	90	2022	Beginning Width=	68
	Annual Erosion=	-12		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	20
	End Beach Width=	78		End Beach Width=	88
2014	Beginning Width=	78	2023	Beginning Width=	88
	Annual Erosion=			Annual Erosion=	-7
	Annual Accretion=	18		Annual Accretion=	
	End Beach Width=	96		End Beach Width=	81


R-36
Emergency-Berm 27,500 CY (2023)
R-30.5 to R-36 Upland Source
Fill Placement 20,000 CY (2021)
R-34 to R-36 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 8,500 CY (2016)
R-34 to R-37 Upland Source
Fill Placement 27,000 CY (2013)
R-31 to R-36 Upland Source
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 9,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Hurricane Ian
(Sept. 2022)
Net Change
-7.0 ft
20.0 ft
-12.0 ft
-7.0 ft
4.0 ft
-4.0 ft
6.0 ft
-9.0 ft
-6.0 ft
18.0 ft
-12.0 ft
0.0 ft
-2.0 ft
10.0 ft
3.0 ft
-13.0 ft
-4.0 ft
15.0 ft
81
88
68
80
87
83
87
81
90
96
78
90
90
92
82
79
92
96
81
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-37

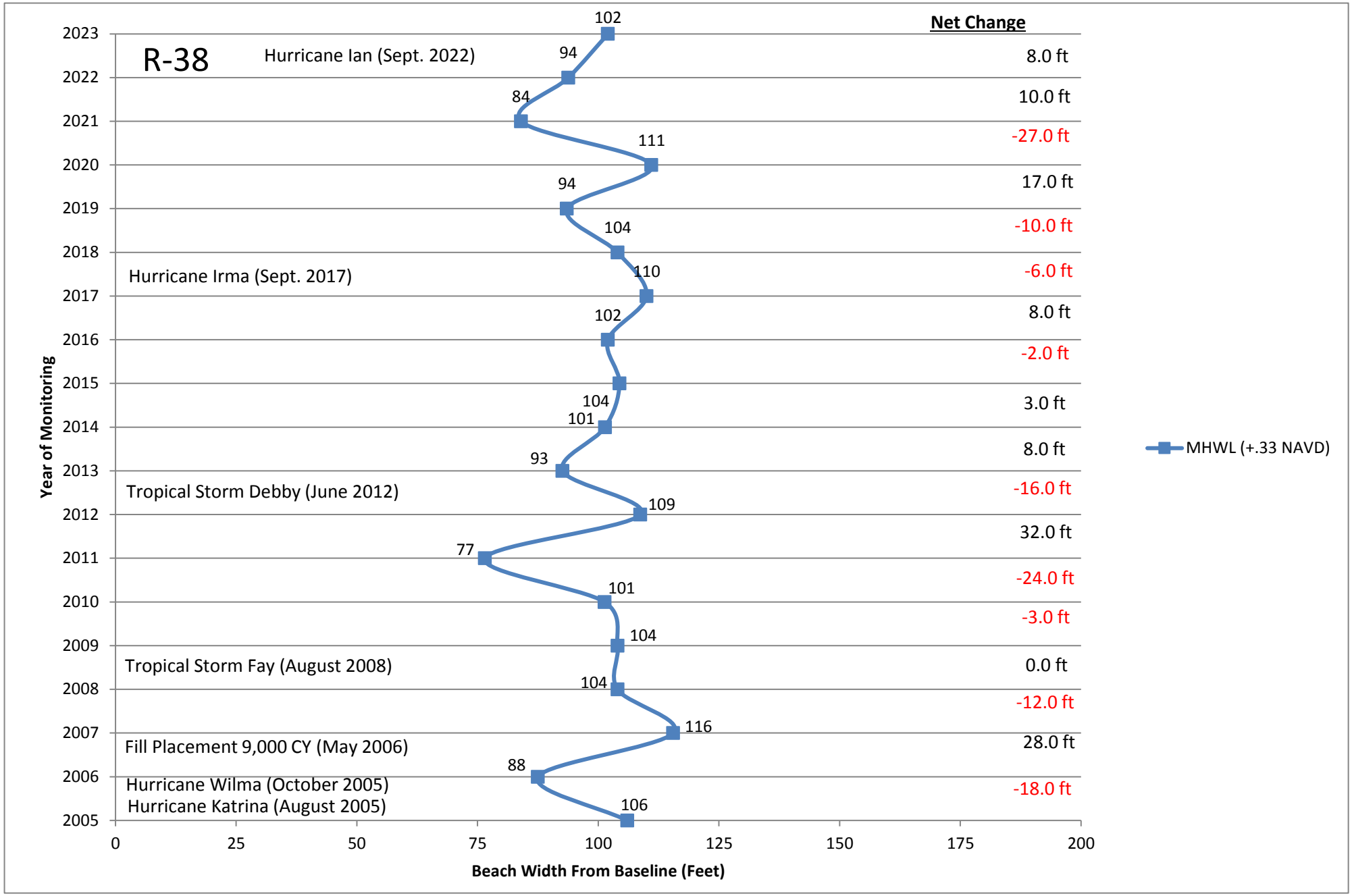
2005 Beach Width=	99	

2006	Beginning Width=	99	2015	Beginning Width=	93
	Annual Erosion=	-7		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	2
	End Beach Width=	92		End Beach Width=	95
2007	Beginning Width=	92	2016	Beginning Width=	95
	Annual Erosion=			Annual Erosion=	-4
	Annual Accretion=	7		Annual Accretion=	
	End Beach Width=	99		End Beach Width=	91
2008	Beginning Width=	99	2017	Beginning Width=	91
	Annual Erosion=	-7		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	5
	End Beach Width=	92		End Beach Width=	96
2009	Beginning Width=	92	2018	Beginning Width=	96
	Annual Erosion=			Annual Erosion=	-3
	Annual Accretion=	6		Annual Accretion=	
	End Beach Width=	98		End Beach Width=	93
2010	Beginning Width=	98	2019	Beginning Width=	93
	Annual Erosion=	-3		Annual Erosion=	-6
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	95		End Beach Width=	87
2011	Beginning Width=	95	2020	Beginning Width=	87
	Annual Erosion=	-12		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	11
	End Beach Width=	83		End Beach Width=	98
2012	Beginning Width=	83	2021	Beginning Width=	98
	Annual Erosion=			Annual Erosion=	-15
	Annual Accretion=	12		Annual Accretion=	
	End Beach Width=	95		End Beach Width=	83
2013	Beginning Width=	95	2022	Beginning Width=	83
	Annual Erosion=	-10		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	6
	End Beach Width=	85		End Beach Width=	89
2014	Beginning Width=	85	2023	Beginning Width=	89
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	8		Annual Accretion=	0
	End Beach Width=	93		End Beach Width=	89


R-37
Hurricane Ian (Sept. 2022)
Hurricane Irma (Sept. 2017)
Fill Placement 8,500 CY (2016)
R-34 to R-37 Upland Source
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 9,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
0.0 ft
6.0 ft
-15.0 ft
11.0 ft
-6.0 ft
-3.0 ft
5.0 ft
-4.0 ft
2.0 ft
8.0 ft
-10.0 ft
12.0 ft
-12.0 ft
-3.0 ft
6.0 ft
-7.0 ft
7.0 ft
-7.0 ft
89
89
83
98
87
93
96
91
95
93
85
95
83
95
98
92
99
92
99
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-38

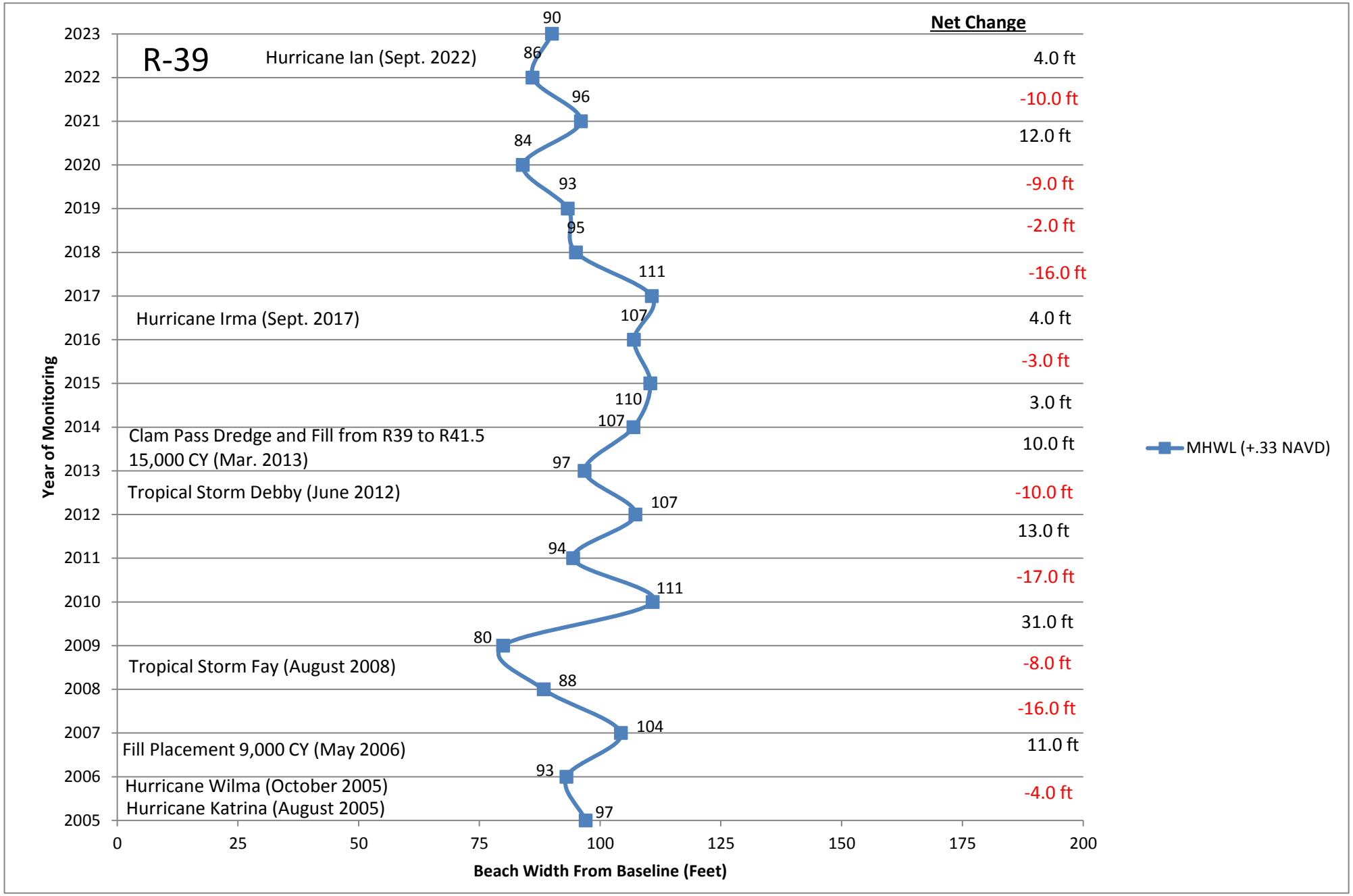
	2005 Beach Width=	106
2006	Beginning Width=	106
	Annual Erosion=	-18
	Annual Accretion=	
	End Beach Width=	88
2007	Beginning Width=	88
	Annual Erosion=	
	Annual Accretion=	28
	End Beach Width=	116
2008	Beginning Width=	116
	Annual Erosion=	-12
	Annual Accretion=	
	End Beach Width=	104
2009	Beginning Width=	104
	Annual Erosion=	
	Annual Accretion=	
	End Beach Width=	104
2010	Beginning Width=	104
	Annual Erosion=	-3
	Annual Accretion=	
	End Beach Width=	101
2011	Beginning Width=	101
	Annual Erosion=	-24
	Annual Accretion=	
	End Beach Width=	77
2012	Beginning Width=	77
	Annual Erosion=	
	Annual Accretion=	32
	End Beach Width=	109
2013	Beginning Width=	109
	Annual Erosion=	-16
	Annual Accretion=	
	End Beach Width=	93
2014	Beginning Width=	93
	Annual Erosion=	
	Annual Accretion=	8
	End Beach Width=	101
2015	Beginning Width=	101
	Annual Erosion=	
	Annual Accretion=	3
	End Beach Width=	104
2016	Beginning Width=	104
	Annual Erosion=	-2
	Annual Accretion=	
	End Beach Width=	102
2017	Beginning Width=	102
	Annual Erosion=	
	Annual Accretion=	8
	End Beach Width=	110
2018	Beginning Width=	110
	Annual Erosion=	-6
	Annual Accretion=	
	End Beach Width=	104
2019	Beginning Width=	104
	Annual Erosion=	-10
	Annual Accretion=	
	End Beach Width=	94
2020	Beginning Width=	94
	Annual Erosion=	
	Annual Accretion=	17
	End Beach Width=	111
2021	Beginning Width=	111
	Annual Erosion=	-27
	Annual Accretion=	
	End Beach Width=	84
2022	Beginning Width=	84
	Annual Erosion=	
	Annual Accretion=	10
	End Beach Width=	94
2023	Beginning Width=	94
	Annual Erosion=	
	Annual Accretion=	8
	End Beach Width=	102


R-38
Hurricane Ian (Sept. 2022)
Hurricane Irma (Sept. 2017)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 9,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
8.0 ft
10.0 ft
-27.0 ft
17.0 ft
-10.0 ft
-6.0 ft
8.0 ft
-2.0 ft
3.0 ft
8.0 ft
-16.0 ft
32.0 ft
-24.0 ft
-3.0 ft
0.0 ft
-12.0 ft
28.0 ft
-18.0 ft
102
94
84
111
94
104
110
102
104
101
93
109
77
101
104
104
116
88
106
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
MHWL (+.33 NAVD)

R-39

2005 Beach Width=	97	

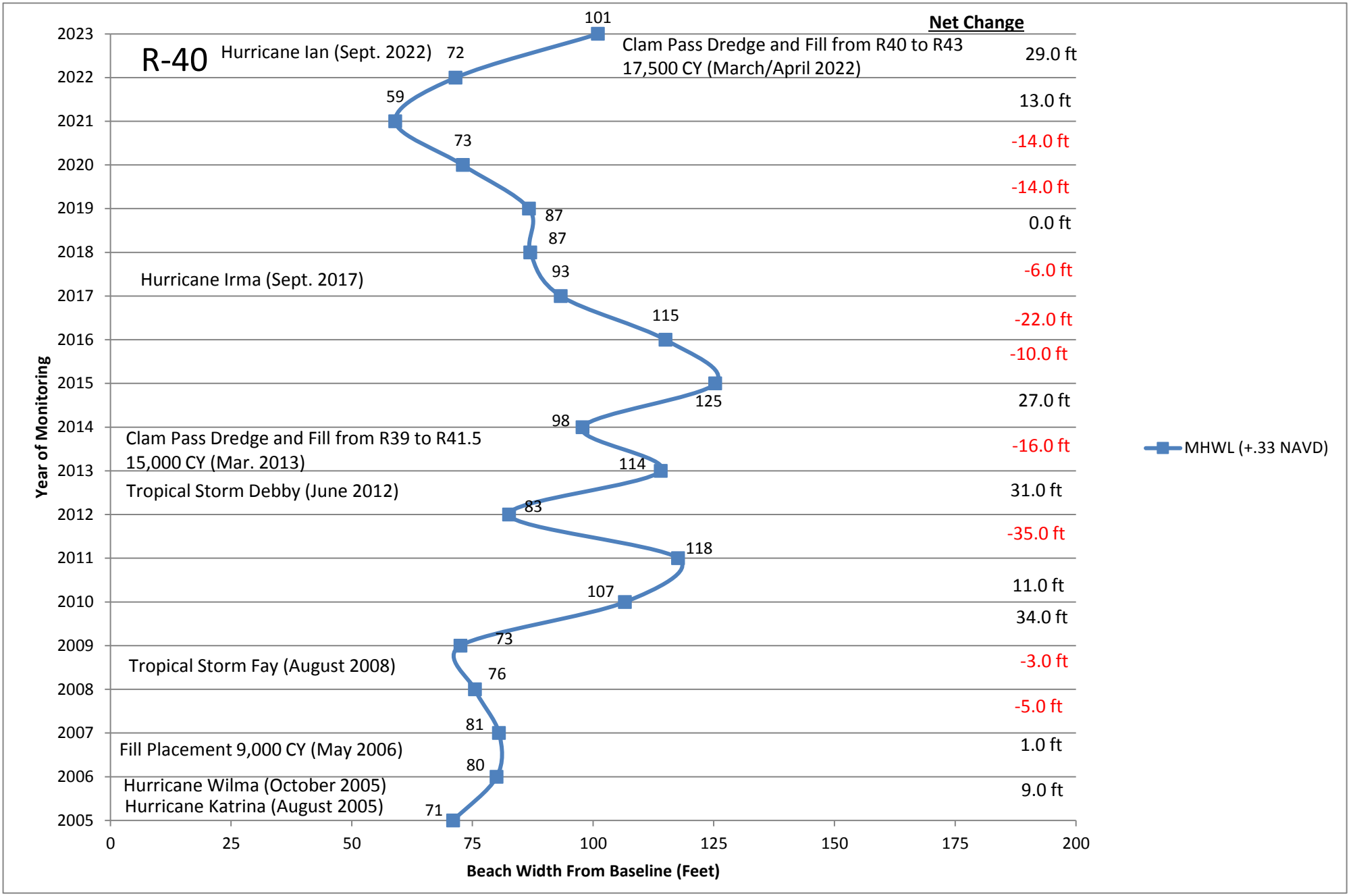
2006	Beginning Width=	97	2015	Beginning Width=	107
	Annual Erosion=	-4		Annual Erosion=	3
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	93		End Beach Width=	110
2007	Beginning Width=	93	2016	Beginning Width=	110
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	11		Annual Accretion=	-3
	End Beach Width=	104		End Beach Width=	107
2008	Beginning Width=	104	2017	Beginning Width=	107
	Annual Erosion=	-16		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	4
	End Beach Width=	88		End Beach Width=	111
2009	Beginning Width=	88	2018	Beginning Width=	111
	Annual Erosion=	-8		Annual Erosion=	-16
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	80		End Beach Width=	95
2010	Beginning Width=	80	2019	Beginning Width=	95
	Annual Erosion=			Annual Erosion=	-2
	Annual Accretion=	31		Annual Accretion=	
	End Beach Width=	111		End Beach Width=	93
2011	Beginning Width=	111	2020	Beginning Width=	93
	Annual Erosion=	-17		Annual Erosion=	-9
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	94		End Beach Width=	84
2012	Beginning Width=	94	2021	Beginning Width=	84
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	13		Annual Accretion=	12
	End Beach Width=	107		End Beach Width=	96
2013	Beginning Width=	107	2022	Beginning Width=	96
	Annual Erosion=	-10		Annual Erosion=	-10
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	97		End Beach Width=	86
2014	Beginning Width=	97	2023	Beginning Width=	86
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	10		Annual Accretion=	4
	End Beach Width=	107		End Beach Width=	90


R-39
Hurricane Ian (Sept. 2022)
Hurricane Irma (Sept. 2017)
Clam Pass Dredge and Fill from R39 to R41.5
15,000 CY (Mar. 2013)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 9,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
4.0 ft
-10.0 ft
12.0 ft
-9.0 ft
-2.0 ft
-16.0 ft
4.0 ft
-3.0 ft
3.0 ft
10.0 ft
-10.0 ft
13.0 ft
-17.0 ft
31.0 ft
-8.0 ft
-16.0 ft
11.0 ft
-4.0 ft
90
86
96
84
93
95
111
107
110
107
97
107
94
111
80
88
104
93
97
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
MHWL (+.33 NAVD)

R-40

	2005 Beach Width=	71

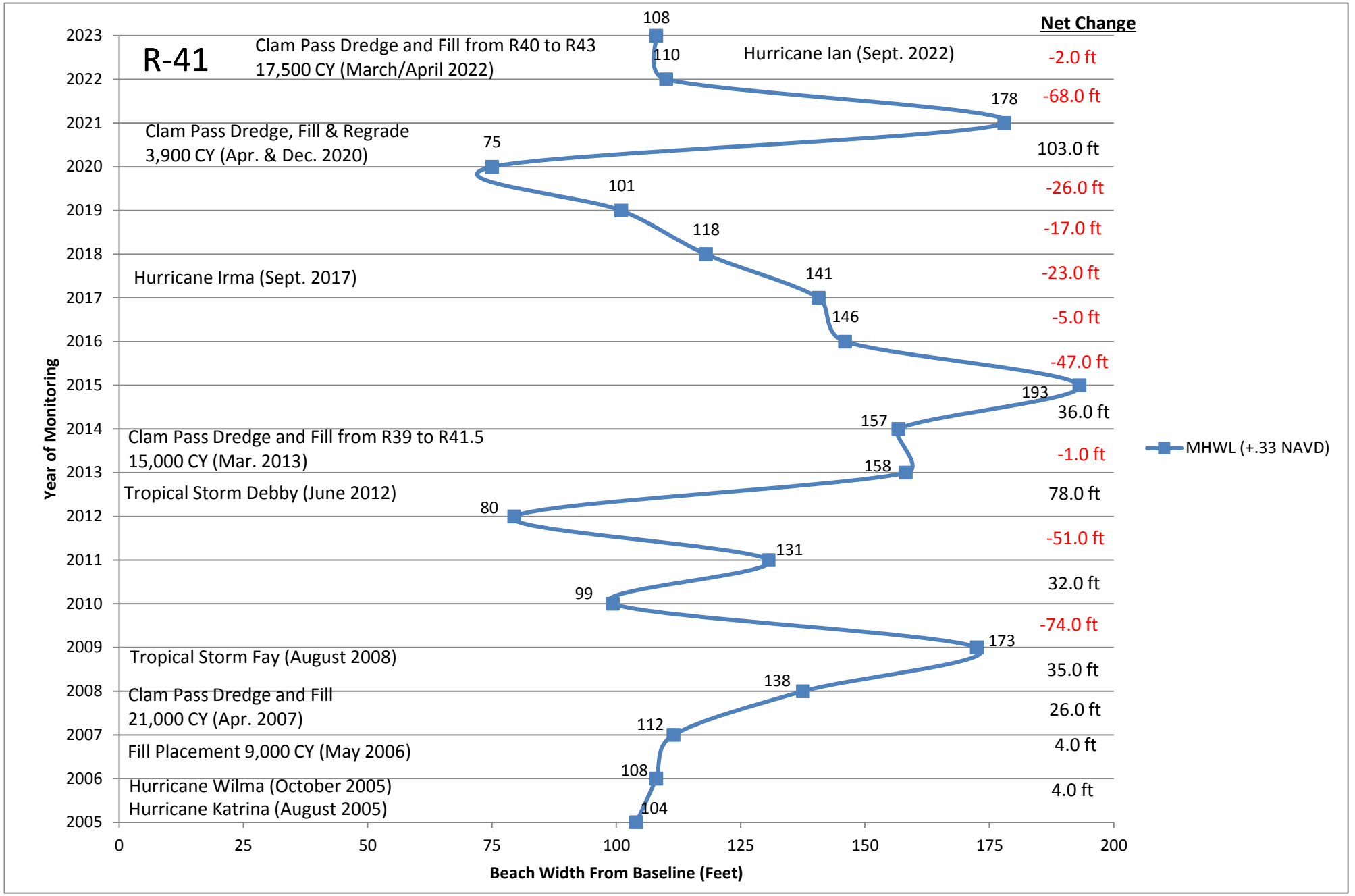
2006	Beginning Width=	71	2015	Beginning Width=	98
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	9		Annual Accretion=	27
	End Beach Width=	80		End Beach Width=	125
2007	Beginning Width=	80	2016	Beginning Width=	125
	Annual Erosion=			Annual Erosion=	-10
	Annual Accretion=	1		Annual Accretion=	
	End Beach Width=	81		End Beach Width=	115
2008	Beginning Width=	81	2017	Beginning Width=	115
	Annual Erosion=	-5		Annual Erosion=	-22
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	76		End Beach Width=	93
2009	Beginning Width=	76	2018	Beginning Width=	93
	Annual Erosion=	-3		Annual Erosion=	-6
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	73		End Beach Width=	87
2010	Beginning Width=	73	2019	Beginning Width=	87
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	34		Annual Accretion=	0
	End Beach Width=	107		End Beach Width=	87
2011	Beginning Width=	107	2020	Beginning Width=	87
	Annual Erosion=			Annual Erosion=	-14
	Annual Accretion=	11		Annual Accretion=	
	End Beach Width=	118		End Beach Width=	73
2012	Beginning Width=	118	2021	Beginning Width=	73
	Annual Erosion=	-35		Annual Erosion=	-14
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	83		End Beach Width=	59
2013	Beginning Width=	83	2022	Beginning Width=	59
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	31		Annual Accretion=	13
	End Beach Width=	114		End Beach Width=	72
2014	Beginning Width=	114	2023	Beginning Width=	72
	Annual Erosion=	-16		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	29
	End Beach Width=	98		End Beach Width=	101


R-40
Hurricane Ian (Sept. 2022)
Clam Pass Dredge and Fill from R40 to R43
17,500 CY (March/April 2022)
Hurricane Irma (Sept. 2017)
Clam Pass Dredge and Fill from R39 to R41.5
15,000 CY (Mar. 2013)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 9,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
29.0 ft
13.0 ft
-14.0 ft
-14.0 ft
0.0 ft
-6.0 ft
-22.0 ft
-10.0 ft
27.0 ft
-16.0 ft
31.0 ft
-35.0 ft
11.0 ft
34.0 ft
-3.0 ft
-5.0 ft
1.0 ft
9.0 ft
101
72
59
73
87
87
93
115
125
98
114
83
118
107
73
76
81
80
71
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
MHWL (+.33 NAVD)

R-41

2005 Beach Width=	104	

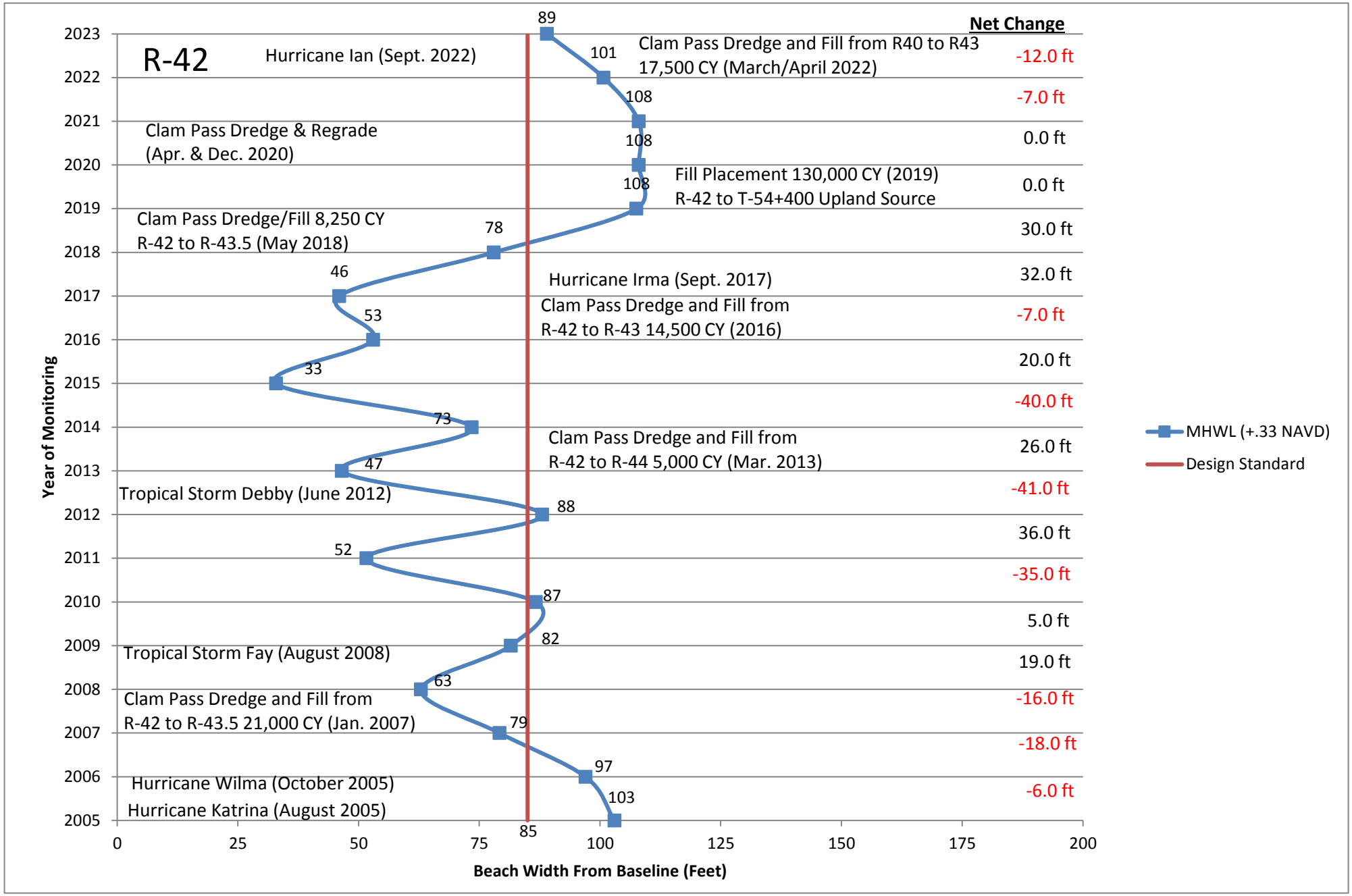
2006	Beginning Width=	104	2015	Beginning Width=	157
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	4		Annual Accretion=	36
	End Beach Width=	108		End Beach Width=	193
2007	Beginning Width=	108	2016	Beginning Width=	193
	Annual Erosion=			Annual Erosion=	-47
	Annual Accretion=	4		Annual Accretion=	
	End Beach Width=	112		End Beach Width=	146
2008	Beginning Width=	112	2017	Beginning Width=	146
	Annual Erosion=			Annual Erosion=	-5
	Annual Accretion=	26		Annual Accretion=	
	End Beach Width=	138		End Beach Width=	141
2009	Beginning Width=	138	2018	Beginning Width=	141
	Annual Erosion=			Annual Erosion=	-23
	Annual Accretion=	35		Annual Accretion=	
	End Beach Width=	173		End Beach Width=	118
2010	Beginning Width=	173	2019	Beginning Width=	118
	Annual Erosion=	-74		Annual Erosion=	-17
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	99		End Beach Width=	101
2011	Beginning Width=	99	2020	Beginning Width=	101
	Annual Erosion=			Annual Erosion=	-26
	Annual Accretion=	32		Annual Accretion=	
	End Beach Width=	131		End Beach Width=	75
2012	Beginning Width=	131	2021	Beginning Width=	75
	Annual Erosion=	-51		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	103
	End Beach Width=	80		End Beach Width=	178
2013	Beginning Width=	80	2022	Beginning Width=	178
	Annual Erosion=			Annual Erosion=	-68
	Annual Accretion=	78		Annual Accretion=	
	End Beach Width=	158		End Beach Width=	110
2014	Beginning Width=	158	2023	Beginning Width=	110
	Annual Erosion=	-1		Annual Erosion=	-2
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	157		End Beach Width=	108


R-41
Clam Pass Dredge and Fill from R40 to R43
17,500 CY (March/April 2022)
Hurricane Ian (Sept. 2022)
Clam Pass Dredge, Fill & Regrade
3,900 CY (Apr. & Dec. 2020)
Hurricane Irma (Sept. 2017)
Clam Pass Dredge and Fill from R39 to R41.5
15,000 CY (Mar. 2013)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Clam Pass Dredge and Fill
21,000 CY (Apr. 2007)
Fill Placement 9,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
-2.0 ft
-68.0 ft
103.0 ft
-26.0 ft
-17.0 ft
-23.0 ft
-5.0 ft
-47.0 ft
36.0 ft
-1.0 ft
78.0 ft
-51.0 ft
32.0 ft
-74.0 ft
35.0 ft
26.0 ft
4.0 ft
4.0 ft
108
110
178
75
101
118
141
146
193
157
158
80
131
99
173
138
112
108
104
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
MHWL (+.33 NAVD)

R-42

2005 Beach Width=	103	

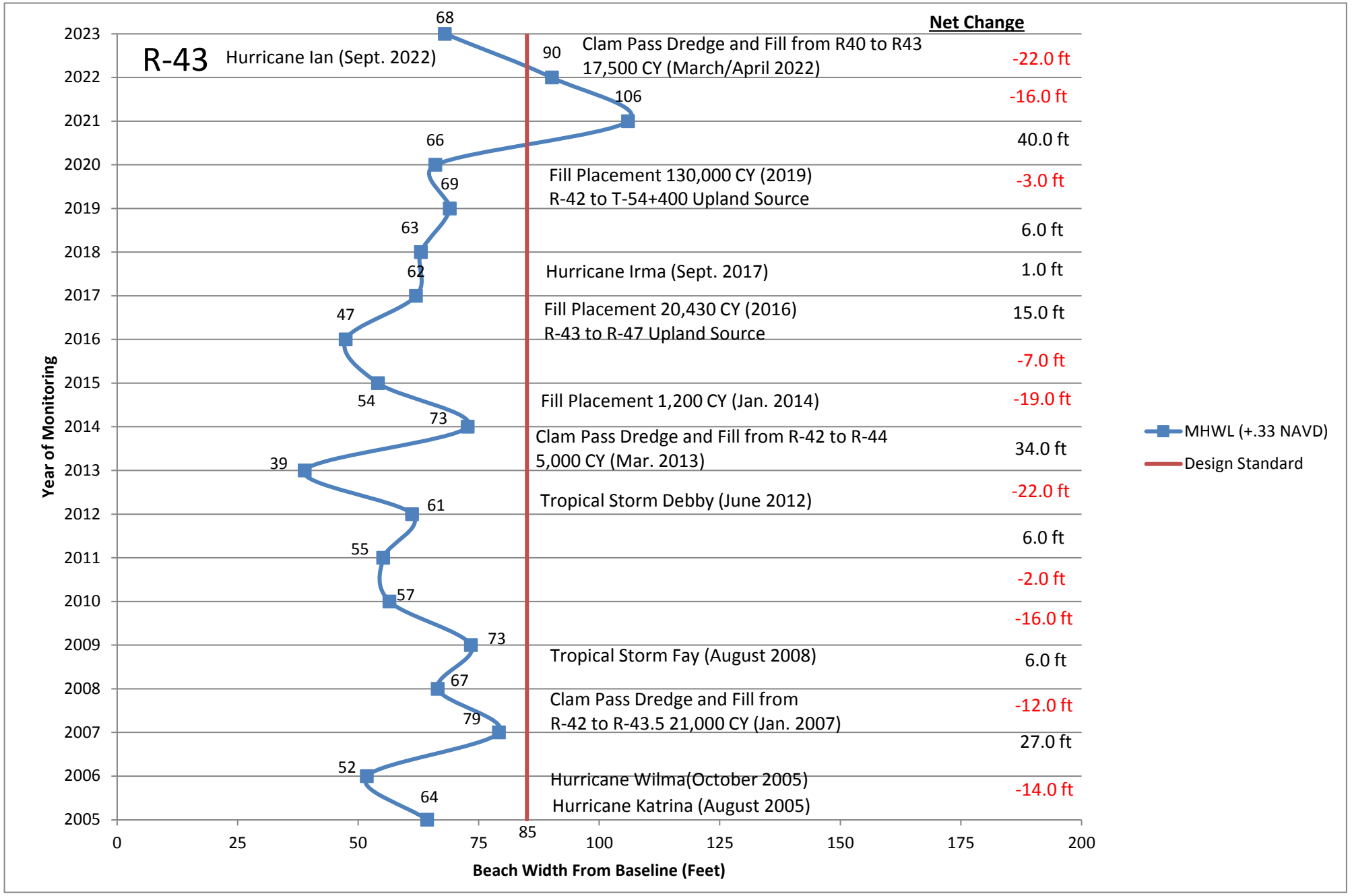
2006	Beginning Width=	103	2015	Beginning Width=	73
	Annual Erosion=	-6		Annual Erosion=	-40
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	97		End Beach Width=	33
2007	Beginning Width=	97	2016	Beginning Width=	33
	Annual Erosion=	-18		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	20
	End Beach Width=	79		End Beach Width=	53
2008	Beginning Width=	79	2017	Beginning Width=	53
	Annual Erosion=	-16		Annual Erosion=	-7
	Annual Accretion=			Annual Accretion=	0
	End Beach Width=	63		End Beach Width=	46
2009	Beginning Width=	63	2018	Beginning Width=	46
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	19		Annual Accretion=	32
	End Beach Width=	82		End Beach Width=	78
2010	Beginning Width=	82	2019	Beginning Width=	78
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	5		Annual Accretion=	30
	End Beach Width=	87		End Beach Width=	108
2011	Beginning Width=	87	2020	Beginning Width=	108
	Annual Erosion=	-35		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	0
	End Beach Width=	52		End Beach Width=	108
2012	Beginning Width=	52	2021	Beginning Width=	108
	Annual Erosion=			Annual Erosion=	0
	Annual Accretion=	36		Annual Accretion=	
	End Beach Width=	88		End Beach Width=	108
2013	Beginning Width=	88	2022	Beginning Width=	108
	Annual Erosion=	-41		Annual Erosion=	-7
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	47		End Beach Width=	101
2014	Beginning Width=	47	2023	Beginning Width=	101
	Annual Erosion=			Annual Erosion=	-12
	Annual Accretion=	26		Annual Accretion=	
	End Beach Width=	73		End Beach Width=	89


R-42
Year of Monitoring
Beach Width From Baseline (Feet)
Net Change
Hurricane Ian (Sept. 2022)
Clam Pass Dredge and Fill from R40 to R43
17,500 CY (March/April 2022)
-12.0 ft
-7.0 ft
Clam Pass Dredge & Regrade
(Apr. & Dec. 2020)
0.0 ft
Fill Placement 130,000 CY (2019)
R-42 to T-54+400 Upland Source
0.0 ft
Clam Pass Dredge/Fill 8,250 CY
R-42 to R-43.5 (May 2018)
30.0 ft
Hurricane Irma (Sept. 2017)
32.0 ft
Clam Pass Dredge and Fill from
R-42 to R-43 14,500 CY (2016)
-7.0 ft
20.0 ft
-40.0 ft
Clam Pass Dredge and Fill from
R-42 to R-44 5,000 CY (Mar. 2013)
26.0 ft
Tropical Storm Debby (June 2012)
-41.0 ft
36.0 ft
-35.0 ft
5.0 ft
Tropical Storm Fay (August 2008)
19.0 ft
Clam Pass Dredge and Fill from
R-42 to R-43.5 21,000 CY (Jan. 2007)
-16.0 ft
-18.0 ft
Hurricane Wilma (October 2005)
-6.0 ft
Hurricane Katrina (August 2005)
89
101
108
108
108
78
46
53
33
73
47
88
52
87
82
63
79
97
103
85
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
0
25
50
75
100
125
150
175
200
MHWL (+.33 NAVD)
Design Standard

R-43

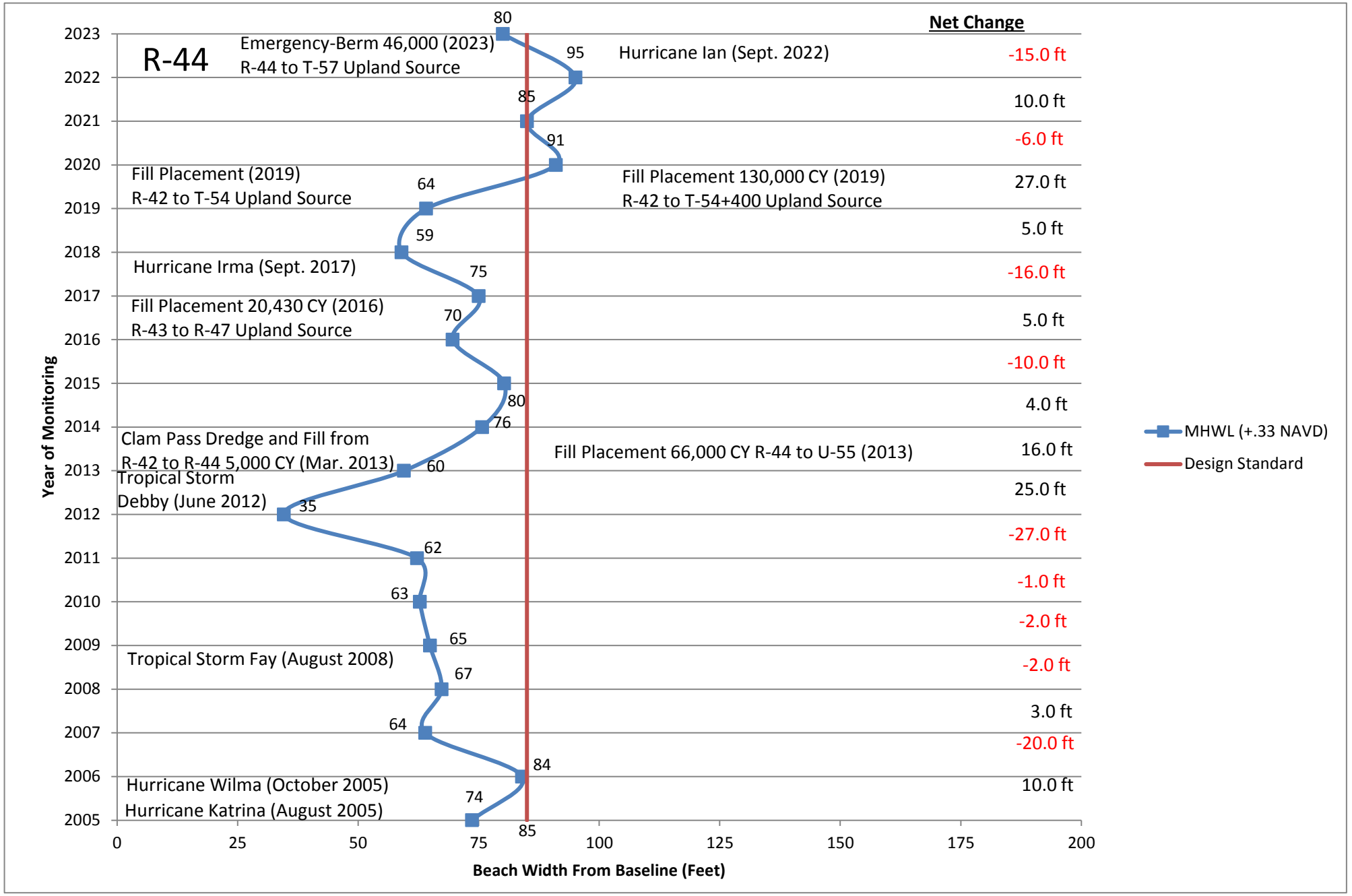
	2005 Beach Width=	64

2006	Beginning Width=	64	2015	Beginning Width=	73
	Annual Erosion=	-12		Annual Erosion=	-19
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	52		End Beach Width=	54
2007	Beginning Width=	52	2016	Beginning Width=	54
	Annual Erosion=			Annual Erosion=	-7
	Annual Accretion=	27		Annual Accretion=	
	End Beach Width=	79		End Beach Width=	47
2008	Beginning Width=	79	2017	Beginning Width=	47
	Annual Erosion=	-12		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	15
	End Beach Width=	67		End Beach Width=	62
2009	Beginning Width=	67	2018	Beginning Width=	62
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	6		Annual Accretion=	1
	End Beach Width=	73		End Beach Width=	63
2010	Beginning Width=	73	2019	Beginning Width=	63
	Annual Erosion=	-16		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	6
	End Beach Width=	57		End Beach Width=	69
2011	Beginning Width=	57	2020	Beginning Width=	69
	Annual Erosion=	-2		Annual Erosion=	-3
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	55		End Beach Width=	66
2012	Beginning Width=	55	2021	Beginning Width=	66
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	6		Annual Accretion=	40
	End Beach Width=	61		End Beach Width=	106
2013	Beginning Width=	61	2022	Beginning Width=	106
	Annual Erosion=	-22		Annual Erosion=	-16
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	39		End Beach Width=	90
2014	Beginning Width=	39	2023	Beginning Width=	90
	Annual Erosion=			Annual Erosion=	-22
	Annual Accretion=	34		Annual Accretion=	
	End Beach Width=	73		End Beach Width=	68


R-43
Hurricane Ian (Sept. 2022)
Net Change
Clam Pass Dredge and Fill from R40 to R43
17,500 CY (March/April 2022)
-22.0 ft
-16.0 ft
40.0 ft
Fill Placement 130,000 CY (2019)
R-42 to T-54+400 Upland Source
-3.0 ft
6.0 ft
Hurricane Irma (Sept. 2017)
1.0 ft
Fill Placement 20,430 CY (2016)
R-43 to R-47 Upland Source
15.0 ft
-7.0 ft
Fill Placement 1,200 CY (Jan. 2014)
-19.0 ft
Clam Pass Dredge and Fill from R-42 to R-44
5,000 CY (Mar. 2013)
34.0 ft
Tropical Storm Debby (June 2012)
-22.0 ft
6.0 ft
-2.0 ft
-16.0 ft
Tropical Storm Fay (August 2008)
6.0 ft
Clam Pass Dredge and Fill from
R-42 to R-43.5 21,000 CY (Jan. 2007)
-12.0 ft
27.0 ft
Hurricane Wilma(October 2005)
Hurricane Katrina (August 2005)
-14.0 ft
68
90
106
66
69
63
62
47
54
73
39
61
55
57
73
67
79
52
64
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
85
100
125
150
175
200
Beach Width From Baseline (Feet)
MHWL (+.33 NAVD)
Design Standard

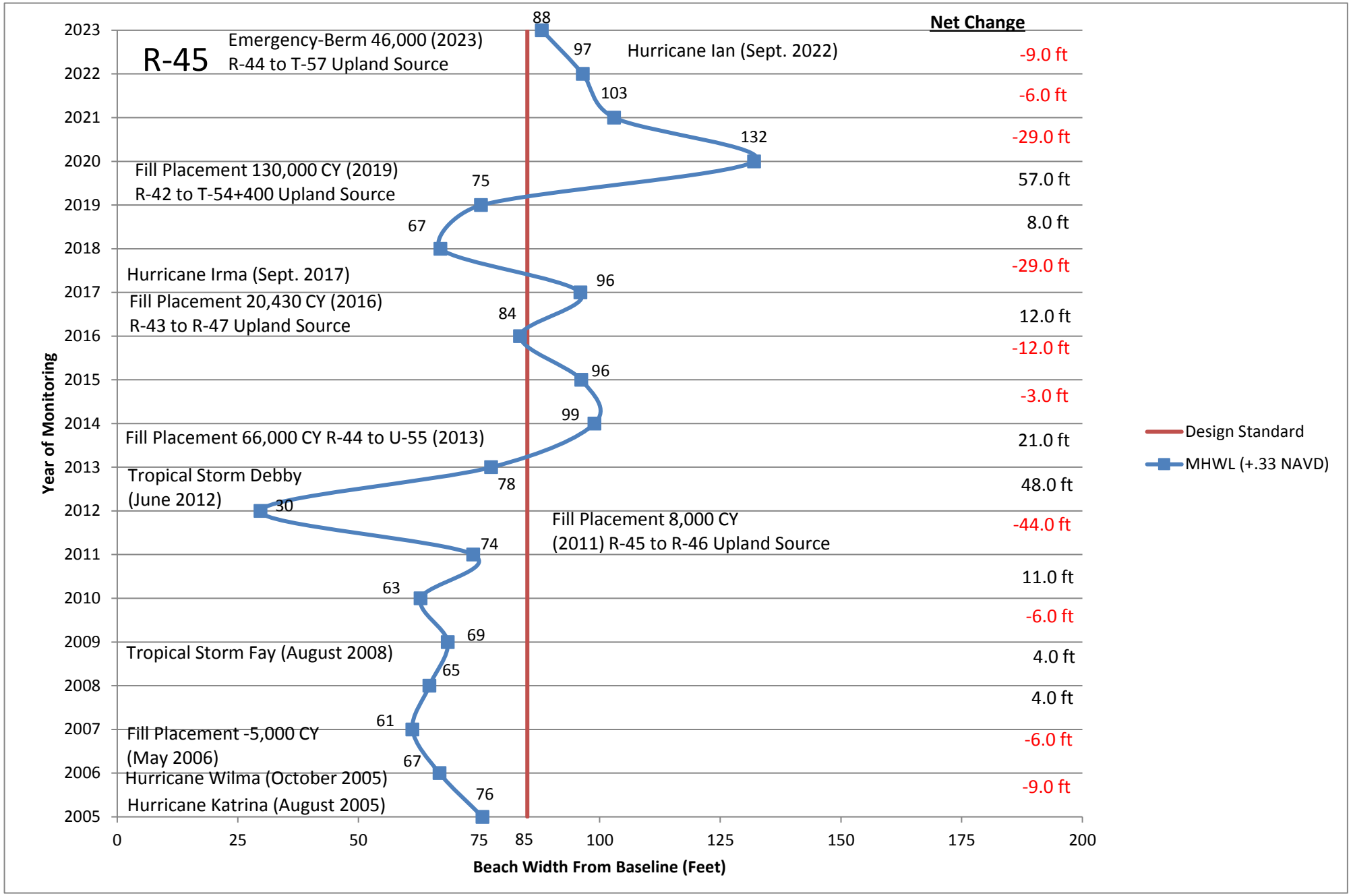
R-44

	2005 Beach Width=	74			
2006	Beginning Width=	74	2015	Beginning Width=	76
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	10		Annual Accretion=	4
	End Beach Width=	84		End Beach Width=	80
2007	Beginning Width=	84	2016	Beginning Width=	80
	Annual Erosion=	-20		Annual Erosion=	-10
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	64		End Beach Width=	70
2008	Beginning Width=	64	2017	Beginning Width=	70
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	3		Annual Accretion=	5
	End Beach Width=	67		End Beach Width=	75
2009	Beginning Width=	67	2018	Beginning Width=	75
	Annual Erosion=	-2		Annual Erosion=	-16
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	65		End Beach Width=	59
2010	Beginning Width=	65	2019	Beginning Width=	59
	Annual Erosion=	-2		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	5
	End Beach Width=	63		End Beach Width=	64
2011	Beginning Width=	63	2020	Beginning Width=	64
	Annual Erosion=	-1		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	27
	End Beach Width=	62		End Beach Width=	91
2012	Beginning Width=	62	2021	Beginning Width=	91
	Annual Erosion=	-27		Annual Erosion=	-6
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	35		End Beach Width=	85
2013	Beginning Width=	35	2022	Beginning Width=	85
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	25		Annual Accretion=	10
	End Beach Width=	60		End Beach Width=	95
2014	Beginning Width=	60	2023	Beginning Width=	95
	Annual Erosion=			Annual Erosion=	-15
	Annual Accretion=	16		Annual Accretion=	
	End Beach Width=	76		End Beach Width=	80


R-44
Emergency-Berm 46,000 (2023)
R-44 to T-57 Upland Source
Hurricane Ian (Sept. 2022)
Fill Placement (2019)
R-42 to T-54 Upland Source
Fill Placement 130,000 CY (2019)
R-42 to T-54+400 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 20,430 CY (2016)
R-43 to R-47 Upland Source
Clam Pass Dredge and Fill from
R-42 to R-44 5,000 CY (Mar. 2013)
Fill Placement 66,000 CY R-44 to U-55 (2013)
Tropical Storm
Debby (June 2012)
Tropical Storm Fay (August 2008)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
-15.0 ft
10.0 ft
-6.0 ft
27.0 ft
5.0 ft
-16.0 ft
5.0 ft
-10.0 ft
4.0 ft
16.0 ft
25.0 ft
-27.0 ft
-1.0 ft
-2.0 ft
-2.0 ft
3.0 ft
-20.0 ft
10.0 ft
80
95
85
91
64
59
75
70
80
76
60
35
62
63
65
67
64
84
74
85
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
0
25
50
75
100
125
150
175
200
Year of Monitoring
Beach Width From Baseline (Feet)
MHWL (+.33 NAVD)
Design Standard

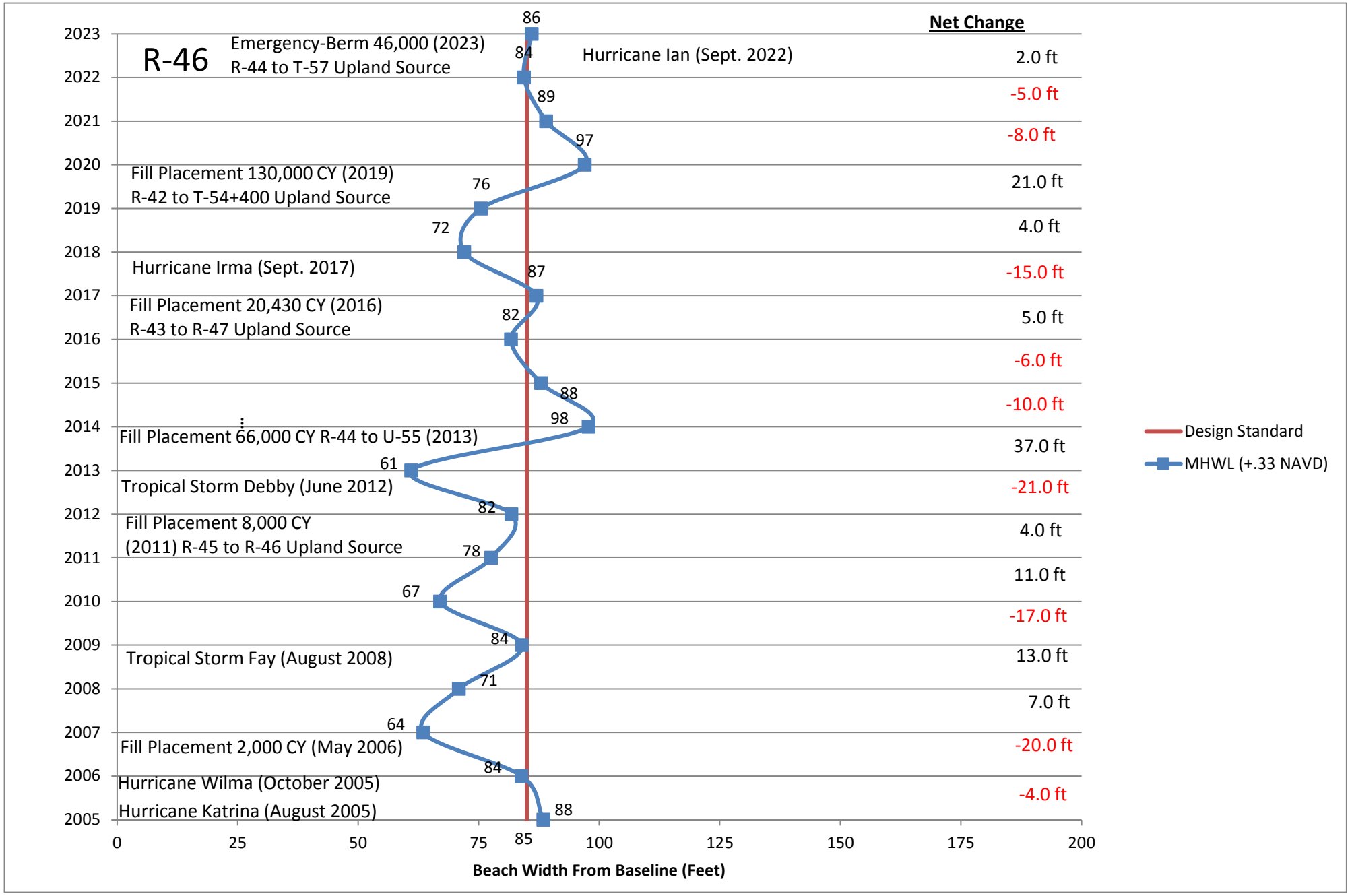
R-45

	2005 Beach Width=	76
2006	Beginning Width=	76
	Annual Erosion=	-9
	Annual Accretion=	
	End Beach Width=	67
2007	Beginning Width=	67
	Annual Erosion=	-6
	Annual Accretion=	
	End Beach Width=	61
2008	Beginning Width=	61
	Annual Erosion=	
	Annual Accretion=	4
	End Beach Width=	65
2009	Beginning Width=	65
	Annual Erosion=	
	Annual Accretion=	4
	End Beach Width=	69
2010	Beginning Width=	69
	Annual Erosion=	-6
	Annual Accretion=	
	End Beach Width=	63
2011	Beginning Width=	63
	Annual Erosion=	
	Annual Accretion=	11
	End Beach Width=	74
2012	Beginning Width=	74
	Annual Erosion=	-44
	Annual Accretion=	
	End Beach Width=	30
2013	Beginning Width=	30
	Annual Erosion=	
	Annual Accretion=	48
	End Beach Width=	78
2014	Beginning Width=	78
	Annual Erosion=	
	Annual Accretion=	21
	End Beach Width=	99
2015	Beginning Width=	99
	Annual Erosion=	-3
	Annual Accretion=	
	End Beach Width=	96
2016	Beginning Width=	96
	Annual Erosion=	-12
	Annual Accretion=	
	End Beach Width=	84
2017	Beginning Width=	84
	Annual Erosion=	
	Annual Accretion=	12
	End Beach Width=	96
2018	Beginning Width=	96
	Annual Erosion=	-29
	Annual Accretion=	
	End Beach Width=	67
2019	Beginning Width=	67
	Annual Erosion=	
	Annual Accretion=	8
	End Beach Width=	75
2020	Beginning Width=	75
	Annual Erosion=	
	Annual Accretion=	57
	End Beach Width=	132
2021	Beginning Width=	132
	Annual Erosion=	-29
	Annual Accretion=	
	End Beach Width=	103
2022	Beginning Width=	103
	Annual Erosion=	-6
	Annual Accretion=	
	End Beach Width=	97
2023	Beginning Width=	97
	Annual Erosion=	-9
	Annual Accretion=	
	End Beach Width=	88


R-45
Emergency-Berm 46,000 (2023)
R-44 to T-57 Upland Source
Hurricane Ian (Sept. 2022)
Fill Placement 130,000 CY (2019)
R-42 to T-54+400 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 20,430 CY (2016)
R-43 to R-47 Upland Source
Fill Placement 66,000 CY R-44 to U-55 (2013)
Tropical Storm Debby
(June 2012)
Fill Placement 8,000 CY
(2011) R-45 to R-46 Upland Source
Tropical Storm Fay (August 2008)
Fill Placement -5,000 CY
(May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
-9.0 ft
-6.0 ft
-29.0 ft
57.0 ft
8.0 ft
-29.0 ft
12.0 ft
-12.0 ft
-3.0 ft
21.0 ft
48.0 ft
-44.0 ft
11.0 ft
-6.0 ft
4.0 ft
4.0 ft
-6.0 ft
-9.0 ft
88
97
103
132
75
67
96
84
96
99
78
30
74
63
69
65
61
67
76
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
85
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-46

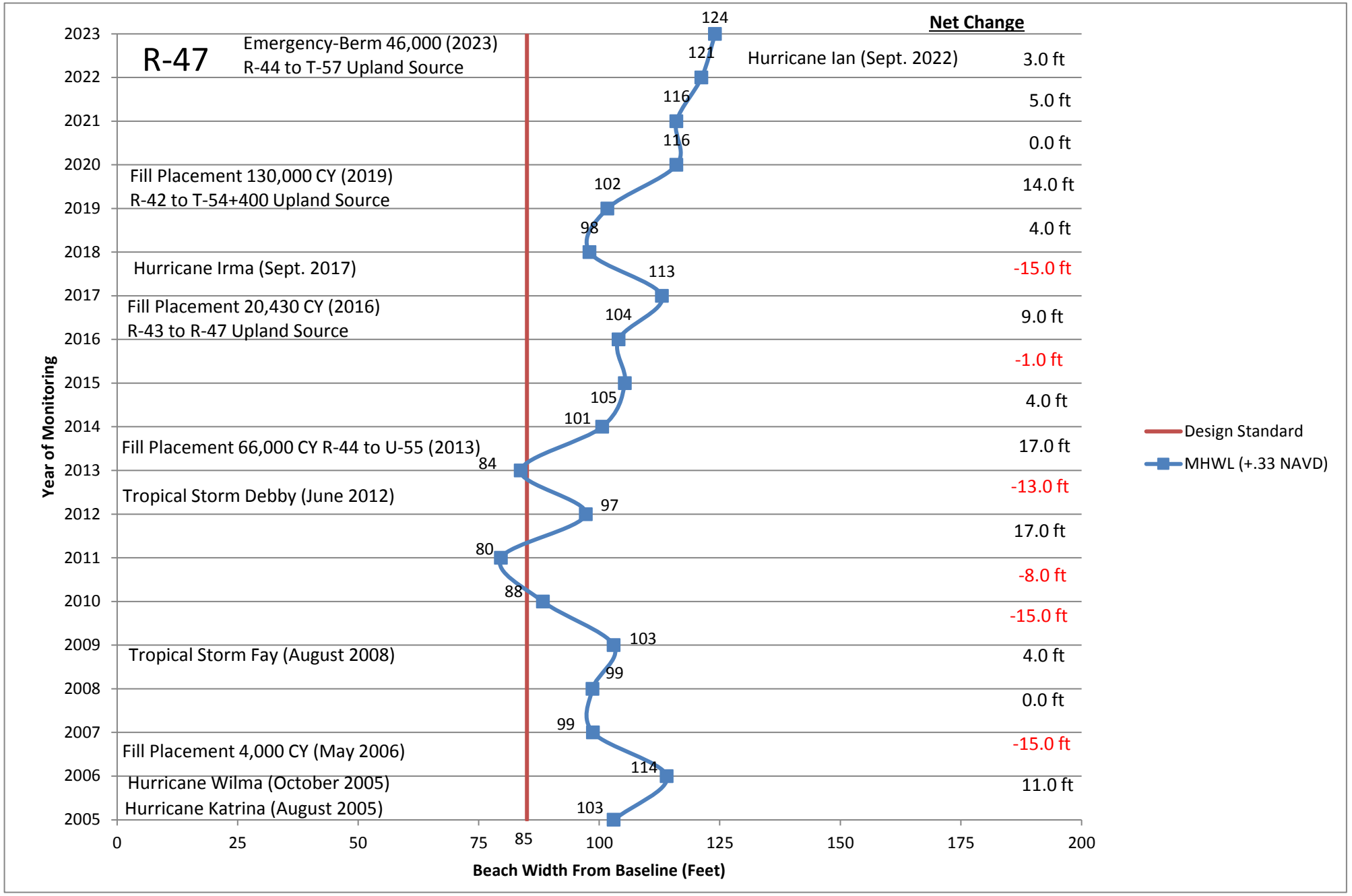
	2005 Beach Width=	88			
2006	Beginning Width=	88	2015	Beginning Width=	98
	Annual Erosion=	-4		Annual Erosion=	-10
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	84		End Beach Width=	88
2007	Beginning Width=	84	2016	Beginning Width=	88
	Annual Erosion=	-20		Annual Erosion=	-6
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	64		End Beach Width=	82
2008	Beginning Width=	64	2017	Beginning Width=	82
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	7		Annual Accretion=	5
	End Beach Width=	71		End Beach Width=	87
2009	Beginning Width=	71	2018	Beginning Width=	87
	Annual Erosion=			Annual Erosion=	-15
	Annual Accretion=	13		Annual Accretion=	
	End Beach Width=	84		End Beach Width=	72
2010	Beginning Width=	84	2019	Beginning Width=	72
	Annual Erosion=	-17		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	4
	End Beach Width=	67		End Beach Width=	76
2011	Beginning Width=	67	2020	Beginning Width=	76
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	11		Annual Accretion=	21
	End Beach Width=	78		End Beach Width=	97
2012	Beginning Width=	78	2021	Beginning Width=	97
	Annual Erosion=			Annual Erosion=	-8
	Annual Accretion=	4		Annual Accretion=	
	End Beach Width=	82		End Beach Width=	89
2013	Beginning Width=	82	2022	Beginning Width=	89
	Annual Erosion=	-21		Annual Erosion=	-5
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	61		End Beach Width=	84
2014	Beginning Width=	61	2023	Beginning Width=	84
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	37		Annual Accretion=	2
	End Beach Width=	98		End Beach Width=	86


R-46
Emergency-Berm 46,000 (2023)
R-44 to T-57 Upland Source
Hurricane Ian (Sept. 2022)
Fill Placement 130,000 CY (2019)
R-42 to T-54+400 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 20,430 CY (2016)
R-43 to R-47 Upland Source
Fill Placement 66,000 CY R-44 to U-55 (2013)
Tropical Storm Debby (June 2012)
Fill Placement 8,000 CY
(2011) R-45 to R-46 Upland Source
Tropical Storm Fay (August 2008)
Fill Placement 2,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
2.0 ft
-5.0 ft
-8.0 ft
21.0 ft
4.0 ft
-15.0 ft
5.0 ft
-6.0 ft
-10.0 ft
37.0 ft
-21.0 ft
4.0 ft
11.0 ft
-17.0 ft
13.0 ft
7.0 ft
-20.0 ft
-4.0 ft
86
84
89
97
76
72
87
82
88
98
61
82
78
67
84
71
64
84
88
85
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-47

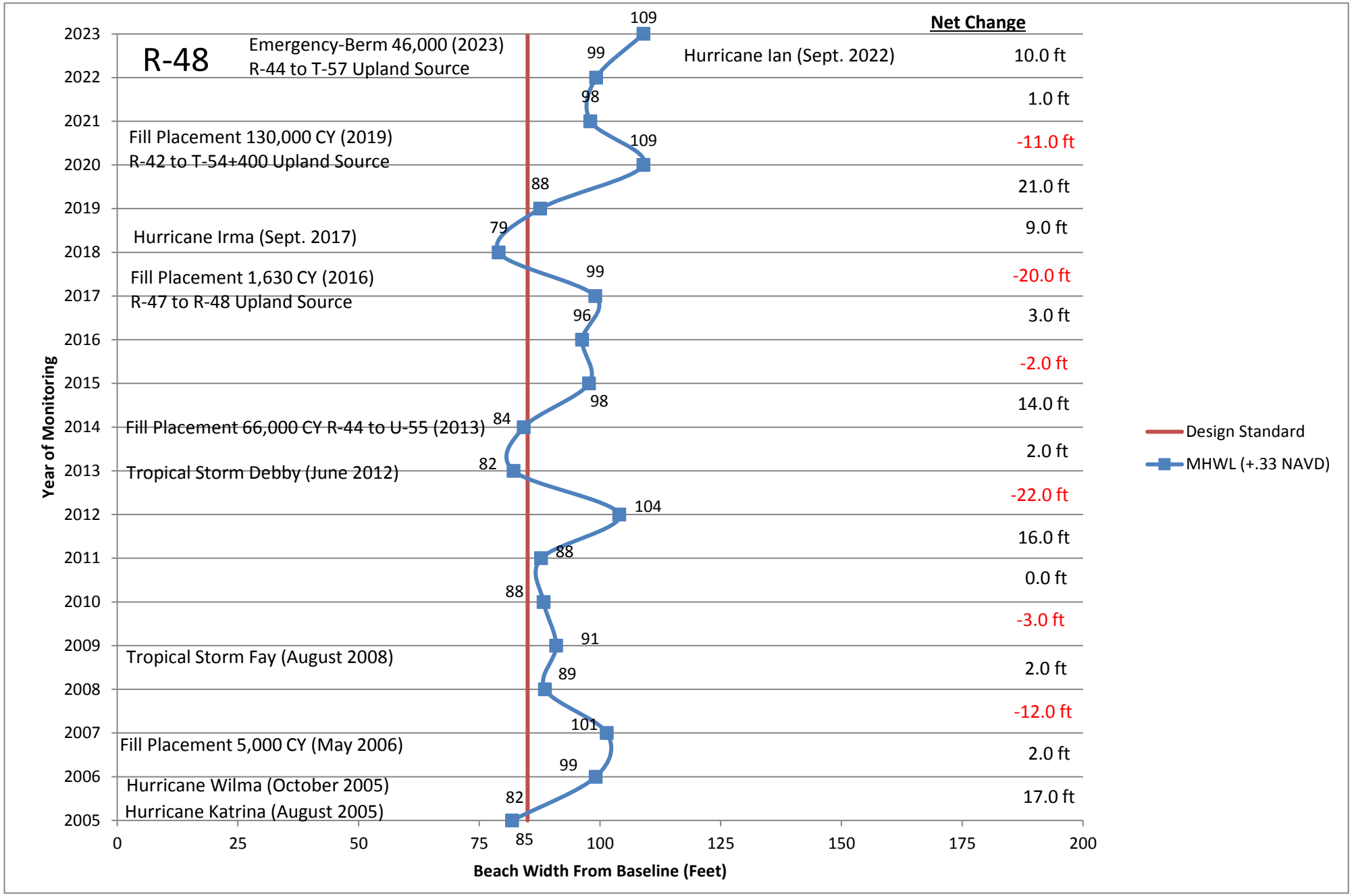
	2005 Beach Width=	103

2006	Beginning Width=	103	2015	Beginning Width=	101
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	11		Annual Accretion=	4
	End Beach Width=	114		End Beach Width=	105
2007	Beginning Width=	114	2016	Beginning Width=	105
	Annual Erosion=	-15		Annual Erosion=	-1
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	99		End Beach Width=	104
2008	Beginning Width=	99	2017	Beginning Width=	104
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=			Annual Accretion=	9
	End Beach Width=	99		End Beach Width=	113
2009	Beginning Width=	99	2018	Beginning Width=	113
	Annual Erosion=			Annual Erosion=	-15
	Annual Accretion=	4		Annual Accretion=	
	End Beach Width=	103		End Beach Width=	98
2010	Beginning Width=	103	2019	Beginning Width=	98
	Annual Erosion=	-15		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	4
	End Beach Width=	88		End Beach Width=	102
2011	Beginning Width=	88	2020	Beginning Width=	102
	Annual Erosion=	-8		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	14
	End Beach Width=	80		End Beach Width=	116
2012	Beginning Width=	80	2021	Beginning Width=	116
	Annual Erosion=			Annual Erosion=	0
	Annual Accretion=	17		Annual Accretion=	
	End Beach Width=	97		End Beach Width=	116
2013	Beginning Width=	97	2022	Beginning Width=	116
	Annual Erosion=	-13		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	5
	End Beach Width=	84		End Beach Width=	121
2014	Beginning Width=	84	2023	Beginning Width=	121
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	17		Annual Accretion=	3
	End Beach Width=	101		End Beach Width=	124


R-47
Emergency-Berm 46,000 (2023)
R-44 to T-57 Upland Source
Fill Placement 130,000 CY (2019)
R-42 to T-54+400 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 20,430 CY (2016)
R-43 to R-47 Upland Source
Fill Placement 66,000 CY R-44 to U-55 (2013)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 4,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
Hurricane Ian (Sept. 2022)
3.0 ft
5.0 ft
0.0 ft
14.0 ft
4.0 ft
-15.0 ft
9.0 ft
-1.0 ft
4.0 ft
17.0 ft
-13.0 ft
17.0 ft
-8.0 ft
-15.0 ft
4.0 ft
0.0 ft
-15.0 ft
11.0 ft
124
121
116
116
102
98
113
104
105
101
84
97
80
88
103
99
99
114
103
Year of Monitoring
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
0
25
50
75
85
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-48

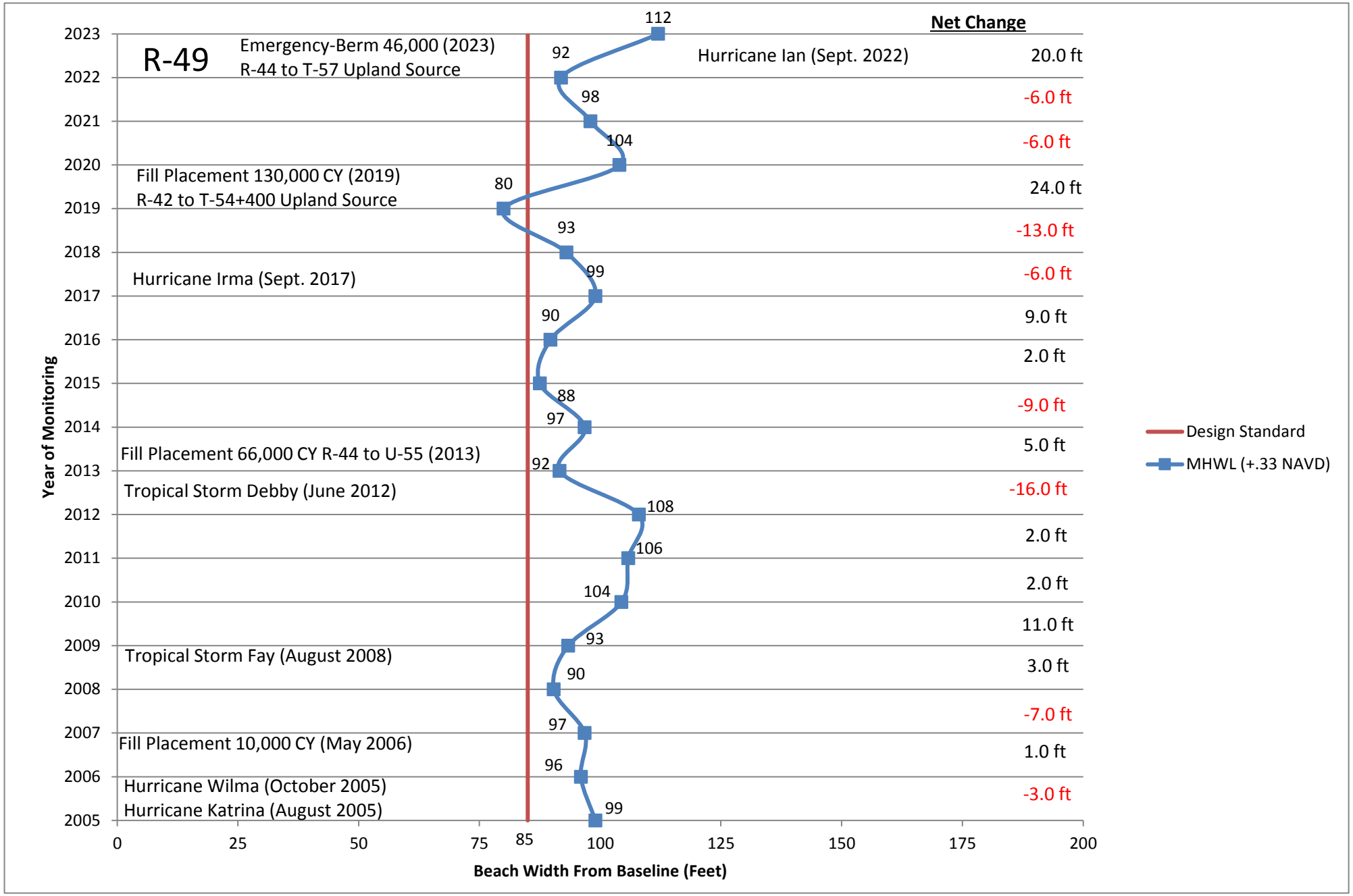
	2005 Beach Width=	82			
2006	Beginning Width=	82	2015	Beginning Width=	84
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	17		Annual Accretion=	14
	End Beach Width=	99		End Beach Width=	98
2007	Beginning Width=	99	2016	Beginning Width=	98
	Annual Erosion=			Annual Erosion=	-2
	Annual Accretion=	2		Annual Accretion=	
	End Beach Width=	101		End Beach Width=	96
2008	Beginning Width=	101	2017	Beginning Width=	96
	Annual Erosion=	-12		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	3
	End Beach Width=	89		End Beach Width=	99
2009	Beginning Width=	89	2018	Beginning Width=	99
	Annual Erosion=			Annual Erosion=	-20
	Annual Accretion=	2		Annual Accretion=	
	End Beach Width=	91		End Beach Width=	79
2010	Beginning Width=	91	2019	Beginning Width=	79
	Annual Erosion=	-3		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	9
	End Beach Width=	88		End Beach Width=	88
2011	Beginning Width=	88	2020	Beginning Width=	88
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=			Annual Accretion=	21
	End Beach Width=	88		End Beach Width=	109
2012	Beginning Width=	88	2021	Beginning Width=	109
	Annual Erosion=			Annual Erosion=	-11
	Annual Accretion=	16		Annual Accretion=	
	End Beach Width=	104		End Beach Width=	98
2013	Beginning Width=	104	2022	Beginning Width=	98
	Annual Erosion=	-22		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	1
	End Beach Width=	82		End Beach Width=	99
2014	Beginning Width=	82	2023	Beginning Width=	99
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	2		Annual Accretion=	10
	End Beach Width=	84		End Beach Width=	109


R-48
Emergency-Berm 46,000 (2023)
R-44 to T-57 Upland Source
Fill Placement 130,000 CY (2019)
R-42 to T-54+400 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 1,630 CY (2016)
R-47 to R-48 Upland Source
Fill Placement 66,000 CY R-44 to U-55 (2013)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 5,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Hurricane Ian (Sept. 2022)
Net Change
10.0 ft
1.0 ft
-11.0 ft
21.0 ft
9.0 ft
-20.0 ft
3.0 ft
-2.0 ft
14.0 ft
2.0 ft
-22.0 ft
16.0 ft
0.0 ft
-3.0 ft
2.0 ft
-12.0 ft
2.0 ft
17.0 ft
109
99
98
109
88
79
99
96
98
84
82
104
88
88
91
89
101
99
82
85
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-49

	2005 Beach Width=	99

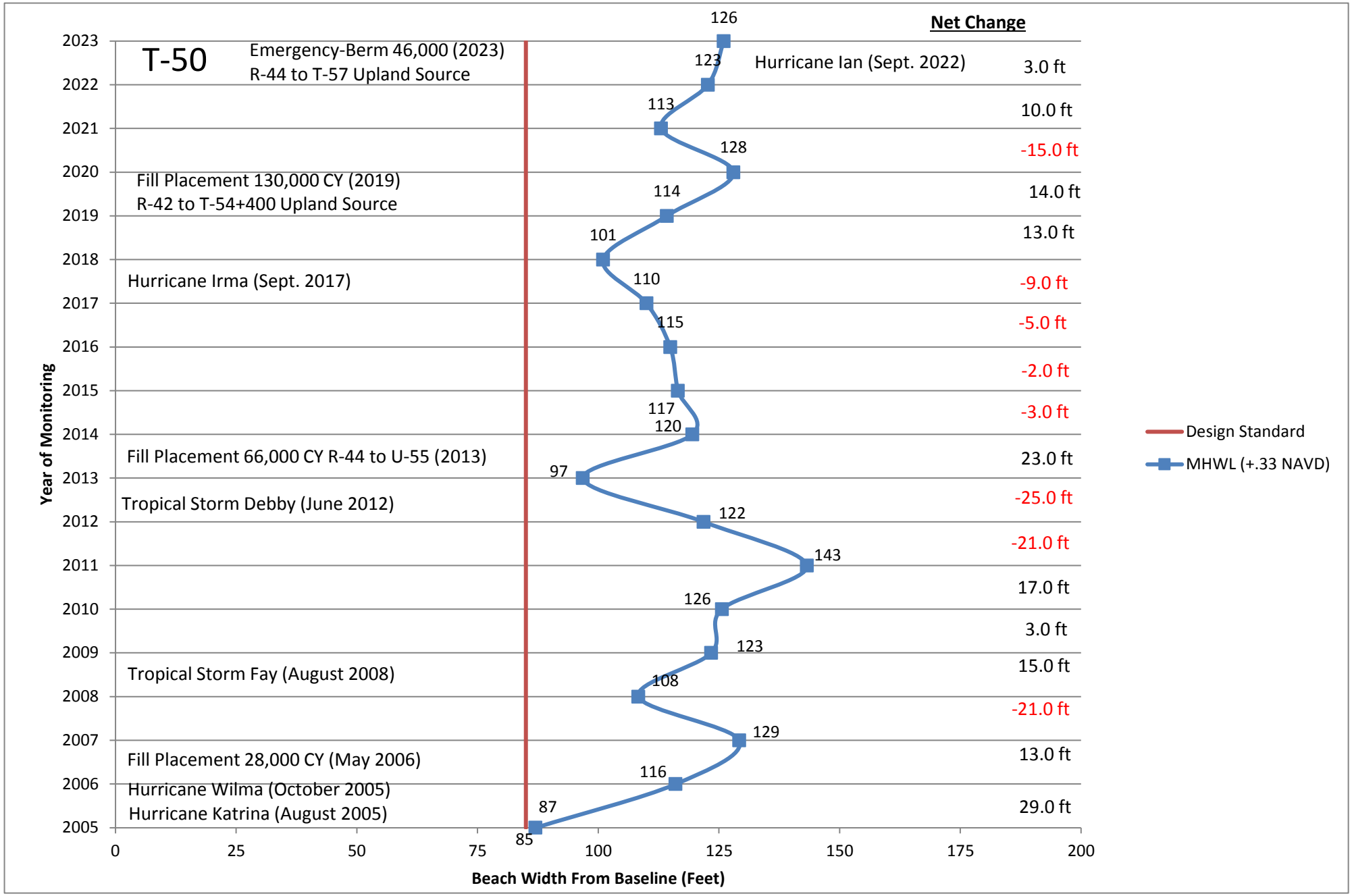
2006	Beginning Width=	99	2015	Beginning Width=	97
	Annual Erosion=	-3		Annual Erosion=	-9
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	96		End Beach Width=	88
2007	Beginning Width=	96	2016	Beginning Width=	88
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	1		Annual Accretion=	2
	End Beach Width=	97		End Beach Width=	90
2008	Beginning Width=	97	2017	Beginning Width=	90
	Annual Erosion=	-7		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	9
	End Beach Width=	90		End Beach Width=	99
2009	Beginning Width=	90	2018	Beginning Width=	99
	Annual Erosion=			Annual Erosion=	-6
	Annual Accretion=	3		Annual Accretion=	
	End Beach Width=	93		End Beach Width=	93
2010	Beginning Width=	93	2019	Beginning Width=	93
	Annual Erosion=			Annual Erosion=	-13
	Annual Accretion=	11		Annual Accretion=	
	End Beach Width=	104		End Beach Width=	80
2011	Beginning Width=	104	2020	Beginning Width=	80
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	2		Annual Accretion=	24
	End Beach Width=	106		End Beach Width=	**104**
2012	Beginning Width=	106	2021	Beginning Width=	104
	Annual Erosion=			Annual Erosion=	-6
	Annual Accretion=	2		Annual Accretion=	
	End Beach Width=	108		End Beach Width=	98
2013	Beginning Width=	108	2022	Beginning Width=	98
	Annual Erosion=	-16		Annual Erosion=	-6
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	92		End Beach Width=	92
2014	Beginning Width=	92	2023	Beginning Width=	92
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	5		Annual Accretion=	20
	End Beach Width=	97		End Beach Width=	112


R-49
Emergency-Berm 46,000 (2023)
R-44 to T-57 Upland Source
Fill Placement 130,000 CY (2019)
R-42 to T-54+400 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 66,000 CY R-44 to U-55 (2013)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 10,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Hurricane Ian (Sept. 2022)
Net Change
20.0 ft
-6.0 ft
-6.0 ft
24.0 ft
-13.0 ft
-6.0 ft
9.0 ft
2.0 ft
-9.0 ft
5.0 ft
-16.0 ft
2.0 ft
2.0 ft
11.0 ft
3.0 ft
-7.0 ft
1.0 ft
-3.0 ft
112
92
98
104
80
93
99
90
88
97
92
108
106
104
93
90
97
96
99
Year of Monitoring
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
0
25
50
75
85
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

T-50

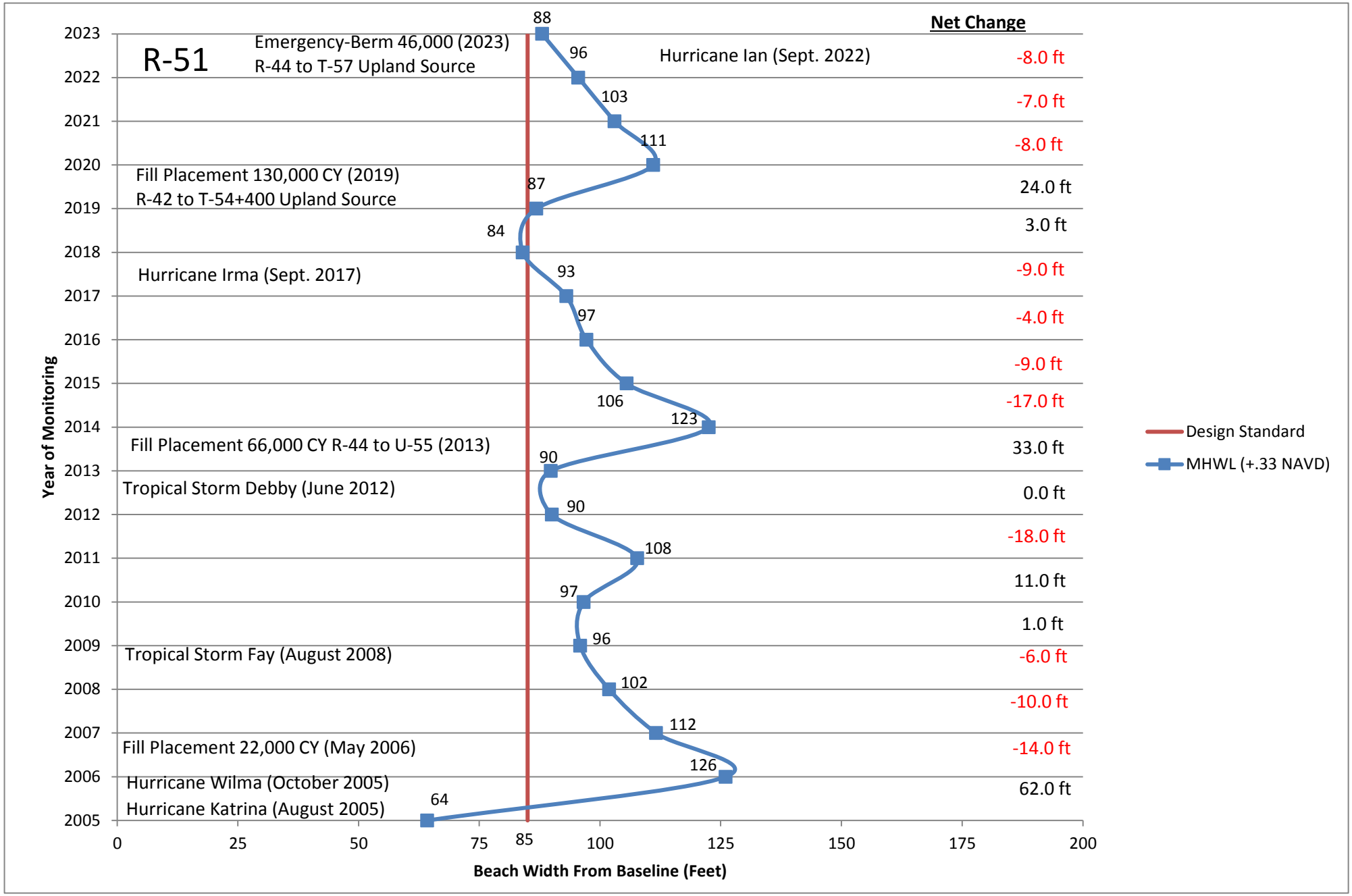
	2005 Beach Width=	87

2006	Beginning Width=	87	2015	Beginning Width=	120
	Annual Erosion=			Annual Erosion=	-3
	Annual Accretion=	29		Annual Accretion=	
	End Beach Width=	116		End Beach Width=	117
2007	Beginning Width=	116	2016	Beginning Width=	117
	Annual Erosion=			Annual Erosion=	-2
	Annual Accretion=	13		Annual Accretion=	
	End Beach Width=	129		End Beach Width=	115
2008	Beginning Width=	129	2017	Beginning Width=	115
	Annual Erosion=	-21		Annual Erosion=	-5
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	108		End Beach Width=	110
2009	Beginning Width=	108	2018	Beginning Width=	110
	Annual Erosion=			Annual Erosion=	-9
	Annual Accretion=	15		Annual Accretion=	
	End Beach Width=	123		End Beach Width=	101
2010	Beginning Width=	123	2019	Beginning Width=	101
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	3		Annual Accretion=	13
	End Beach Width=	126		End Beach Width=	114
2011	Beginning Width=	126	2020	Beginning Width=	114
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	17		Annual Accretion=	14
	End Beach Width=	143		End Beach Width=	128
2012	Beginning Width=	143	2021	Beginning Width=	128
	Annual Erosion=	-21		Annual Erosion=	-15
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	122		End Beach Width=	113
2013	Beginning Width=	122	2022	Beginning Width=	113
	Annual Erosion=	-25		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	10
	End Beach Width=	97		End Beach Width=	123
2014	Beginning Width=	97	2023	Beginning Width=	123
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	23		Annual Accretion=	3
	End Beach Width=	120		End Beach Width=	126


T-50
Emergency-Berm 46,000 (2023)
R-44 to T-57 Upland Source
Fill Placement 130,000 CY (2019)
R-42 to T-54+400 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 66,000 CY R-44 to U-55 (2013)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 28,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Hurricane Ian (Sept. 2022)
Net Change
3.0 ft
10.0 ft
-15.0 ft
14.0 ft
13.0 ft
-9.0 ft
-5.0 ft
-2.0 ft
-3.0 ft
23.0 ft
-25.0 ft
-21.0 ft
17.0 ft
3.0 ft
15.0 ft
-21.0 ft
13.0 ft
29.0 ft
126
123
113
128
114
101
110
115
117
120
97
122
143
126
123
108
129
116
87
85
Year of Monitoring
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-51

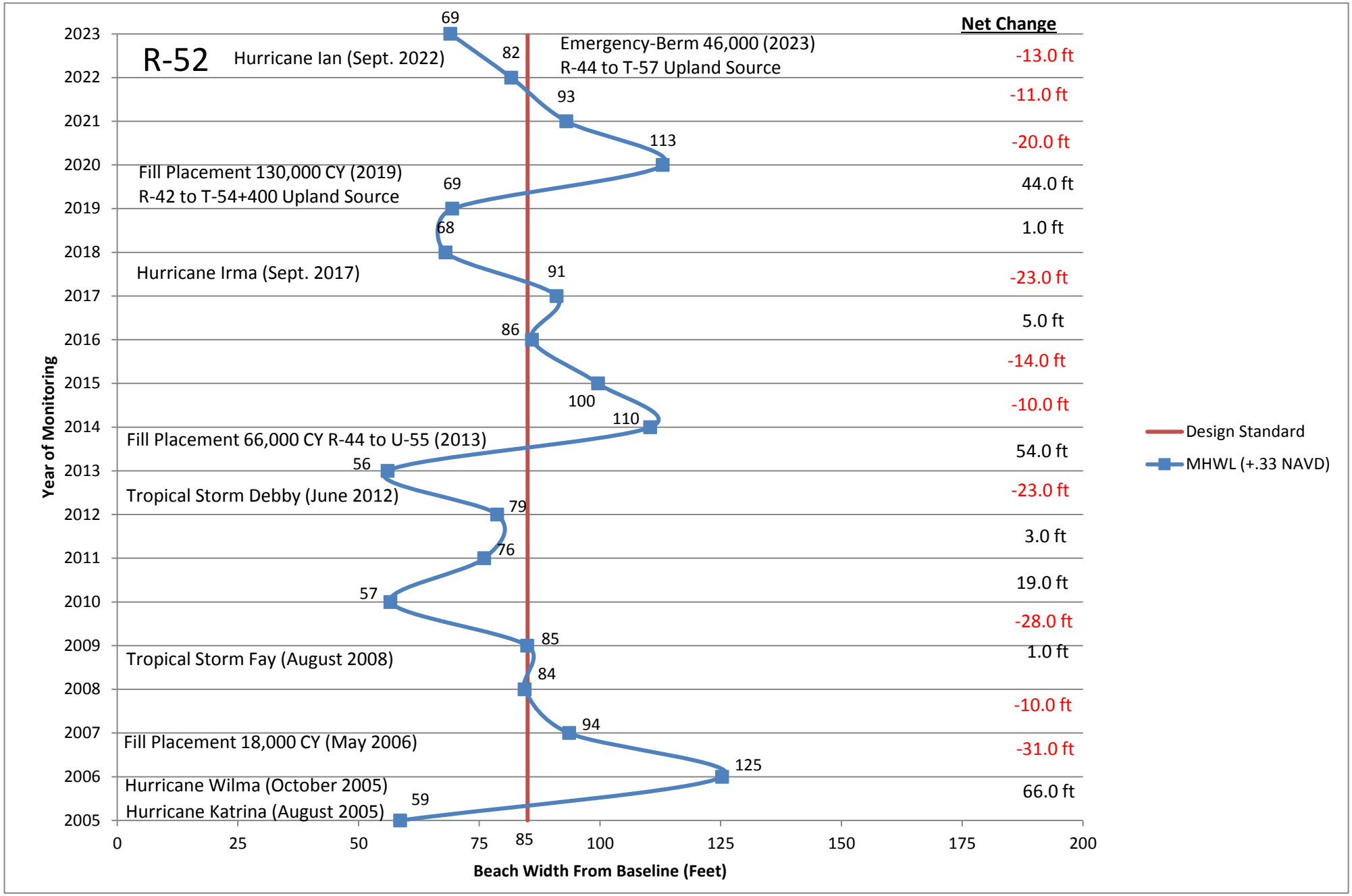
	2005 Beach Width=	64			
2006	Beginning Width=	64	2015	Beginning Width=	123
	Annual Erosion=			Annual Erosion=	-17
	Annual Accretion=	62		Annual Accretion=	
	End Beach Width=	126		End Beach Width=	106
2007	Beginning Width=	126	2016	Beginning Width=	106
	Annual Erosion=	-14		Annual Erosion=	-9
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	112		End Beach Width=	97
2008	Beginning Width=	112	2017	Beginning Width=	97
	Annual Erosion=	-10		Annual Erosion=	-4
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	102		End Beach Width=	93
2009	Beginning Width=	102	2018	Beginning Width=	93
	Annual Erosion=	-6		Annual Erosion=	-9
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	96		End Beach Width=	84
2010	Beginning Width=	96	2019	Beginning Width=	84
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	1		Annual Accretion=	3
	End Beach Width=	97		End Beach Width=	87
2011	Beginning Width=	97	2020	Beginning Width=	87
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	11		Annual Accretion=	24
	End Beach Width=	108		End Beach Width=	111
2012	Beginning Width=	108	2021	Beginning Width=	111
	Annual Erosion=			Annual Erosion=	-8
	Annual Accretion=	-18		Annual Accretion=	
	End Beach Width=	90		End Beach Width=	103
2013	Beginning Width=	90	2022	Beginning Width=	103
	Annual Erosion=			Annual Erosion=	-7
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	90		End Beach Width=	96
2014	Beginning Width=	90	2023	Beginning Width=	96
	Annual Erosion=			Annual Erosion=	-8
	Annual Accretion=	33		Annual Accretion=	
	End Beach Width=	123		End Beach Width=	88


R-51
Emergency-Berm 46,000 (2023)
R-44 to T-57 Upland Source
Hurricane Ian (Sept. 2022)
Fill Placement 130,000 CY (2019)
R-42 to T-54+400 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 66,000 CY R-44 to U-55 (2013)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 22,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
-8.0 ft
-7.0 ft
-8.0 ft
24.0 ft
3.0 ft
-9.0 ft
-4.0 ft
-9.0 ft
-17.0 ft
33.0 ft
0.0 ft
-18.0 ft
11.0 ft
1.0 ft
-6.0 ft
-10.0 ft
-14.0 ft
62.0 ft
88
96
103
111
87
84
93
97
106
123
90
90
108
97
96
102
112
126
64
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
85
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-52

2005 Beach Width=	59	

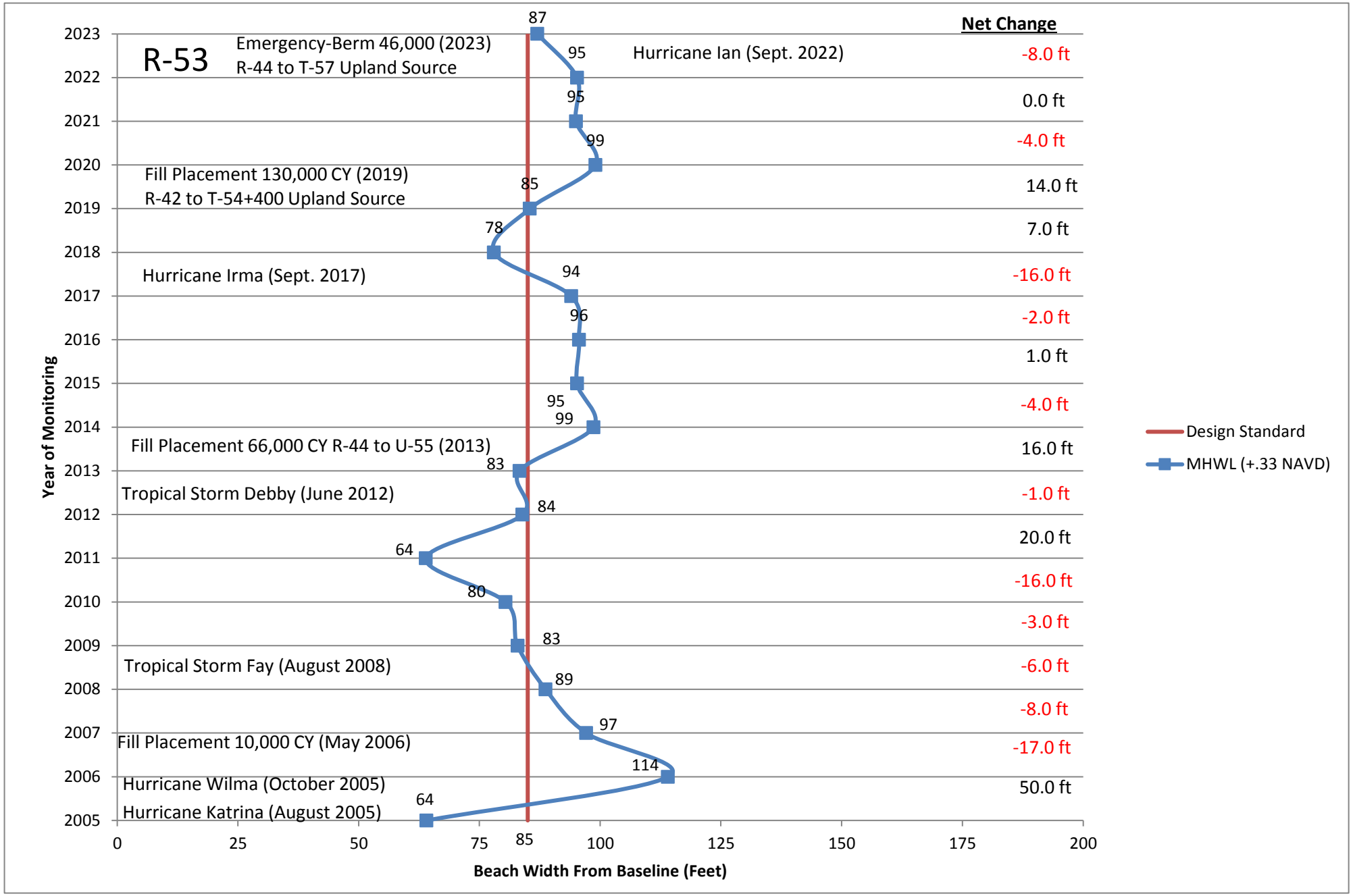
2006	Beginning Width=	59	2015	Beginning Width=	0
	Annual Erosion=			Annual Erosion=	-10
	Annual Accretion=	66		Annual Accretion=	
	End Beach Width=	125		End Beach Width=	-10
2007	Beginning Width=	125	2016	Beginning Width=	-10
	Annual Erosion=	-31		Annual Erosion=	-14
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	94		End Beach Width=	-24
2008	Beginning Width=	94	2017	Beginning Width=	-24
	Annual Erosion=	-10		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	5
	End Beach Width=	84		End Beach Width=	91
2009	Beginning Width=	84	2018	Beginning Width=	91
	Annual Erosion=			Annual Erosion=	-23
	Annual Accretion=	1		Annual Accretion=	
	End Beach Width=	85		End Beach Width=	68
2010	Beginning Width=	85	2019	Beginning Width=	68
	Annual Erosion=	-28		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	1
	End Beach Width=	57		End Beach Width=	69
2011	Beginning Width=	57	2020	Beginning Width=	69
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	19		Annual Accretion=	44
	End Beach Width=	76		End Beach Width=	113
2012	Beginning Width=	76	2021	Beginning Width=	113
	Annual Erosion=			Annual Erosion=	-20
	Annual Accretion=	3		Annual Accretion=	
	End Beach Width=	79		End Beach Width=	93
2013	Beginning Width=	79	2022	Beginning Width=	93
	Annual Erosion=	-23		Annual Erosion=	-11
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	56		End Beach Width=	82
2014	Beginning Width=	56	2023	Beginning Width=	82
	Annual Erosion=			Annual Erosion=	-13
	Annual Accretion=	54		Annual Accretion=	
	End Beach Width=	110		End Beach Width=	69


R-52
Hurricane Ian (Sept. 2022)
Emergency-Berm 46,000 (2023)
R-44 to T-57 Upland Source
Fill Placement 130,000 CY (2019)
R-42 to T-54+400 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 66,000 CY R-44 to U-55 (2013)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 18,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
-13.0 ft
-11.0 ft
-20.0 ft
44.0 ft
1.0 ft
-23.0 ft
5.0 ft
-14.0 ft
-10.0 ft
54.0 ft
-23.0 ft
3.0 ft
19.0 ft
-28.0 ft
1.0 ft
-10.0 ft
-31.0 ft
66.0 ft
69
82
93
113
69
68
91
86
100
110
56
79
76
57
85
84
94
125
59
Year of Monitoring
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
0
25
50
75
85
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-53

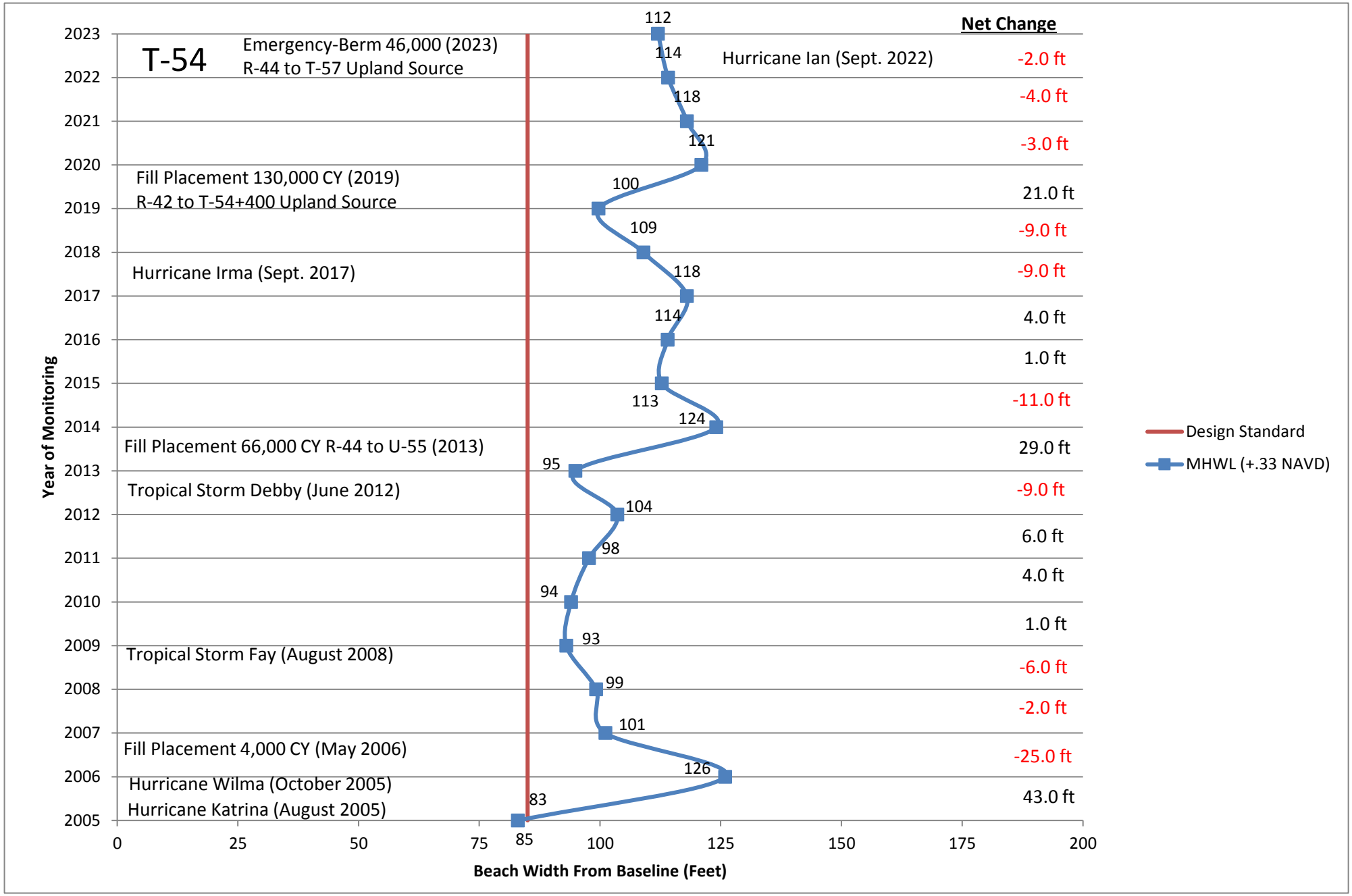
	2005 Beach Width=	64

2006	Beginning Width=	64	2015	Beginning Width=	99
	Annual Erosion=			Annual Erosion=	-4
	Annual Accretion=	50		Annual Accretion=	
	End Beach Width=	114		End Beach Width=	95
2007	Beginning Width=	114	2016	Beginning Width=	95
	Annual Erosion=	-17		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	1
	End Beach Width=	97		End Beach Width=	96
2008	Beginning Width=	97	2017	Beginning Width=	96
	Annual Erosion=	-8		Annual Erosion=	-2
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	89		End Beach Width=	94
2009	Beginning Width=	89	2018	Beginning Width=	94
	Annual Erosion=	-6		Annual Erosion=	-16
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	83		End Beach Width=	78
2010	Beginning Width=	83	2019	Beginning Width=	78
	Annual Erosion=	-3		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	7
	End Beach Width=	80		End Beach Width=	85
2011	Beginning Width=	80	2020	Beginning Width=	85
	Annual Erosion=	-16		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	14
	End Beach Width=	64		End Beach Width=	99
2012	Beginning Width=	64	2021	Beginning Width=	99
	Annual Erosion=			Annual Erosion=	-4
	Annual Accretion=	20		Annual Accretion=	
	End Beach Width=	84		End Beach Width=	95
2013	Beginning Width=	84	2022	Beginning Width=	95
	Annual Erosion=	-1		Annual Erosion=	0
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	83		End Beach Width=	95
2014	Beginning Width=	83	2023	Beginning Width=	95
	Annual Erosion=			Annual Erosion=	-8
	Annual Accretion=	16		Annual Accretion=	
	End Beach Width=	99		End Beach Width=	87


R-53
Emergency-Berm 46,000 (2023)
R-44 to T-57 Upland Source
Hurricane Ian (Sept. 2022)
Fill Placement 130,000 CY (2019)
R-42 to T-54+400 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 66,000 CY R-44 to U-55 (2013)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 10,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
-8.0 ft
0.0 ft
-4.0 ft
14.0 ft
7.0 ft
-16.0 ft
-2.0 ft
1.0 ft
-4.0 ft
16.0 ft
-1.0 ft
20.0 ft
-16.0 ft
-3.0 ft
-6.0 ft
-8.0 ft
-17.0 ft
50.0 ft
87
95
95
99
85
78
94
96
95
99
83
84
64
80
83
89
97
114
64
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
85
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

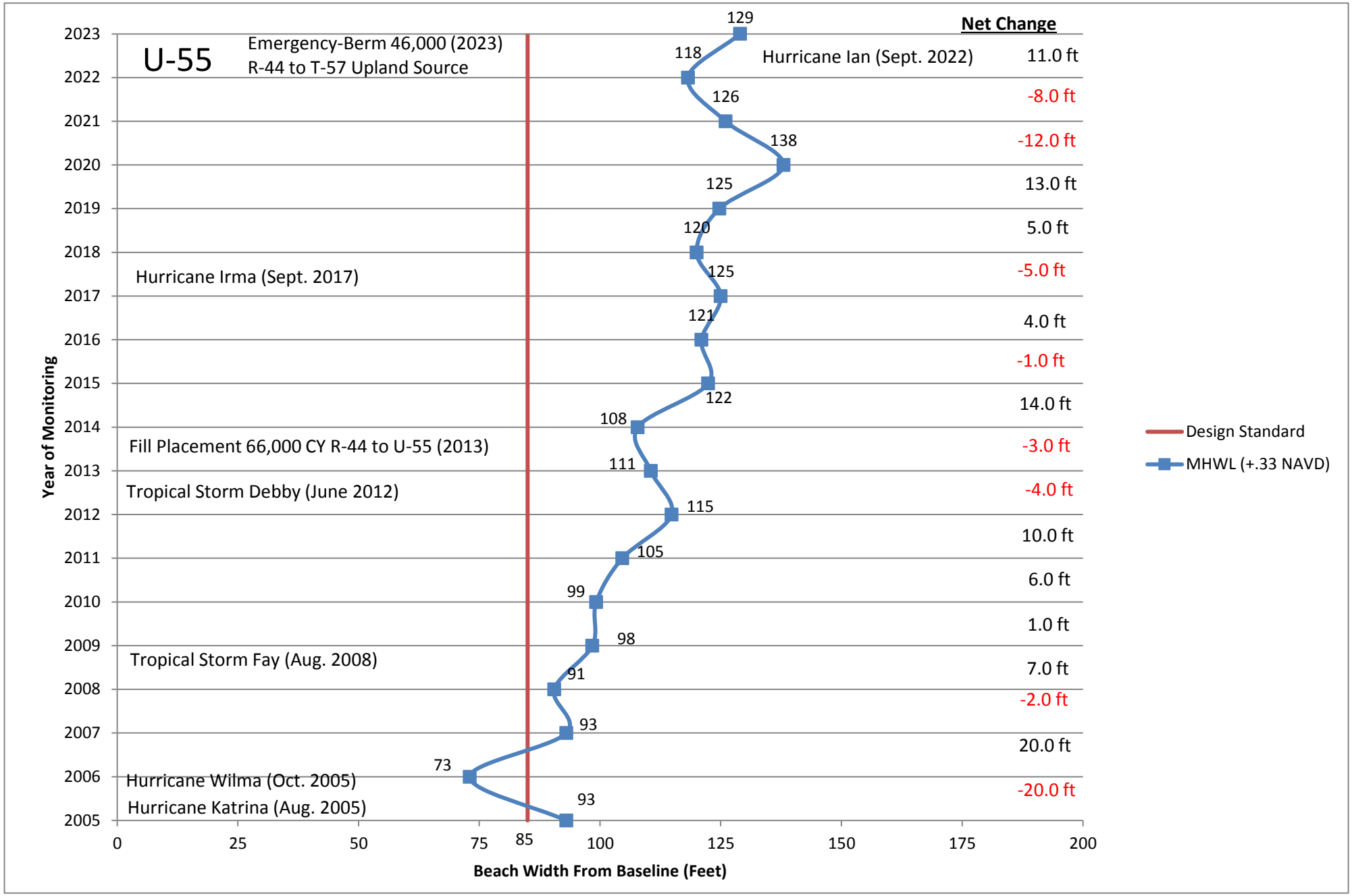
T-54

	2005 Beach Width=	83			
2006	Beginning Width=	83	2015	Beginning Width=	124
	Annual Erosion=			Annual Erosion=	-11
	Annual Accretion=	43		Annual Accretion=	
	End Beach Width=	126		End Beach Width=	113
2007	Beginning Width=	126	2016	Beginning Width=	113
	Annual Erosion=	-25		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	1
	End Beach Width=	101		End Beach Width=	114
2008	Beginning Width=	101	2017	Beginning Width=	114
	Annual Erosion=	-2		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	4
	End Beach Width=	99		End Beach Width=	118
2009	Beginning Width=	99	2018	Beginning Width=	118
	Annual Erosion=	-6		Annual Erosion=	-9
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	93		End Beach Width=	109
2010	Beginning Width=	93	2019	Beginning Width=	109
	Annual Erosion=			Annual Erosion=	-9
	Annual Accretion=	1		Annual Accretion=	
	End Beach Width=	94		End Beach Width=	100
2011	Beginning Width=	94	2020	Beginning Width=	100
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	4		Annual Accretion=	21
	End Beach Width=	98		End Beach Width=	121
2012	Beginning Width=	98	2021	Beginning Width=	121
	Annual Erosion=			Annual Erosion=	-3
	Annual Accretion=	6		Annual Accretion=	
	End Beach Width=	104		End Beach Width=	118
2013	Beginning Width=	104	2022	Beginning Width=	118
	Annual Erosion=	-9		Annual Erosion=	-4
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	95		End Beach Width=	114
2014	Beginning Width=	95	2023	Beginning Width=	114
	Annual Erosion=			Annual Erosion=	-2
	Annual Accretion=	29		Annual Accretion=	
	End Beach Width=	124		End Beach Width=	112


T-54
Emergency-Berm 46,000 (2023)
R-44 to T-57 Upland Source
Fill Placement 130,000 CY (2019)
R-42 to T-54+400 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 66,000 CY R-44 to U-55 (2013)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 4,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Hurricane Ian (Sept. 2022)
Net Change
-2.0 ft
-4.0 ft
-3.0 ft
21.0 ft
-9.0 ft
-9.0 ft
4.0 ft
1.0 ft
-11.0 ft
29.0 ft
-9.0 ft
6.0 ft
4.0 ft
1.0 ft
-6.0 ft
-2.0 ft
-25.0 ft
43.0 ft
112
114
118
121
100
109
118
114
113
124
95
104
98
94
93
99
101
126
83
Year of Monitoring
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
0
25
50
75
85
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

U-55

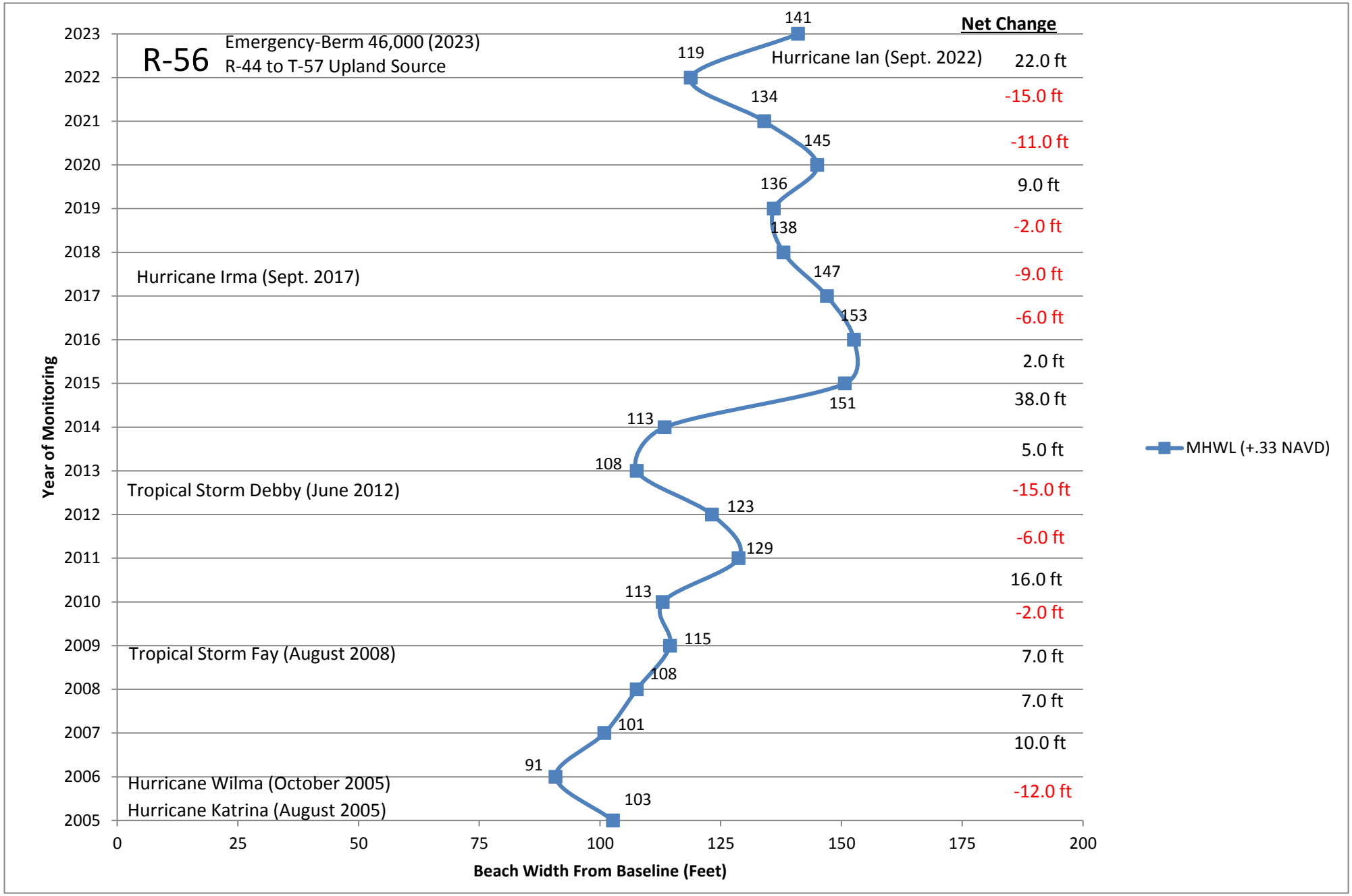
	2005 Beach Width=	93			
2006	Beginning Width=	93	2015	Beginning Width=	108
	Annual Erosion=	-20		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	14
	End Beach Width=	73		End Beach Width=	122
2007	Beginning Width=	73	2016	Beginning Width=	122
	Annual Erosion=			Annual Erosion=	-1
	Annual Accretion=	20		Annual Accretion=	
	End Beach Width=	93		End Beach Width=	121
2008	Beginning Width=	93	2017	Beginning Width=	121
	Annual Erosion=	-2		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	4
	End Beach Width=	91		End Beach Width=	125
2009	Beginning Width=	91	2018	Beginning Width=	125
	Annual Erosion=			Annual Erosion=	-5
	Annual Accretion=	7		Annual Accretion=	
	End Beach Width=	98		End Beach Width=	120
2010	Beginning Width=	98	2019	Beginning Width=	120
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	1		Annual Accretion=	5
	End Beach Width=	99		End Beach Width=	125
2011	Beginning Width=	99	2020	Beginning Width=	125
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	6		Annual Accretion=	13
	End Beach Width=	105		End Beach Width=	138
2012	Beginning Width=	105	2021	Beginning Width=	138
	Annual Erosion=			Annual Erosion=	-12
	Annual Accretion=	10		Annual Accretion=	
	End Beach Width=	115		End Beach Width=	126
2013	Beginning Width=	115	2022	Beginning Width=	126
	Annual Erosion=	-4		Annual Erosion=	-8
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	111		End Beach Width=	118
2014	Beginning Width=	111	2023	Beginning Width=	118
	Annual Erosion=	-3		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	11
	End Beach Width=	108		End Beach Width=	129


U-55
Emergency-Berm 46,000 (2023)
R-44 to T-57 Upland Source
Hurricane Ian (Sept. 2022)
Hurricane Irma (Sept. 2017)
Fill Placement 66,000 CY R-44 to U-55 (2013)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (Aug. 2008)
Hurricane Wilma (Oct. 2005)
Hurricane Katrina (Aug. 2005)
Net Change
11.0 ft
-8.0 ft
-12.0 ft
13.0 ft
5.0 ft
-5.0 ft
4.0 ft
-1.0 ft
14.0 ft
-3.0 ft
-4.0 ft
10.0 ft
6.0 ft
1.0 ft
7.0 ft
-2.0 ft
20.0 ft
-20.0 ft
129
118
126
138
125
120
125
121
122
108
111
115
105
99
98
91
93
73
93
85
Year of Monitoring
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-56

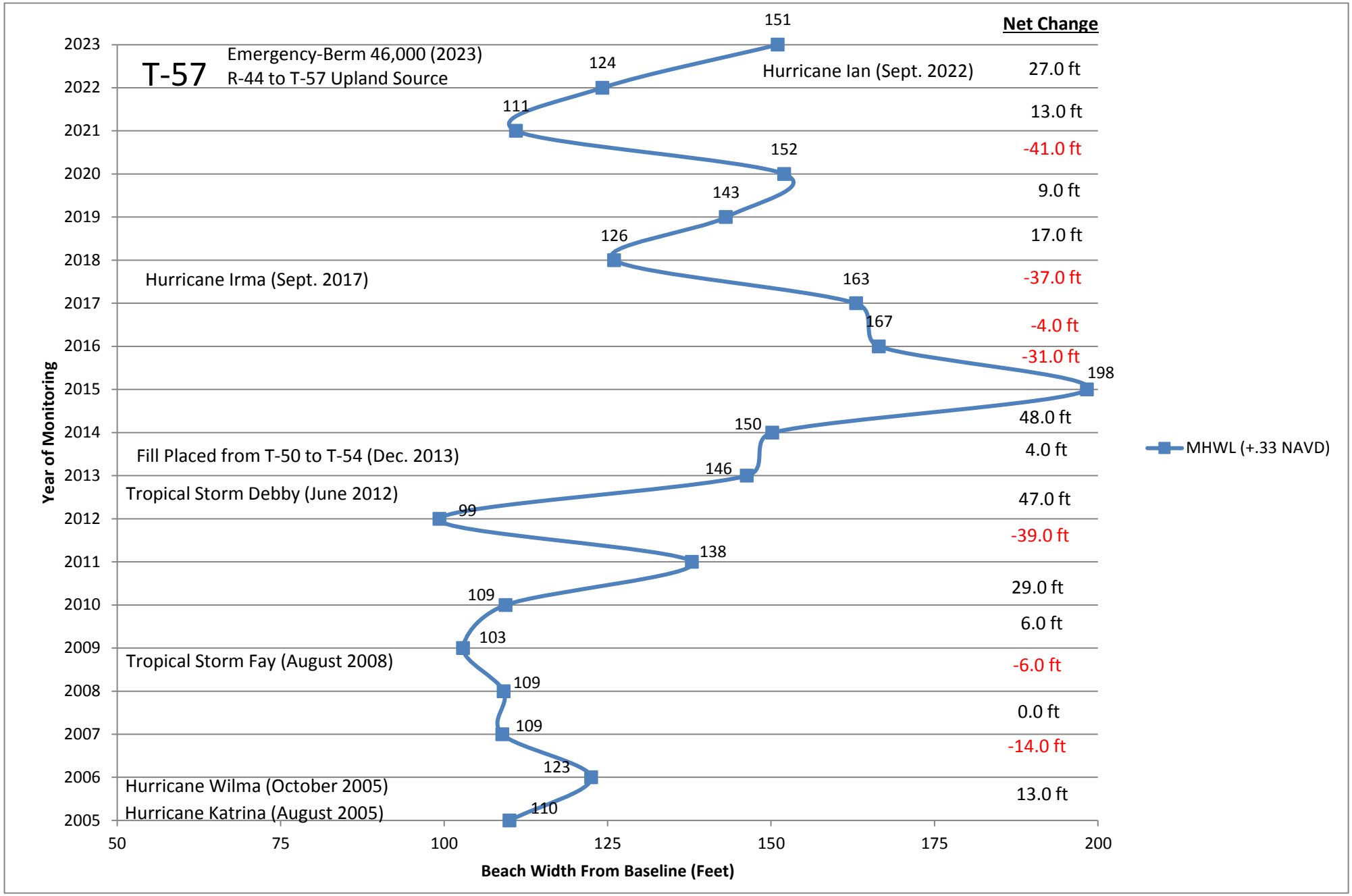
2005 Beach Width=	103	

2006	Beginning Width=	103	2015	Beginning Width=	113
	Annual Erosion=	-12		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	38
	End Beach Width=	91		End Beach Width=	151
2007	Beginning Width=	91	2016	Beginning Width=	151
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	10		Annual Accretion=	2
	End Beach Width=	101		End Beach Width=	153
2008	Beginning Width=	101	2017	Beginning Width=	153
	Annual Erosion=			Annual Erosion=	-6
	Annual Accretion=	7		Annual Accretion=	
	End Beach Width=	108		End Beach Width=	147
2009	Beginning Width=	108	2018	Beginning Width=	147
	Annual Erosion=			Annual Erosion=	-9
	Annual Accretion=	7		Annual Accretion=	
	End Beach Width=	115		End Beach Width=	138
2010	Beginning Width=	115	2019	Beginning Width=	138
	Annual Erosion=	-2		Annual Erosion=	-2
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	113		End Beach Width=	136
2011	Beginning Width=	113	2020	Beginning Width=	136
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	16		Annual Accretion=	9
	End Beach Width=	129		End Beach Width=	145
2012	Beginning Width=	129	2021	Beginning Width=	145
	Annual Erosion=	-6		Annual Erosion=	-11
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	123		End Beach Width=	134
2013	Beginning Width=	123	2022	Beginning Width=	134
	Annual Erosion=	-15		Annual Erosion=	-15
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	108		End Beach Width=	119
2014	Beginning Width=	108	2023	Beginning Width=	119
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	5		Annual Accretion=	22
	End Beach Width=	113		End Beach Width=	141


R-56
Emergency-Berm 46,000 (2023)
R-44 to T-57 Upland Source
Net Change
Hurricane Ian (Sept. 2022)
Hurricane Irma (Sept. 2017)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
141
119
134
145
136
138
147
153
151
113
108
123
129
113
115
108
101
91
103
22.0 ft
-15.0 ft
-11.0 ft
9.0 ft
-2.0 ft
-9.0 ft
-6.0 ft
2.0 ft
38.0 ft
5.0 ft
-15.0 ft
-6.0 ft
16.0 ft
-2.0 ft
7.0 ft
7.0 ft
10.0 ft
-12.0 ft
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
MHWL (+.33 NAVD)

T-57

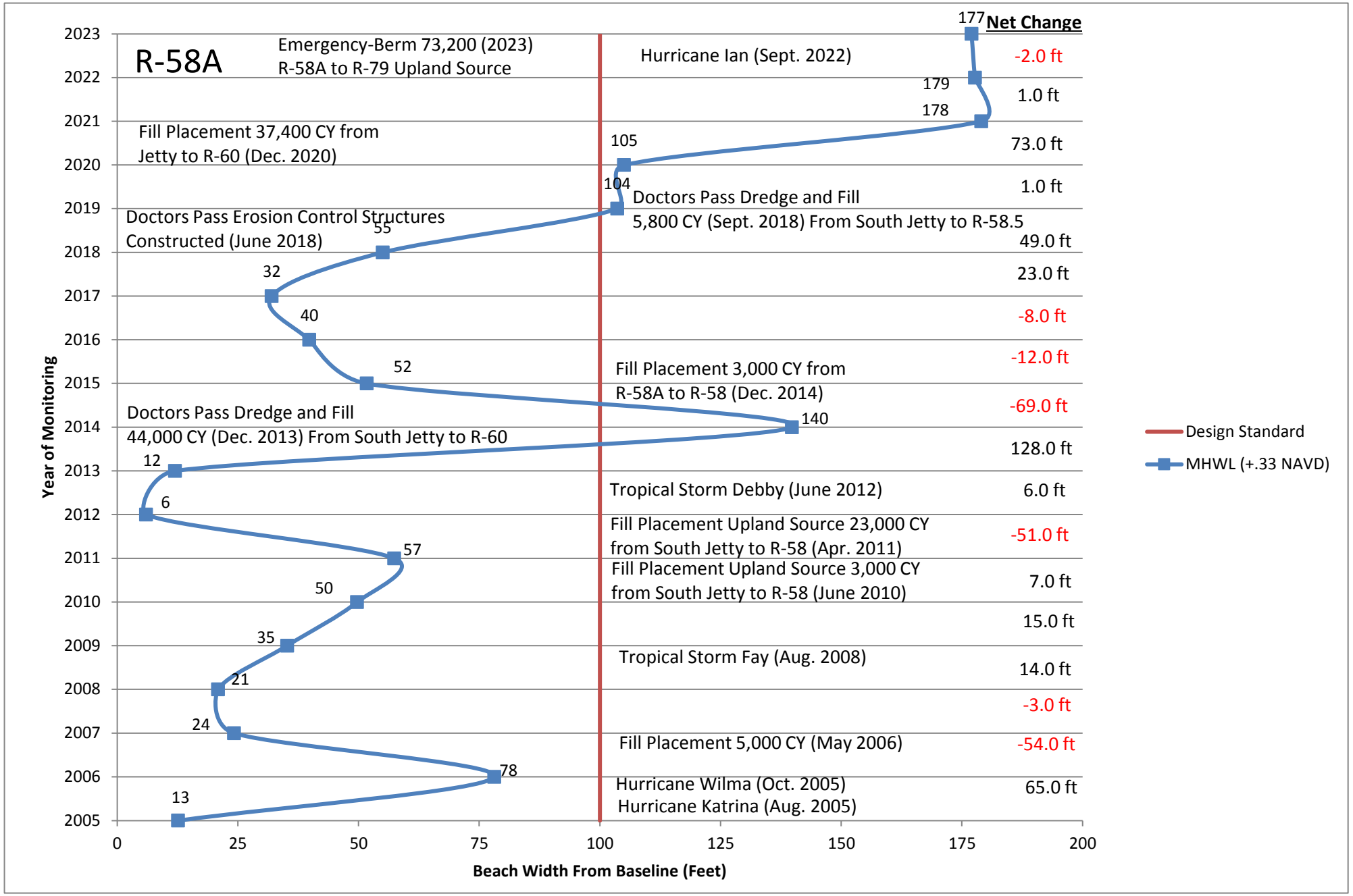
	2005 Beach Width=	110
2006	Beginning Width=	110
	Annual Erosion=	
	Annual Accretion=	13
	End Beach Width=	123
2007	Beginning Width=	123
	Annual Erosion=	-14
	Annual Accretion=	
	End Beach Width=	109
2008	Beginning Width=	109
	Annual Erosion=	
	Annual Accretion=	
	End Beach Width=	109
2009	Beginning Width=	109
	Annual Erosion=	-6
	Annual Accretion=	
	End Beach Width=	103
2010	Beginning Width=	103
	Annual Erosion=	
	Annual Accretion=	6
	End Beach Width=	109
2011	Beginning Width=	109
	Annual Erosion=	
	Annual Accretion=	29
	End Beach Width=	138
2012	Beginning Width=	138
	Annual Erosion=	-39
	Annual Accretion=	
	End Beach Width=	99
2013	Beginning Width=	99
	Annual Erosion=	
	Annual Accretion=	47
	End Beach Width=	146
2014	Beginning Width=	146
	Annual Erosion=	
	Annual Accretion=	4
	End Beach Width=	150
2015	Beginning Width=	150
	Annual Erosion=	
	Annual Accretion=	48
	End Beach Width=	198
2016	Beginning Width=	198
	Annual Erosion=	-31
	Annual Accretion=	
	End Beach Width=	167
2017	Beginning Width=	167
	Annual Erosion=	-4
	Annual Accretion=	
	End Beach Width=	163
2018	Beginning Width=	163
	Annual Erosion=	-37
	Annual Accretion=	
	End Beach Width=	126
2019	Beginning Width=	126
	Annual Erosion=	
	Annual Accretion=	17
	End Beach Width=	143
2020	Beginning Width=	143
	Annual Erosion=	
	Annual Accretion=	9
	End Beach Width=	152
2021	Beginning Width=	152
	Annual Erosion=	-41
	Annual Accretion=	
	End Beach Width=	111
2022	Beginning Width=	111
	Annual Erosion=	
	Annual Accretion=	13
	End Beach Width=	124
2023	Beginning Width=	124
	Annual Erosion=	
	Annual Accretion=	27
	End Beach Width=	151


T-57
Emergency-Berm 46,000 (2023)
R-44 to T-57 Upland Source
Hurricane Ian (Sept. 2022)
Hurricane Irma (Sept. 2017)
Fill Placed from T-50 to T-54 (Dec. 2013)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
27.0 ft
13.0 ft
-41.0 ft
9.0 ft
17.0 ft
-37.0 ft
-4.0 ft
-31.0 ft
48.0 ft
4.0 ft
47.0 ft
-39.0 ft
29.0 ft
6.0 ft
-6.0 ft
0.0 ft
-14.0 ft
13.0 ft
151
124
111
152
143
126
163
167
198
150
146
99
138
109
103
109
109
123
110
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
MHWL (+.33 NAVD)

R-58A

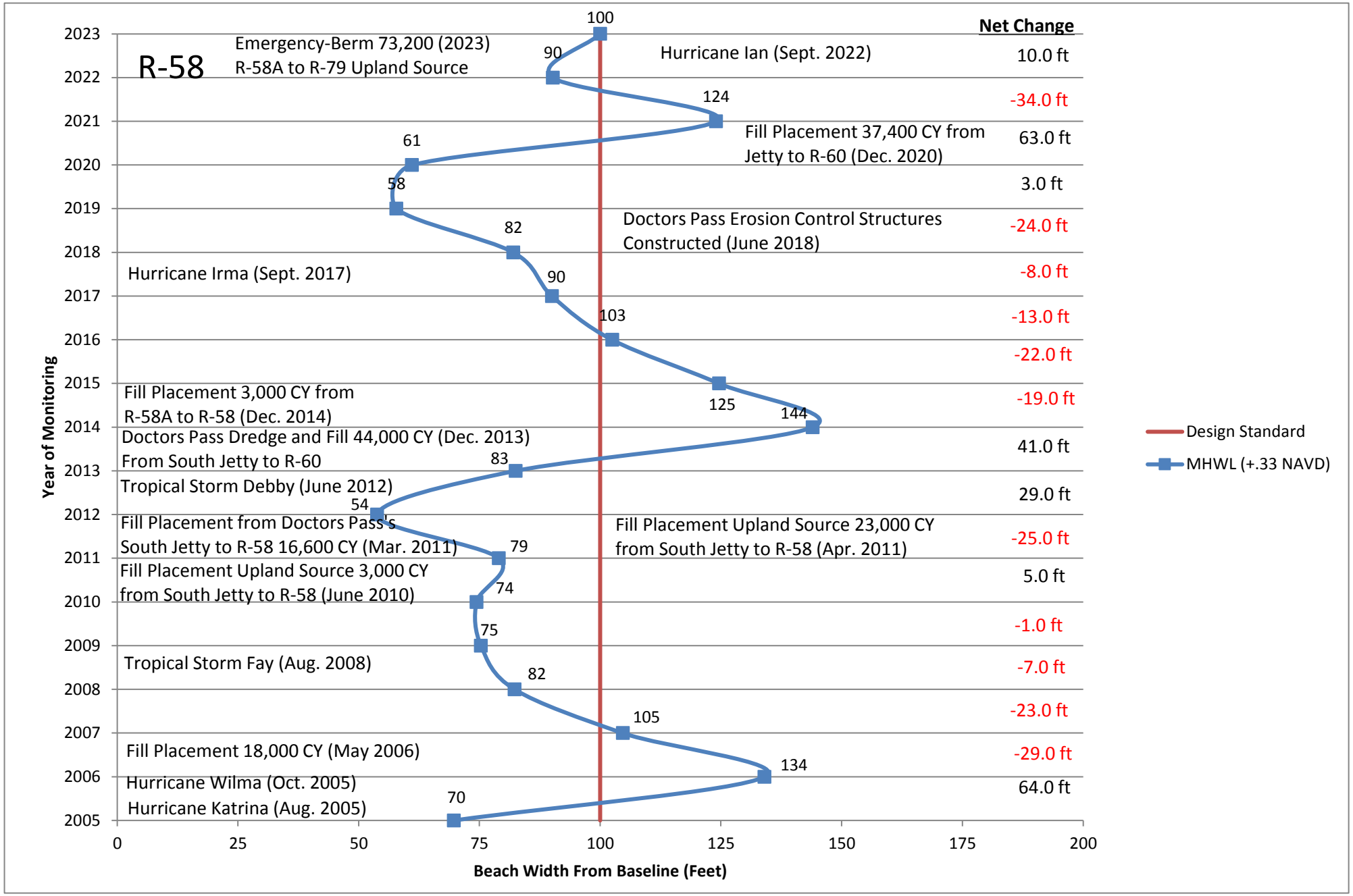
	2005 Beach Width=	13

2006	Beginning Width=	13	2015	Beginning Width=	140
	Annual Erosion=			Annual Erosion=	-88
	Annual Accretion=	65		Annual Accretion=	
	End Beach Width=	78		End Beach Width=	52
2007	Beginning Width=	78	2016	Beginning Width=	52
	Annual Erosion=	-54		Annual Erosion=	-12
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	24		End Beach Width=	40
2008	Beginning Width=	24	2017	Beginning Width=	40
	Annual Erosion=	-3		Annual Erosion=	-8
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	21		End Beach Width=	32
2009	Beginning Width=	21	2018	Beginning Width=	32
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	14		Annual Accretion=	23
	End Beach Width=	35		End Beach Width=	55
2010	Beginning Width=	35	2019	Beginning Width=	55
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	15		Annual Accretion=	49
	End Beach Width=	50		End Beach Width=	104
2011	Beginning Width=	50	2020	Beginning Width=	104
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	7		Annual Accretion=	1
	End Beach Width=	57		End Beach Width=	105
2012	Beginning Width=	57	2021	Beginning Width=	105
	Annual Erosion=	-51		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	73
	End Beach Width=	6		End Beach Width=	178
2013	Beginning Width=	6	2022	Beginning Width=	178
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	6		Annual Accretion=	1
	End Beach Width=	12		End Beach Width=	179
2014	Beginning Width=	12	2023	Beginning Width=	179
	Annual Erosion=			Annual Erosion=	-2
	Annual Accretion=	128		Annual Accretion=	
	End Beach Width=	140		End Beach Width=	177


R-58A
Emergency-Berm 73,200 (2023)
R-58A to R-79 Upland Source
Hurricane Ian (Sept. 2022)
Fill Placement 37,400 CY from
Jetty to R-60 (Dec. 2020)
Doctors Pass Erosion Control Structures
Constructed (June 2018)
Doctors Pass Dredge and Fill
5,800 CY (Sept. 2018) From South Jetty to R-58.5
Fill Placement 3,000 CY from
R-58A to R-58 (Dec. 2014)
Doctors Pass Dredge and Fill
44,000 CY (Dec. 2013) From South Jetty to R-60
Tropical Storm Debby (June 2012)
Fill Placement Upland Source 23,000 CY
from South Jetty to R-58 (Apr. 2011)
Fill Placement Upland Source 3,000 CY
from South Jetty to R-58 (June 2010)
Tropical Storm Fay (Aug. 2008)
Fill Placement 5,000 CY (May 2006)
Hurricane Wilma (Oct. 2005)
Hurricane Katrina (Aug. 2005)
Net Change
-2.0 ft
1.0 ft
73.0 ft
1.0 ft
49.0 ft
23.0 ft
-8.0 ft
-12.0 ft
-69.0 ft
128.0 ft
6.0 ft
-51.0 ft
7.0 ft
15.0 ft
14.0 ft
-3.0 ft
-54.0 ft
65.0 ft
177
179
178
105
104
55
32
40
52
140
12
6
57
50
35
21
24
78
13
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

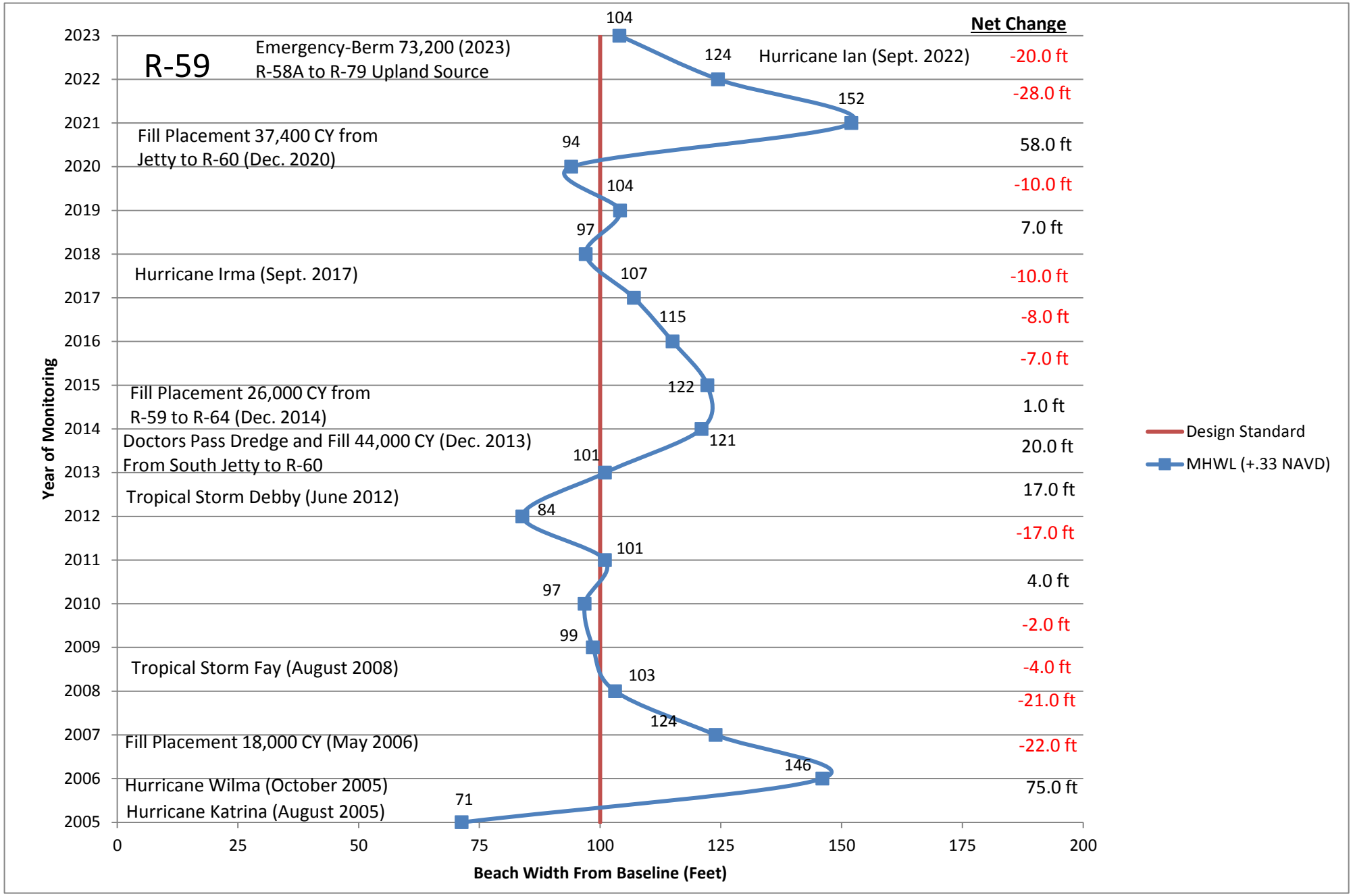
R-58

	2005 Beach Width=	70			
2006	Beginning Width=	70	2015	Beginning Width=	124
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	64		Annual Accretion=	1
	End Beach Width=	134		End Beach Width=	125
2007	Beginning Width=	134	2016	Beginning Width=	125
	Annual Erosion=	-29		Annual Erosion=	-22
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	105		End Beach Width=	103
2008	Beginning Width=	105	2017	Beginning Width=	103
	Annual Erosion=	-23		Annual Erosion=	-13
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	82		End Beach Width=	90
2009	Beginning Width=	82	2018	Beginning Width=	90
	Annual Erosion=	-7		Annual Erosion=	-8
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	75		End Beach Width=	82
2010	Beginning Width=	75	2019	Beginning Width=	82
	Annual Erosion=	-1		Annual Erosion=	-24
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	74		End Beach Width=	58
2011	Beginning Width=	74	2020	Beginning Width=	58
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	5		Annual Accretion=	3
	End Beach Width=	79		End Beach Width=	61
2012	Beginning Width=	79	2021	Beginning Width=	61
	Annual Erosion=	-25		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	63
	End Beach Width=	54		End Beach Width=	124
2013	Beginning Width=	54	2022	Beginning Width=	124
	Annual Erosion=			Annual Erosion=	-34
	Annual Accretion=	29		Annual Accretion=	
	End Beach Width=	83		End Beach Width=	90
2014	Beginning Width=	83	2023	Beginning Width=	90
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	41		Annual Accretion=	10
	End Beach Width=	124		End Beach Width=	100


R-58
Emergency-Berm 73,200 (2023)
R-58A to R-79 Upland Source
Hurricane Ian (Sept. 2022)
Fill Placement 37,400 CY from
Jetty to R-60 (Dec. 2020)
Doctors Pass Erosion Control Structures
Constructed (June 2018)
Hurricane Irma (Sept. 2017)
Fill Placement 3,000 CY from
R-58A to R-58 (Dec. 2014)
Doctors Pass Dredge and Fill 44,000 CY (Dec. 2013)
From South Jetty to R-60
Tropical Storm Debby (June 2012)
Fill Placement from Doctors Pass's
South Jetty to R-58 16,600 CY (Mar. 2011)
Fill Placement Upland Source 23,000 CY
from South Jetty to R-58 (Apr. 2011)
Fill Placement Upland Source 3,000 CY
from South Jetty to R-58 (June 2010)
Tropical Storm Fay (Aug. 2008)
Fill Placement 18,000 CY (May 2006)
Hurricane Wilma (Oct. 2005)
Hurricane Katrina (Aug. 2005)
Net Change
10.0 ft
-34.0 ft
63.0 ft
3.0 ft
-24.0 ft
-8.0 ft
-13.0 ft
-22.0 ft
-19.0 ft
41.0 ft
29.0 ft
-25.0 ft
5.0 ft
-1.0 ft
-7.0 ft
-23.0 ft
-29.0 ft
64.0 ft
100
90
124
61
58
82
90
103
125
144
83
54
79
74
75
82
105
134
70
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

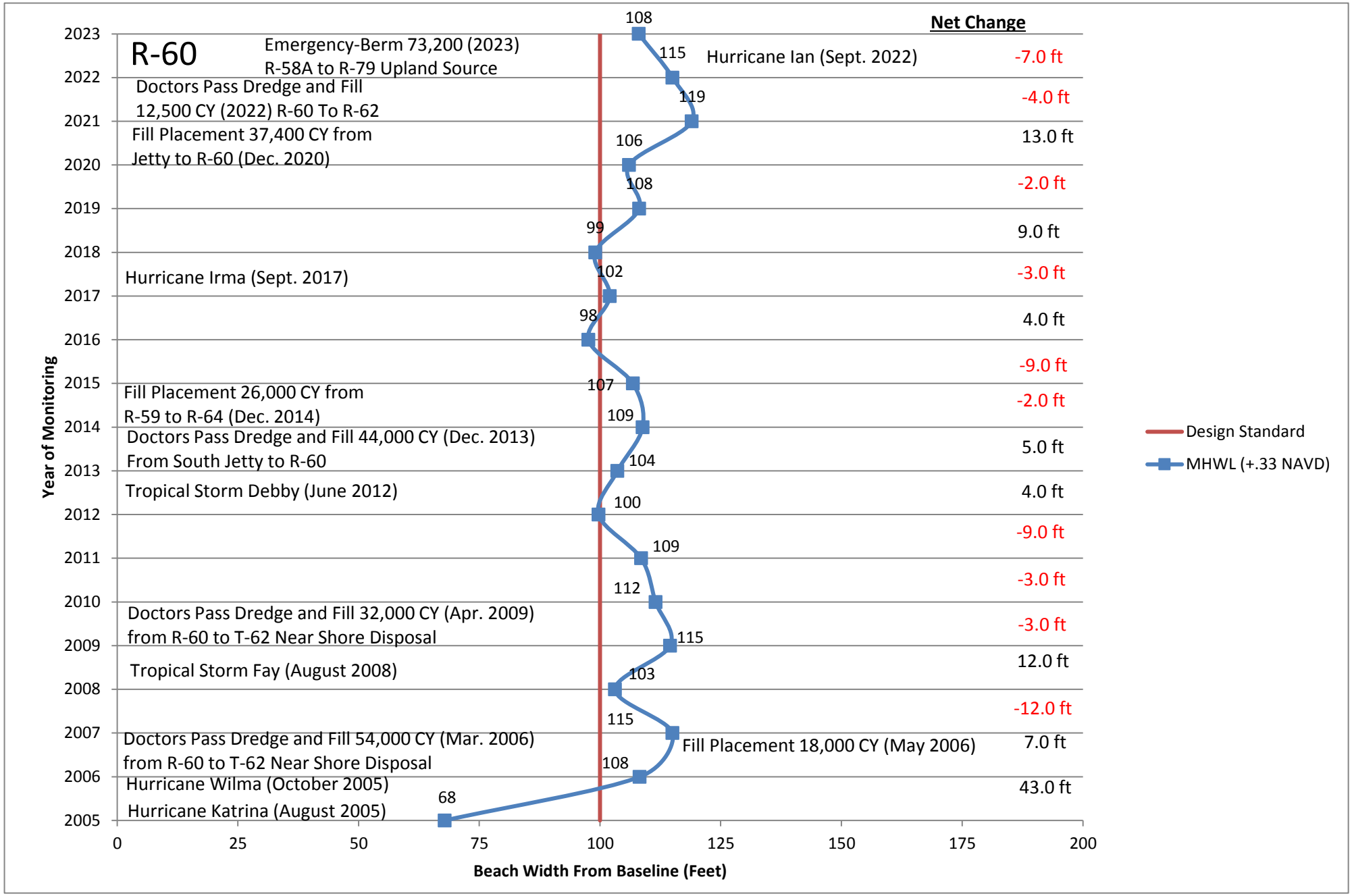
R-59

	2005 Beach Width=	71
2006	Beginning Width=	71
	Annual Erosion=	
	Annual Accretion=	75
	End Beach Width=	146
2007	Beginning Width=	146
	Annual Erosion=	-22
	Annual Accretion=	
	End Beach Width=	124
2008	Beginning Width=	124
	Annual Erosion=	-21
	Annual Accretion=	
	End Beach Width=	103
2009	Beginning Width=	103
	Annual Erosion=	-4
	Annual Accretion=	
	End Beach Width=	99
2010	Beginning Width=	99
	Annual Erosion=	-2
	Annual Accretion=	
	End Beach Width=	97
2011	Beginning Width=	97
	Annual Erosion=	
	Annual Accretion=	4
	End Beach Width=	101
2012	Beginning Width=	101
	Annual Erosion=	-17
	Annual Accretion=	
	End Beach Width=	84
2013	Beginning Width=	84
	Annual Erosion=	
	Annual Accretion=	17
	End Beach Width=	101
2014	Beginning Width=	101
	Annual Erosion=	
	Annual Accretion=	20
	End Beach Width=	121
2015	Beginning Width=	121
	Annual Erosion=	
	Annual Accretion=	1
	End Beach Width=	122
2016	Beginning Width=	122
	Annual Erosion=	-7
	Annual Accretion=	
	End Beach Width=	115
2017	Beginning Width=	115
	Annual Erosion=	-8
	Annual Accretion=	
	End Beach Width=	107
2018	Beginning Width=	107
	Annual Erosion=	-10
	Annual Accretion=	
	End Beach Width=	97
2019	Beginning Width=	97
	Annual Erosion=	
	Annual Accretion=	7
	End Beach Width=	104
2020	Beginning Width=	104
	Annual Erosion=	-10
	Annual Accretion=	
	End Beach Width=	94
2021	Beginning Width=	94
	Annual Erosion=	
	Annual Accretion=	58
	End Beach Width=	152
2022	Beginning Width=	152
	Annual Erosion=	-28
	Annual Accretion=	
	End Beach Width=	124
2023	Beginning Width=	124
	Annual Erosion=	-20
	Annual Accretion=	
	End Beach Width=	104


R-59
Emergency-Berm 73,200 (2023)
R-58A to R-79 Upland Source
Fill Placement 37,400 CY from
Jetty to R-60 (Dec. 2020)
Hurricane Irma (Sept. 2017)
Fill Placement 26,000 CY from
R-59 to R-64 (Dec. 2014)
Doctors Pass Dredge and Fill 44,000 CY (Dec. 2013)
From South Jetty to R-60
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 18,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Hurricane Ian (Sept. 2022)
Net Change
-20.0 ft
-28.0 ft
58.0 ft
-10.0 ft
7.0 ft
-10.0 ft
-8.0 ft
-7.0 ft
1.0 ft
20.0 ft
17.0 ft
-17.0 ft
4.0 ft
-2.0 ft
-4.0 ft
-21.0 ft
-22.0 ft
75.0 ft
104
124
152
94
104
97
107
115
122
121
101
84
101
97
99
103
124
146
71
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

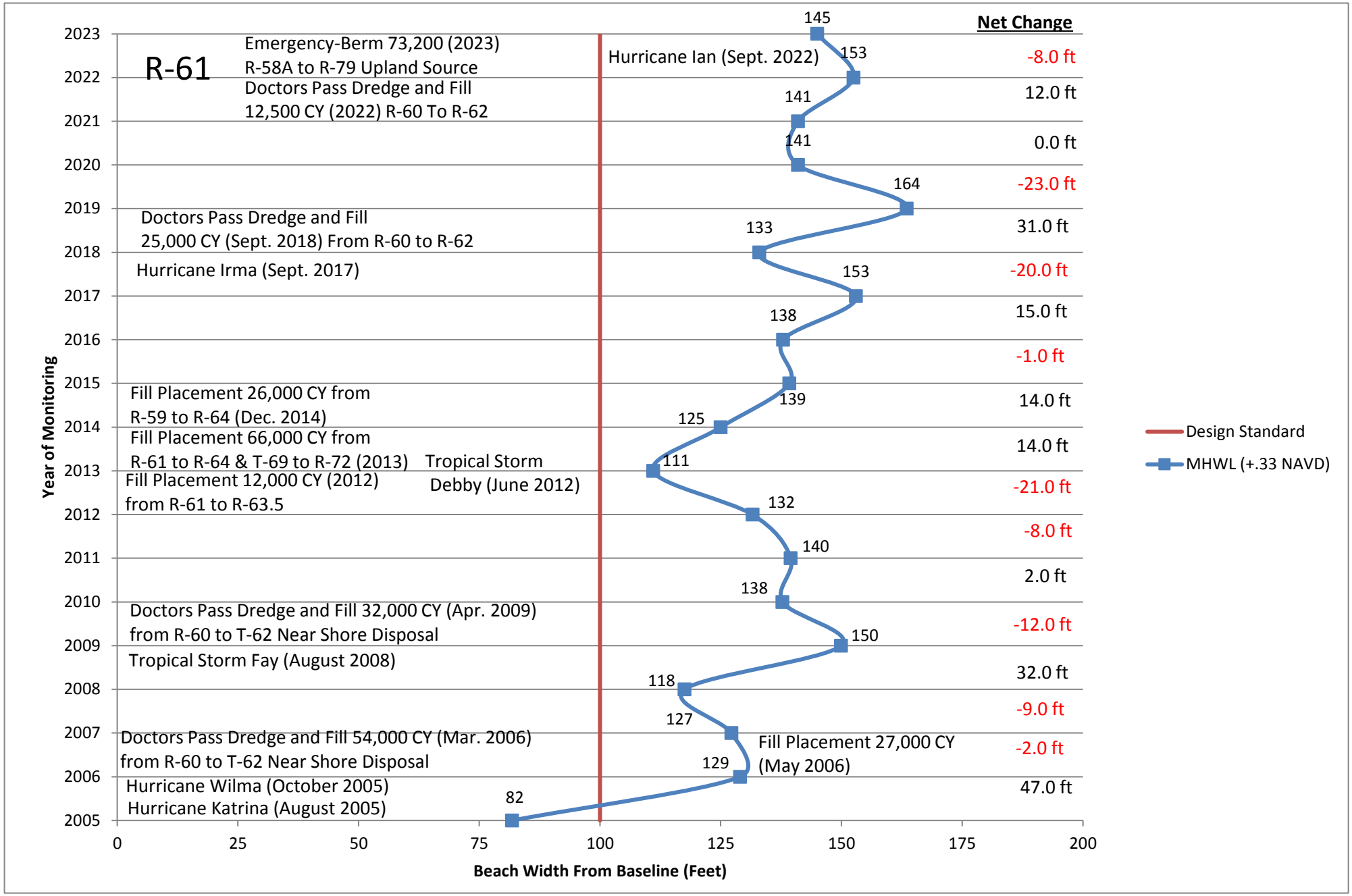
R-60

	2005 Beach Width=	68			
2006	Beginning Width=	68	2015	Beginning Width=	109
	Annual Erosion=			Annual Erosion=	-2
	Annual Accretion=	40		Annual Accretion=	
	End Beach Width=	108		End Beach Width=	107
2007	Beginning Width=	108	2016	Beginning Width=	107
	Annual Erosion=			Annual Erosion=	-9
	Annual Accretion=	7		Annual Accretion=	
	End Beach Width=	115		End Beach Width=	98
2008	Beginning Width=	115	2017	Beginning Width=	98
	Annual Erosion=	-12		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	4
	End Beach Width=	103		End Beach Width=	102
2009	Beginning Width=	103	2018	Beginning Width=	102
	Annual Erosion=			Annual Erosion=	-3
	Annual Accretion=	12		Annual Accretion=	
	End Beach Width=	115		End Beach Width=	99
2010	Beginning Width=	115	2019	Beginning Width=	99
	Annual Erosion=	-3		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	9
	End Beach Width=	112		End Beach Width=	108
2011	Beginning Width=	112	2020	Beginning Width=	108
	Annual Erosion=	-3		Annual Erosion=	-2
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	109		End Beach Width=	106
2012	Beginning Width=	109	2021	Beginning Width=	106
	Annual Erosion=	-9		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	13
	End Beach Width=	100		End Beach Width=	119
2013	Beginning Width=	100	2022	Beginning Width=	119
	Annual Erosion=			Annual Erosion=	-4
	Annual Accretion=	4		Annual Accretion=	
	End Beach Width=	104		End Beach Width=	115
2014	Beginning Width=	104	2023	Beginning Width=	115
	Annual Erosion=			Annual Erosion=	-7
	Annual Accretion=	5		Annual Accretion=	
	End Beach Width=	109		End Beach Width=	108


R-60
Emergency-Berm 73,200 (2023)
R-58A to R-79 Upland Source
Doctors Pass Dredge and Fill
12,500 CY (2022) R-60 To R-62
Fill Placement 37,400 CY from
Jetty to R-60 (Dec. 2020)
Hurricane Irma (Sept. 2017)
Fill Placement 26,000 CY from
R-59 to R-64 (Dec. 2014)
Doctors Pass Dredge and Fill 44,000 CY (Dec. 2013)
From South Jetty to R-60
Tropical Storm Debby (June 2012)
Doctors Pass Dredge and Fill 32,000 CY (Apr. 2009)
from R-60 to T-62 Near Shore Disposal
Tropical Storm Fay (August 2008)
Doctors Pass Dredge and Fill 54,000 CY (Mar. 2006)
from R-60 to T-62 Near Shore Disposal
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Hurricane Ian (Sept. 2022)
Fill Placement 18,000 CY (May 2006)
Net Change
-7.0 ft
-4.0 ft
13.0 ft
-2.0 ft
9.0 ft
-3.0 ft
4.0 ft
-9.0 ft
-2.0 ft
5.0 ft
4.0 ft
-9.0 ft
-3.0 ft
-3.0 ft
12.0 ft
-12.0 ft
7.0 ft
43.0 ft
108
115
119
106
108
99
102
98
107
109
104
100
109
112
115
103
115
108
68
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-61

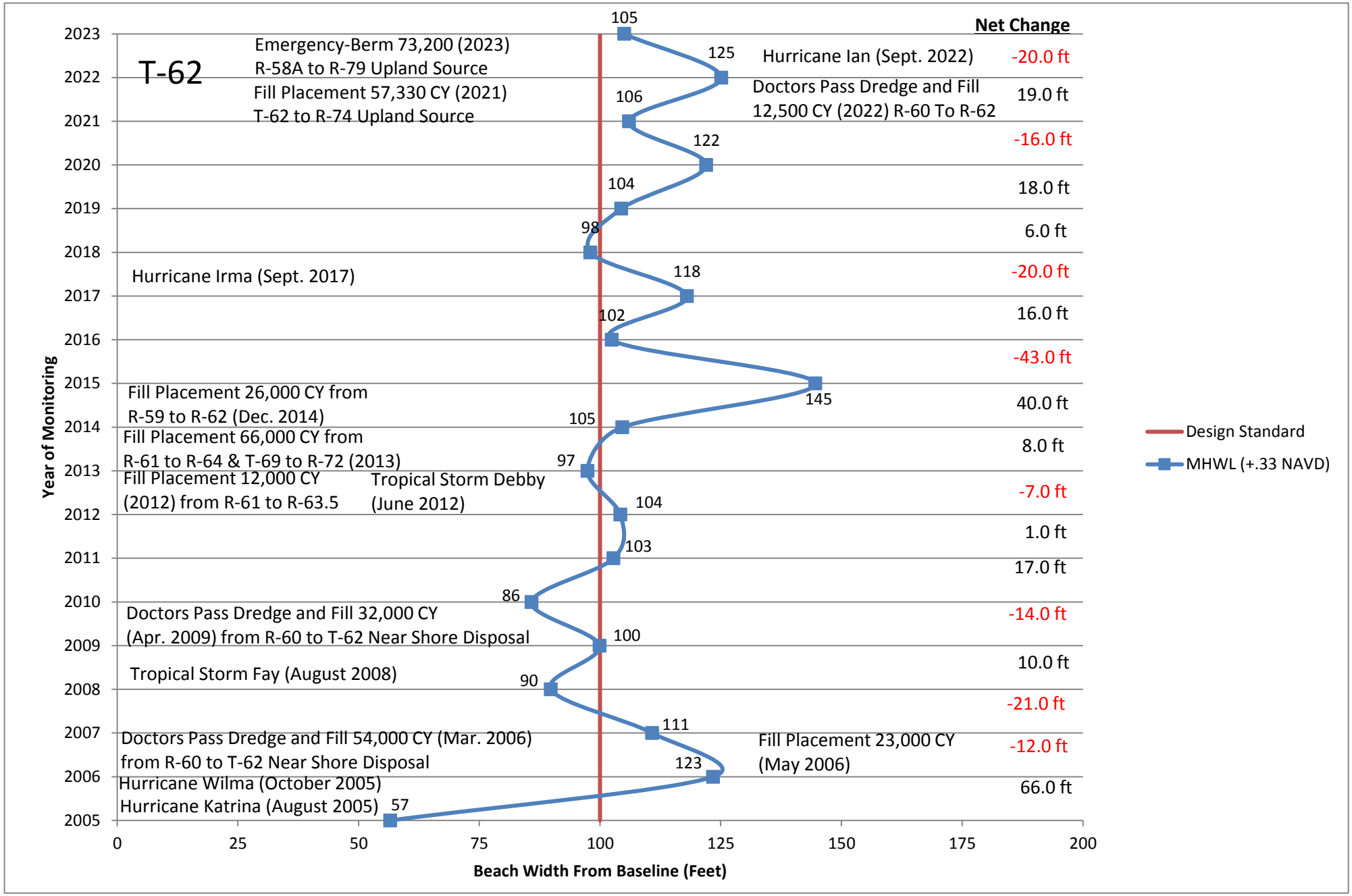
	2005 Beach Width=	82			
2006	Beginning Width=	82	2015	Beginning Width=	125
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	47		Annual Accretion=	14
	End Beach Width=	129		End Beach Width=	139
2007	Beginning Width=	129	2016	Beginning Width=	139
	Annual Erosion=	-2		Annual Erosion=	-1
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	127		End Beach Width=	138
2008	Beginning Width=	127	2017	Beginning Width=	138
	Annual Erosion=	-9		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	15
	End Beach Width=	118		End Beach Width=	153
2009	Beginning Width=	118	2018	Beginning Width=	153
	Annual Erosion=			Annual Erosion=	-20
	Annual Accretion=	32		Annual Accretion=	
	End Beach Width=	150		End Beach Width=	133
2010	Beginning Width=	150	2019	Beginning Width=	133
	Annual Erosion=	-12		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	31
	End Beach Width=	138		End Beach Width=	164
2011	Beginning Width=	138	2020	Beginning Width=	164
	Annual Erosion=			Annual Erosion=	-23
	Annual Accretion=	2		Annual Accretion=	
	End Beach Width=	140		End Beach Width=	141
2012	Beginning Width=	140	2021	Beginning Width=	141
	Annual Erosion=	-8		Annual Erosion=	0
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	132		End Beach Width=	141
2013	Beginning Width=	132	2022	Beginning Width=	141
	Annual Erosion=	-21		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	12
	End Beach Width=	111		End Beach Width=	153
2014	Beginning Width=	111	2023	Beginning Width=	153
	Annual Erosion=			Annual Erosion=	-8
	Annual Accretion=	14		Annual Accretion=	
	End Beach Width=	125		End Beach Width=	145


R-61
Emergency-Berm 73,200 (2023)
R-58A to R-79 Upland Source
Doctors Pass Dredge and Fill
12,500 CY (2022) R-60 To R-62
Hurricane Ian (Sept. 2022)
Doctors Pass Dredge and Fill
25,000 CY (Sept. 2018) From R-60 to R-62
Hurricane Irma (Sept. 2017)
Fill Placement 26,000 CY from
R-59 to R-64 (Dec. 2014)
Fill Placement 66,000 CY from
R-61 to R-64 & T-69 to R-72 (2013)
Tropical Storm
Debby (June 2012)
Fill Placement 12,000 CY (2012)
from R-61 to R-63.5
Doctors Pass Dredge and Fill 32,000 CY (Apr. 2009)
from R-60 to T-62 Near Shore Disposal
Tropical Storm Fay (August 2008)
Doctors Pass Dredge and Fill 54,000 CY (Mar. 2006)
from R-60 to T-62 Near Shore Disposal
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Fill Placement 27,000 CY
(May 2006)
Net Change
-8.0 ft
12.0 ft
0.0 ft
-23.0 ft
31.0 ft
-20.0 ft
15.0 ft
-1.0 ft
14.0 ft
14.0 ft
-21.0 ft
-8.0 ft
2.0 ft
-12.0 ft
32.0 ft
-9.0 ft
-2.0 ft
47.0 ft
145
153
141
141
164
133
153
138
139
125
111
132
140
138
150
118
127
129
82
Year of Monitoring
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

T-62

	2005 Beach Width=	57

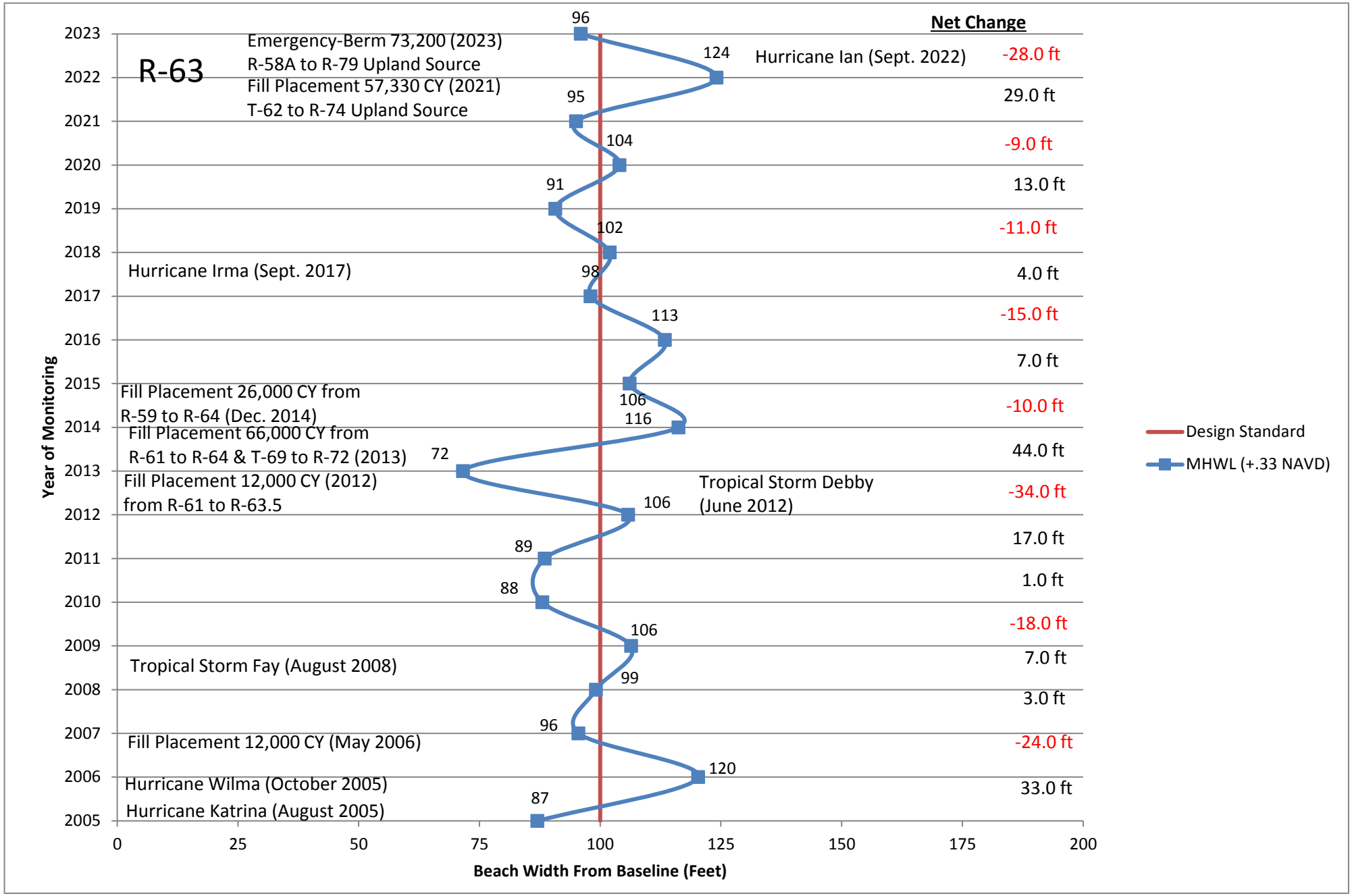
2006	Beginning Width=	57	2015	Beginning Width=	105
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	66		Annual Accretion=	40
	End Beach Width=	123		End Beach Width=	145
2007	Beginning Width=	123	2016	Beginning Width=	145
	Annual Erosion=	-12		Annual Erosion=	-43
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	111		End Beach Width=	102
2008	Beginning Width=	111	2017	Beginning Width=	102
	Annual Erosion=	-21		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	16
	End Beach Width=	90		End Beach Width=	118
2009	Beginning Width=	90	2018	Beginning Width=	118
	Annual Erosion=			Annual Erosion=	-20
	Annual Accretion=	10		Annual Accretion=	
	End Beach Width=	100		End Beach Width=	98
2010	Beginning Width=	100	2019	Beginning Width=	98
	Annual Erosion=	-14		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	6
	End Beach Width=	86		End Beach Width=	104
2011	Beginning Width=	86	2020	Beginning Width=	104
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	17		Annual Accretion=	18
	End Beach Width=	103		End Beach Width=	122
2012	Beginning Width=	103	2021	Beginning Width=	122
	Annual Erosion=			Annual Erosion=	-16
	Annual Accretion=	1		Annual Accretion=	
	End Beach Width=	104		End Beach Width=	106
2013	Beginning Width=	104	2022	Beginning Width=	106
	Annual Erosion=	-7		Annual Erosion=	19
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	97		End Beach Width=	125
2014	Beginning Width=	97	2023	Beginning Width=	125
	Annual Erosion=			Annual Erosion=	-20
	Annual Accretion=	8		Annual Accretion=	
	End Beach Width=	105		End Beach Width=	105


T-62
Emergency-Berm 73,200 (2023)
R-58A to R-79 Upland Source
Fill Placement 57,330 CY (2021)
T-62 to R-74 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 26,000 CY from
R-59 to R-62 (Dec. 2014)
Fill Placement 66,000 CY from
R-61 to R-64 & T-69 to R-72 (2013)
Fill Placement 12,000 CY
(2012) from R-61 to R-63.5
Tropical Storm Debby
(June 2012)
Doctors Pass Dredge and Fill 32,000 CY
(Apr. 2009) from R-60 to T-62 Near Shore Disposal
Tropical Storm Fay (August 2008)
Doctors Pass Dredge and Fill 54,000 CY (Mar. 2006)
from R-60 to T-62 Near Shore Disposal
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Hurricane Ian (Sept. 2022)
Doctors Pass Dredge and Fill
12,500 CY (2022) R-60 To R-62
Fill Placement 23,000 CY
(May 2006)
Net Change
-20.0 ft
19.0 ft
-16.0 ft
18.0 ft
6.0 ft
-20.0 ft
16.0 ft
-43.0 ft
40.0 ft
8.0 ft
-7.0 ft
1.0 ft
17.0 ft
-14.0 ft
10.0 ft
-21.0 ft
-12.0 ft
66.0 ft
105
125
106
122
104
98
118
102
145
105
97
104
103
86
100
90
111
123
57
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-63

2005 Beach Width=	87	

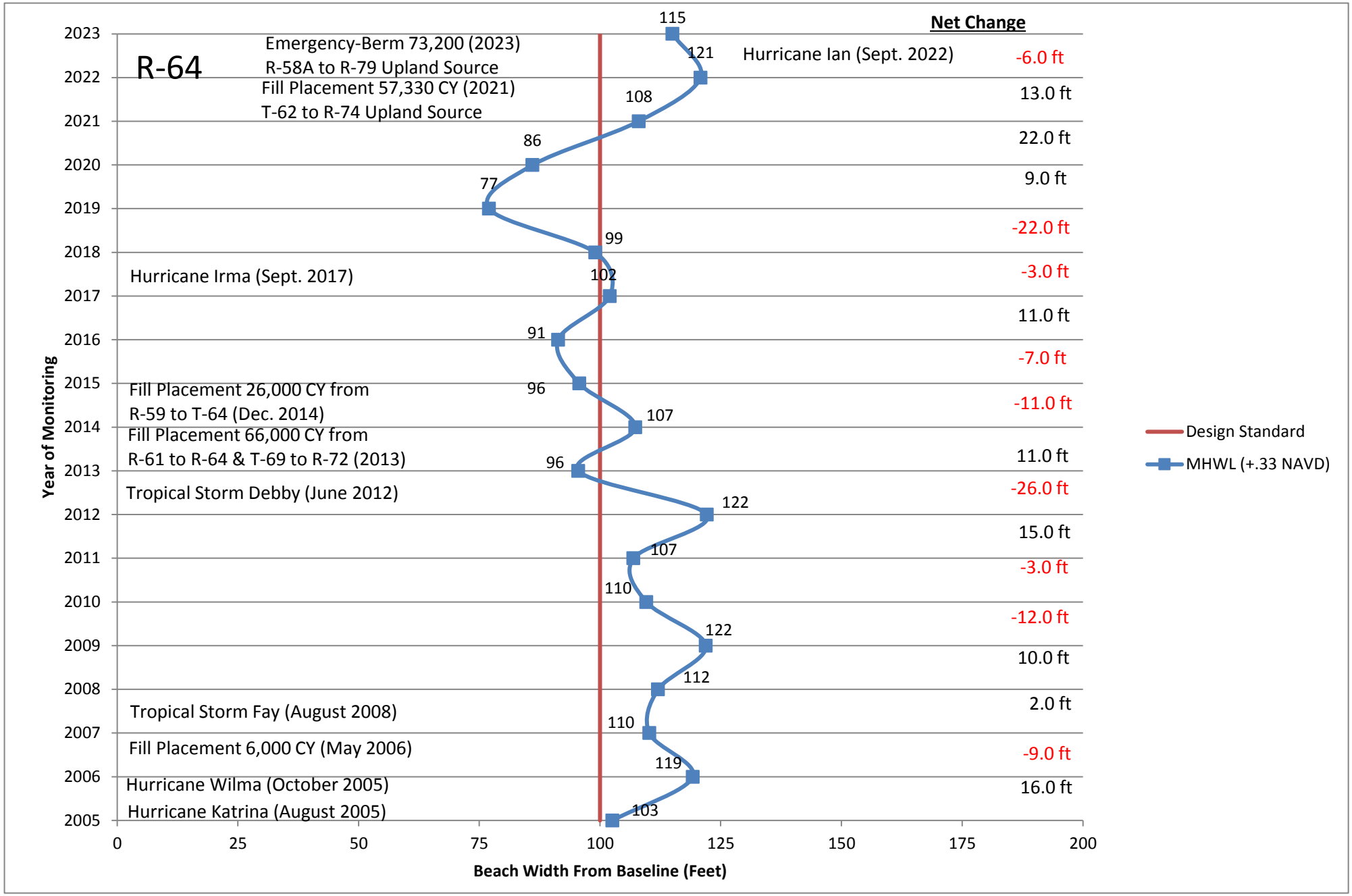
2006	Beginning Width=	87	2015	Beginning Width=	116
	Annual Erosion=			Annual Erosion=	-10
	Annual Accretion=	33		Annual Accretion=	
	End Beach Width=	120		End Beach Width=	106
2007	Beginning Width=	120	2016	Beginning Width=	106
	Annual Erosion=	-24		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	7
	End Beach Width=	96		End Beach Width=	113
2008	Beginning Width=	96	2017	Beginning Width=	113
	Annual Erosion=			Annual Erosion=	-15
	Annual Accretion=	3		Annual Accretion=	
	End Beach Width=	99		End Beach Width=	98
2009	Beginning Width=	99	2018	Beginning Width=	98
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	7		Annual Accretion=	4
	End Beach Width=	106		End Beach Width=	102
2010	Beginning Width=	106	2019	Beginning Width=	102
	Annual Erosion=	-18		Annual Erosion=	-11
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	88		End Beach Width=	91
2011	Beginning Width=	88	2020	Beginning Width=	91
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	1		Annual Accretion=	13
	End Beach Width=	89		End Beach Width=	104
2012	Beginning Width=	89	2021	Beginning Width=	104
	Annual Erosion=			Annual Erosion=	-9
	Annual Accretion=	17		Annual Accretion=	
	End Beach Width=	106		End Beach Width=	95
2013	Beginning Width=	106	2022	Beginning Width=	95
	Annual Erosion=	-34		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	29
	End Beach Width=	72		End Beach Width=	124
2014	Beginning Width=	72	2023	Beginning Width=	124
	Annual Erosion=			Annual Erosion=	-28
	Annual Accretion=	44		Annual Accretion=	
	End Beach Width=	116		End Beach Width=	96


R-63
Emergency-Berm 73,200 (2023)
R-58A to R-79 Upland Source
Fill Placement 57,330 CY (2021)
T-62 to R-74 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 26,000 CY from
R-59 to R-64 (Dec. 2014)
Fill Placement 66,000 CY from
R-61 to R-64 & T-69 to R-72 (2013)
Fill Placement 12,000 CY (2012)
from R-61 to R-63.5
Tropical Storm Fay (August 2008)
Fill Placement 12,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Hurricane Ian (Sept. 2022)
Tropical Storm Debby
(June 2012)
Net Change
-28.0 ft
29.0 ft
-9.0 ft
13.0 ft
-11.0 ft
4.0 ft
-15.0 ft
7.0 ft
-10.0 ft
44.0 ft
-34.0 ft
17.0 ft
1.0 ft
-18.0 ft
7.0 ft
3.0 ft
-24.0 ft
33.0 ft
96
124
95
104
91
102
98
113
106
116
72
106
89
88
106
99
96
120
87
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-64

2005 Beach Width=	103	

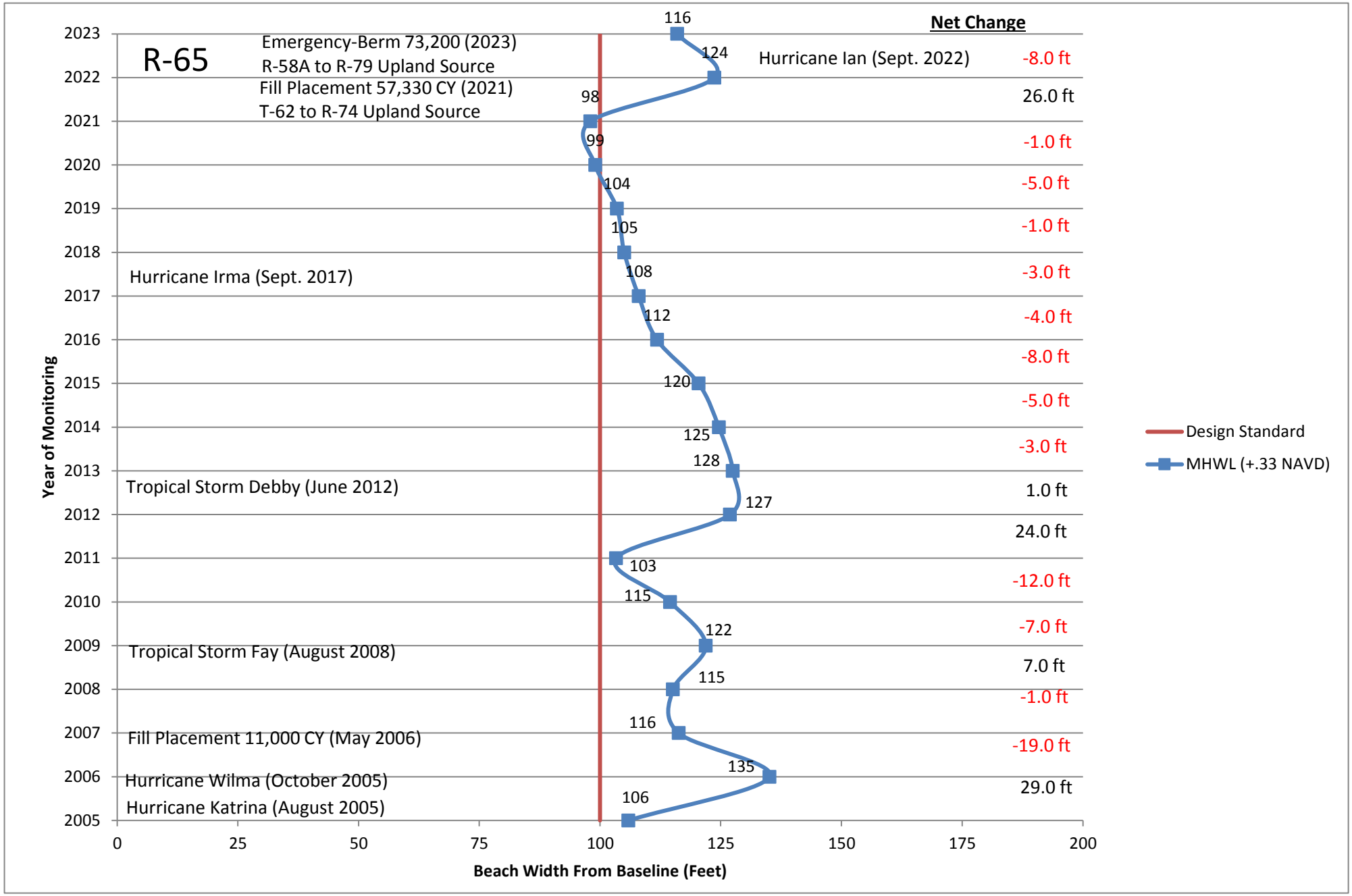
2006	Beginning Width=	103	2015	Beginning Width=	107
	Annual Erosion=			Annual Erosion=	-11
	Annual Accretion=	16		Annual Accretion=	
	End Beach Width=	119		End Beach Width=	96
2007	Beginning Width=	119	2016	Beginning Width=	96
	Annual Erosion=	-9		Annual Erosion=	-5
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	110		End Beach Width=	91
2008	Beginning Width=	110	2017	Beginning Width=	91
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	2		Annual Accretion=	11
	End Beach Width=	112		End Beach Width=	102
2009	Beginning Width=	112	2018	Beginning Width=	102
	Annual Erosion=			Annual Erosion=	-3
	Annual Accretion=	10		Annual Accretion=	
	End Beach Width=	122		End Beach Width=	99
2010	Beginning Width=	122	2019	Beginning Width=	99
	Annual Erosion=	-12		Annual Erosion=	-22
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	110		End Beach Width=	77
2011	Beginning Width=	110	2020	Beginning Width=	77
	Annual Erosion=	-3		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	9
	End Beach Width=	107		End Beach Width=	86
2012	Beginning Width=	107	2021	Beginning Width=	86
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	15		Annual Accretion=	22
	End Beach Width=	122		End Beach Width=	108
2013	Beginning Width=	122	2022	Beginning Width=	108
	Annual Erosion=	-26		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	13
	End Beach Width=	96		End Beach Width=	121
2014	Beginning Width=	96	2023	Beginning Width=	121
	Annual Erosion=			Annual Erosion=	-6
	Annual Accretion=	11		Annual Accretion=	
	End Beach Width=	107		End Beach Width=	115


R-64
Emergency-Berm 73,200 (2023)
R-58A to R-79 Upland Source
Fill Placement 57,330 CY (2021)
T-62 to R-74 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 26,000 CY from
R-59 to T-64 (Dec. 2014)
Fill Placement 66,000 CY from
R-61 to R-64 & T-69 to R-72 (2013)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 6,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Hurricane Ian (Sept. 2022)
Net Change
-6.0 ft
13.0 ft
22.0 ft
9.0 ft
-22.0 ft
-3.0 ft
11.0 ft
-7.0 ft
-11.0 ft
11.0 ft
-26.0 ft
15.0 ft
-3.0 ft
-12.0 ft
10.0 ft
2.0 ft
-9.0 ft
16.0 ft
115
121
108
86
77
99
102
91
96
107
96
122
107
110
122
112
110
119
103
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-65

	2005 Beach Width=	106

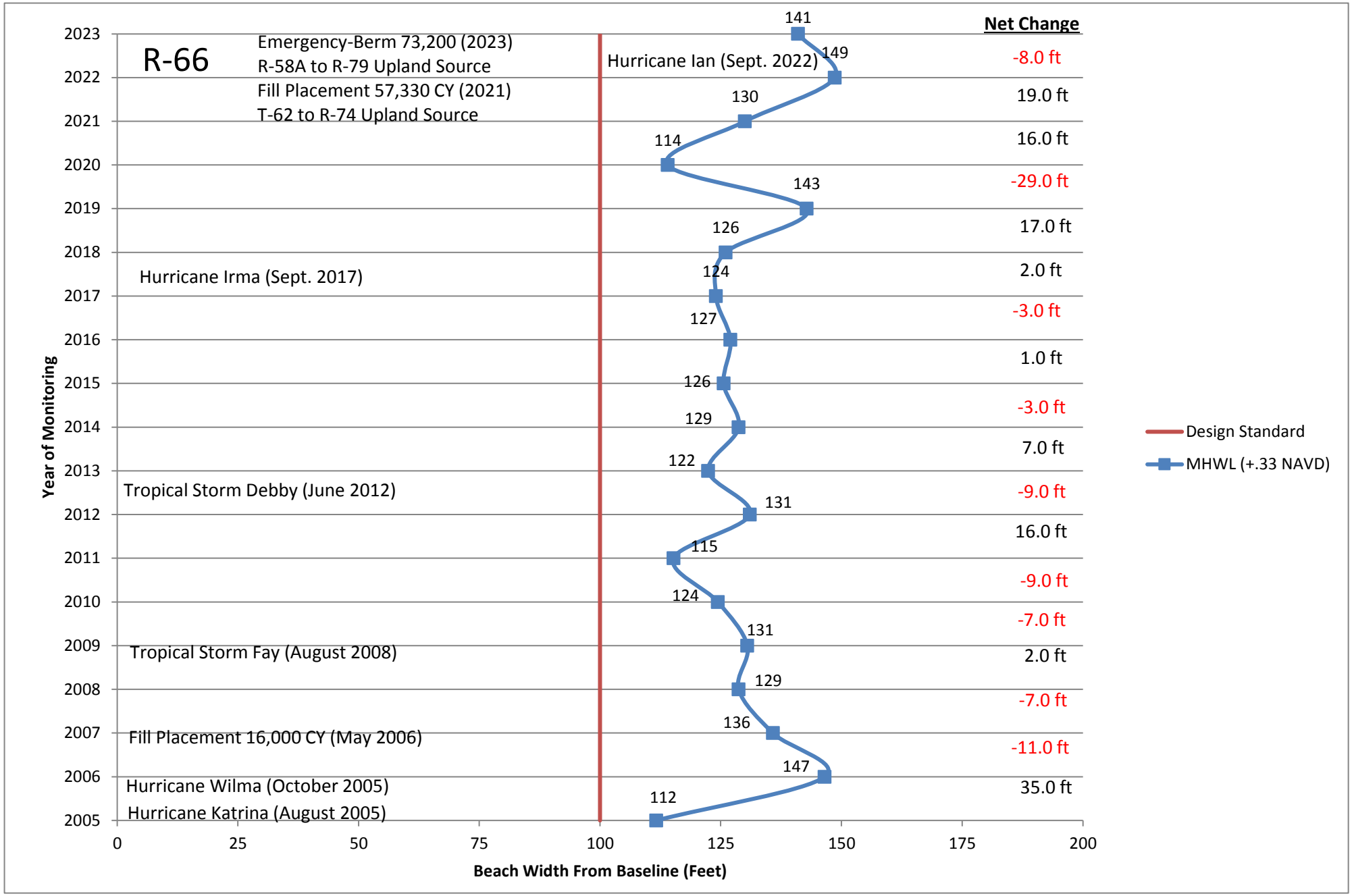
2006	Beginning Width=	106	2015	Beginning Width=	125
	Annual Erosion=			Annual Erosion=	-5
	Annual Accretion=	29		Annual Accretion=	
	End Beach Width=	135		End Beach Width=	120
2007	Beginning Width=	135	2016	Beginning Width=	120
	Annual Erosion=	-19		Annual Erosion=	-8
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	116		End Beach Width=	112
2008	Beginning Width=	116	2017	Beginning Width=	112
	Annual Erosion=	-1		Annual Erosion=	-4
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	115		End Beach Width=	108
2009	Beginning Width=	115	2018	Beginning Width=	108
	Annual Erosion=			Annual Erosion=	-3
	Annual Accretion=	7		Annual Accretion=	
	End Beach Width=	122		End Beach Width=	105
2010	Beginning Width=	122	2019	Beginning Width=	105
	Annual Erosion=	-7		Annual Erosion=	-1
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	115		End Beach Width=	104
2011	Beginning Width=	115	2020	Beginning Width=	104
	Annual Erosion=	-12		Annual Erosion=	-5
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	103		End Beach Width=	99
2012	Beginning Width=	103	2021	Beginning Width=	99
	Annual Erosion=			Annual Erosion=	-1
	Annual Accretion=	24		Annual Accretion=	
	End Beach Width=	127		End Beach Width=	98
2013	Beginning Width=	127	2022	Beginning Width=	98
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	1		Annual Accretion=	26
	End Beach Width=	128		End Beach Width=	124
2014	Beginning Width=	128	2023	Beginning Width=	124
	Annual Erosion=	-3		Annual Erosion=	-8
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	125		End Beach Width=	116


R-65
Emergency-Berm 73,200 (2023)
R-58A to R-79 Upland Source
Fill Placement 57,330 CY (2021)
T-62 to R-74 Upland Source
Hurricane Irma (Sept. 2017)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 11,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Hurricane Ian (Sept. 2022)
Net Change
-8.0 ft
26.0 ft
-1.0 ft
-5.0 ft
-1.0 ft
-3.0 ft
-4.0 ft
-8.0 ft
-5.0 ft
-3.0 ft
1.0 ft
24.0 ft
-12.0 ft
-7.0 ft
7.0 ft
-1.0 ft
-19.0 ft
29.0 ft
116
124
98
99
104
105
108
112
120
125
128
127
103
115
122
115
116
135
106
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-66

2005 Beach Width=	112	

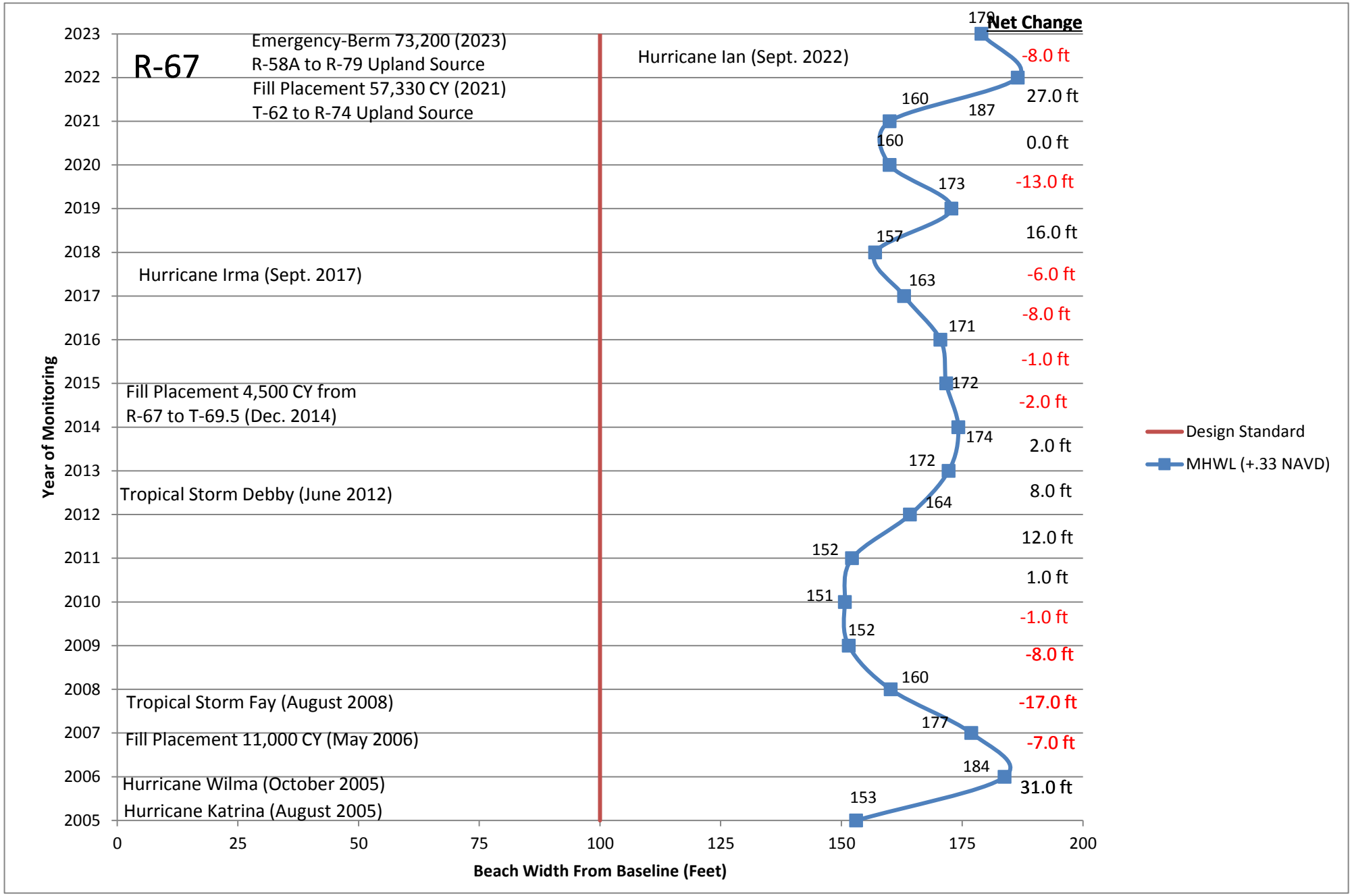
2006	Beginning Width=	112	2015	Beginning Width=	129
	Annual Erosion=			Annual Erosion=	-3
	Annual Accretion=	35		Annual Accretion=	
	End Beach Width=	147		End Beach Width=	126
2007	Beginning Width=	147	2016	Beginning Width=	126
	Annual Erosion=	-11		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	1
	End Beach Width=	136		End Beach Width=	127
2008	Beginning Width=	136	2017	Beginning Width=	127
	Annual Erosion=	-7		Annual Erosion=	-3
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	129		End Beach Width=	124
2009	Beginning Width=	129	2018	Beginning Width=	124
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	2		Annual Accretion=	2
	End Beach Width=	131		End Beach Width=	126
2010	Beginning Width=	131	2019	Beginning Width=	126
	Annual Erosion=	-7		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	17
	End Beach Width=	124		End Beach Width=	143
2011	Beginning Width=	124	2020	Beginning Width=	143
	Annual Erosion=	-9		Annual Erosion=	-29
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	115		End Beach Width=	114
2012	Beginning Width=	115	2021	Beginning Width=	114
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	16		Annual Accretion=	16
	End Beach Width=	131		End Beach Width=	130
2013	Beginning Width=	131	2022	Beginning Width=	130
	Annual Erosion=	-9		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	19
	End Beach Width=	122		End Beach Width=	149
2014	Beginning Width=	122	2022	Beginning Width=	149
	Annual Erosion=			Annual Erosion=	-8
	Annual Accretion=	7		Annual Accretion=	
	End Beach Width=	129		End Beach Width=	141


R-66
Emergency-Berm 73,200 (2023)
R-58A to R-79 Upland Source
Fill Placement 57,330 CY (2021)
T-62 to R-74 Upland Source
Hurricane Ian (Sept. 2022)
Hurricane Irma (Sept. 2017)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 16,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
-8.0 ft
19.0 ft
16.0 ft
-29.0 ft
17.0 ft
2.0 ft
-3.0 ft
1.0 ft
-3.0 ft
7.0 ft
-9.0 ft
16.0 ft
-9.0 ft
-7.0 ft
2.0 ft
-7.0 ft
-11.0 ft
35.0 ft
141
149
130
114
143
126
124
127
126
129
122
131
115
124
131
129
136
147
112
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-67

2005 Beach Width=	153	

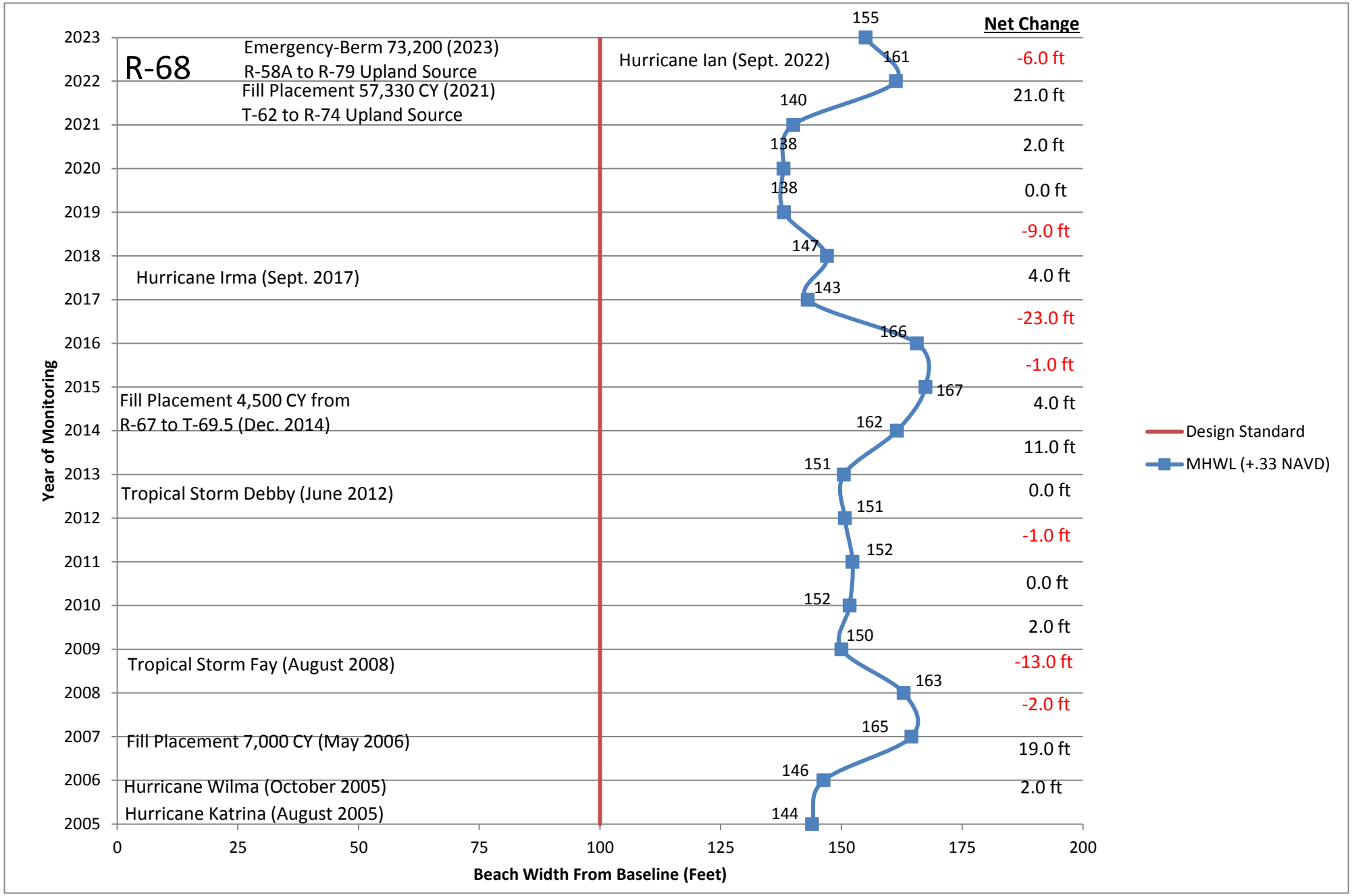
2006	Beginning Width=	153	2015	Beginning Width=	174
	Annual Erosion=			Annual Erosion=	-2
	Annual Accretion=	31		Annual Accretion=	
	End Beach Width=	184		End Beach Width=	172
2007	Beginning Width=	184	2016	Beginning Width=	172
	Annual Erosion=	-7		Annual Erosion=	-1
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	177		End Beach Width=	171
2008	Beginning Width=	177	2017	Beginning Width=	171
	Annual Erosion=	-17		Annual Erosion=	-8
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	160		End Beach Width=	163
2009	Beginning Width=	160	2018	Beginning Width=	163
	Annual Erosion=	-8		Annual Erosion=	-6
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	152		End Beach Width=	157
2010	Beginning Width=	152	2019	Beginning Width=	157
	Annual Erosion=	-1		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	16
	End Beach Width=	151		End Beach Width=	173
2011	Beginning Width=	151	2020	Beginning Width=	173
	Annual Erosion=			Annual Erosion=	-13
	Annual Accretion=	1		Annual Accretion=	
	End Beach Width=	152		End Beach Width=	160
2012	Beginning Width=	152	2021	Beginning Width=	160
	Annual Erosion=			Annual Erosion=	0
	Annual Accretion=	12		Annual Accretion=	
	End Beach Width=	164		End Beach Width=	160
2013	Beginning Width=	164	2022	Beginning Width=	160
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	8		Annual Accretion=	27
	End Beach Width=	172		End Beach Width=	187
2014	Beginning Width=	172	2023	Beginning Width=	187
	Annual Erosion=			Annual Erosion=	-8
	Annual Accretion=	2		Annual Accretion=	
	End Beach Width=	174		End Beach Width=	179


R-67
Emergency-Berm 73,200 (2023)
R-58A to R-79 Upland Source
Fill Placement 57,330 CY (2021)
T-62 to R-74 Upland Source
Hurricane Ian (Sept. 2022)
Hurricane Irma (Sept. 2017)
Fill Placement 4,500 CY from
R-67 to T-69.5 (Dec. 2014)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 11,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
-8.0 ft
27.0 ft
0.0 ft
-13.0 ft
16.0 ft
-6.0 ft
-8.0 ft
-1.0 ft
-2.0 ft
2.0 ft
8.0 ft
12.0 ft
1.0 ft
-1.0 ft
-8.0 ft
-17.0 ft
-7.0 ft
31.0 ft
170
160
187
160
173
157
163
171
172
174
172
164
152
151
152
160
177
184
153
Year of Monitoring
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-68

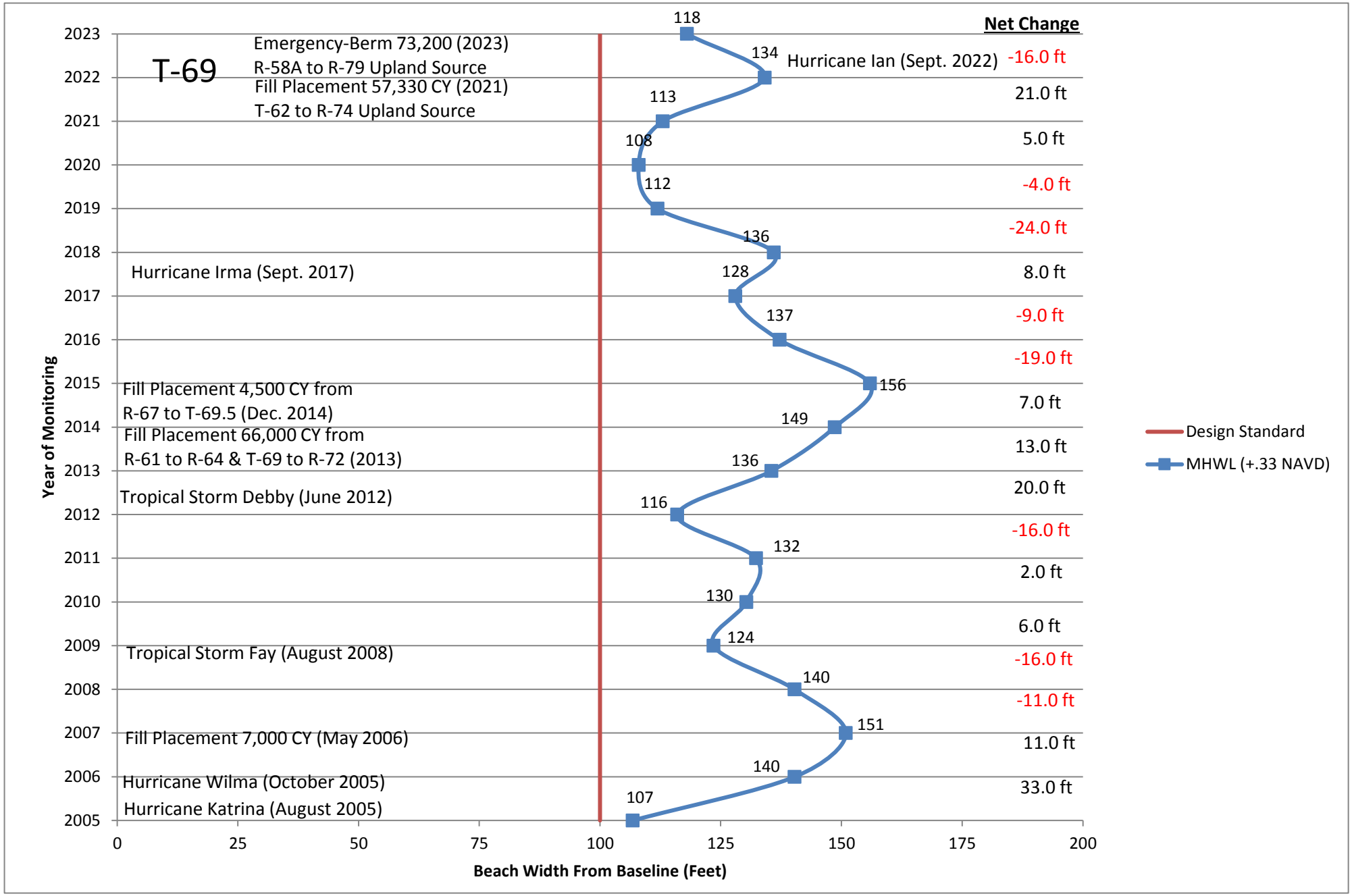
	2005 Beach Width=	144

2006	Beginning Width=	144	2015	Beginning Width=	162
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	2		Annual Accretion=	5
	End Beach Width=	146		End Beach Width=	167
2007	Beginning Width=	146	2016	Beginning Width=	167
	Annual Erosion=			Annual Erosion=	-1
	Annual Accretion=	19		Annual Accretion=	
	End Beach Width=	165		End Beach Width=	166
2008	Beginning Width=	165	2017	Beginning Width=	166
	Annual Erosion=	-2		Annual Erosion=	-23
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	163		End Beach Width=	143
2009	Beginning Width=	163	2018	Beginning Width=	143
	Annual Erosion=	-13		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	4
	End Beach Width=	150		End Beach Width=	147
2010	Beginning Width=	150	2019	Beginning Width=	147
	Annual Erosion=			Annual Erosion=	-9
	Annual Accretion=	2		Annual Accretion=	
	End Beach Width=	152		End Beach Width=	138
2011	Beginning Width=	152	2020	Beginning Width=	138
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=			Annual Accretion=	0
	End Beach Width=	152		End Beach Width=	138
2012	Beginning Width=	152	2021	Beginning Width=	138
	Annual Erosion=	-1		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	2
	End Beach Width=	151		End Beach Width=	140
2013	Beginning Width=	151	2022	Beginning Width=	140
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=			Annual Accretion=	21
	End Beach Width=	151		End Beach Width=	161
2014	Beginning Width=	151	2023	Beginning Width=	161
	Annual Erosion=			Annual Erosion=	-6
	Annual Accretion=	11		Annual Accretion=	
	End Beach Width=	162		End Beach Width=	155


R-68
Emergency-Berm 73,200 (2023)
R-58A to R-79 Upland Source
Fill Placement 57,330 CY (2021)
T-62 to R-74 Upland Source
Hurricane Ian (Sept. 2022)
Hurricane Irma (Sept. 2017)
Fill Placement 4,500 CY from
R-67 to T-69.5 (Dec. 2014)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 7,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
-6.0 ft
21.0 ft
2.0 ft
0.0 ft
-9.0 ft
4.0 ft
-23.0 ft
-1.0 ft
4.0 ft
11.0 ft
0.0 ft
-1.0 ft
0.0 ft
2.0 ft
-13.0 ft
-2.0 ft
19.0 ft
2.0 ft
155
161
140
138
138
147
143
166
167
162
151
151
152
152
150
163
165
146
144
Year of Monitoring
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

T-69

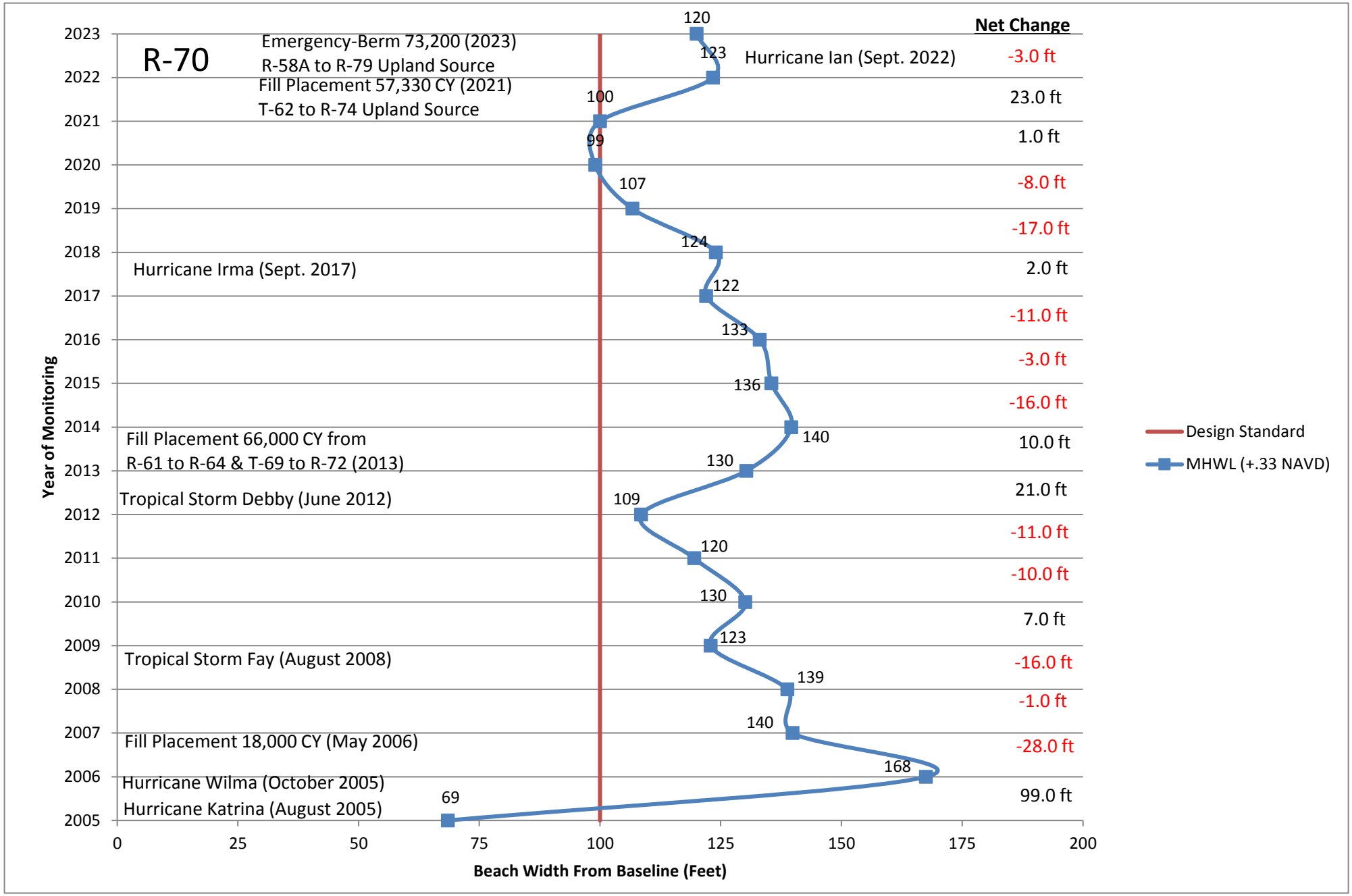
	2005 Beach Width=	107
2006	Beginning Width=	107
	Annual Erosion=	
	Annual Accretion=	33
	End Beach Width=	140
2007	Beginning Width=	140
	Annual Erosion=	
	Annual Accretion=	11
	End Beach Width=	151
2008	Beginning Width=	151
	Annual Erosion=	-11
	Annual Accretion=	
	End Beach Width=	140
2009	Beginning Width=	140
	Annual Erosion=	-16
	Annual Accretion=	
	End Beach Width=	124
2010	Beginning Width=	124
	Annual Erosion=	
	Annual Accretion=	6
	End Beach Width=	130
2011	Beginning Width=	130
	Annual Erosion=	
	Annual Accretion=	2
	End Beach Width=	132
2012	Beginning Width=	132
	Annual Erosion=	-16
	Annual Accretion=	
	End Beach Width=	116
2013	Beginning Width=	116
	Annual Erosion=	
	Annual Accretion=	20
	End Beach Width=	136
2014	Beginning Width=	136
	Annual Erosion=	
	Annual Accretion=	13
	End Beach Width=	149
2015	Beginning Width=	149
	Annual Erosion=	
	Annual Accretion=	7
	End Beach Width=	156
2016	Beginning Width=	156
	Annual Erosion=	-19
	Annual Accretion=	
	End Beach Width=	137
2017	Beginning Width=	137
	Annual Erosion=	-9
	Annual Accretion=	
	End Beach Width=	128
2018	Beginning Width=	128
	Annual Erosion=	
	Annual Accretion=	8
	End Beach Width=	136
2019	Beginning Width=	136
	Annual Erosion=	-24
	Annual Accretion=	
	End Beach Width=	112
2020	Beginning Width=	112
	Annual Erosion=	-4
	Annual Accretion=	
	End Beach Width=	108
2021	Beginning Width=	108
	Annual Erosion=	
	Annual Accretion=	5
	End Beach Width=	113
2022	Beginning Width=	113
	Annual Erosion=	
	Annual Accretion=	21
	End Beach Width=	134
2023	Beginning Width=	134
	Annual Erosion=	-16
	Annual Accretion=	
	End Beach Width=	118


T-69
Emergency-Berm 73,200 (2023)
R-58A to R-79 Upland Source
Fill Placement 57,330 CY (2021)
T-62 to R-74 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 4,500 CY from
R-67 to T-69.5 (Dec. 2014)
Fill Placement 66,000 CY from
R-61 to R-64 & T-69 to R-72 (2013)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 7,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Hurricane Ian (Sept. 2022)
Net Change
-16.0 ft
21.0 ft
5.0 ft
-4.0 ft
-24.0 ft
8.0 ft
-9.0 ft
-19.0 ft
7.0 ft
13.0 ft
20.0 ft
-16.0 ft
2.0 ft
6.0 ft
-16.0 ft
-11.0 ft
11.0 ft
33.0 ft
118
134
113
108
112
136
128
137
156
149
136
116
132
130
124
140
151
140
107
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-70

	2005 Beach Width=	69

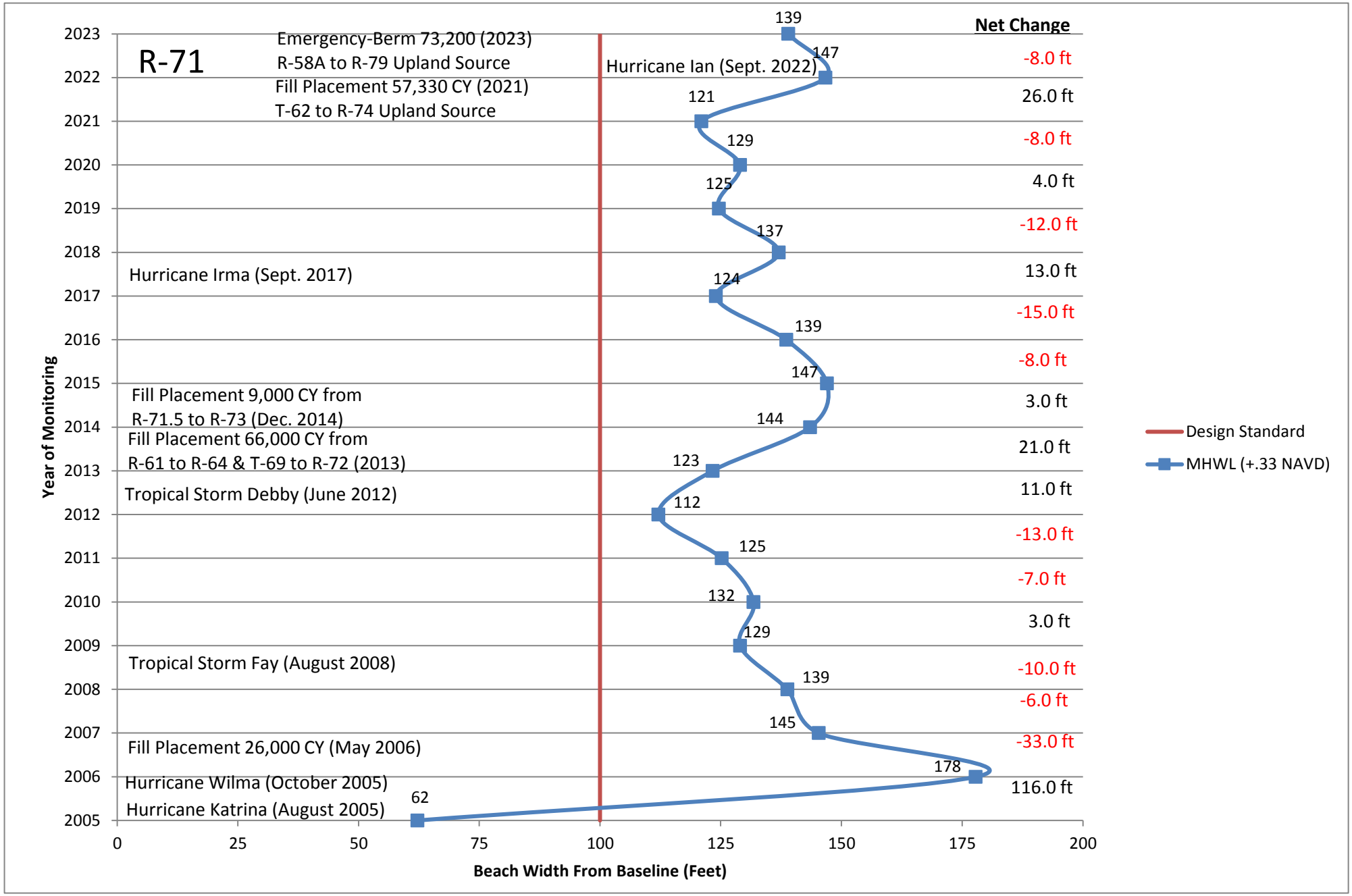
2006	Beginning Width=	69	2015	Beginning Width=	140
	Annual Erosion=			Annual Erosion=	-4
	Annual Accretion=	99		Annual Accretion=	
	End Beach Width=	168		End Beach Width=	136
2007	Beginning Width=	168	2016	Beginning Width=	136
	Annual Erosion=	-28		Annual Erosion=	-3
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	140		End Beach Width=	133
2008	Beginning Width=	140	2017	Beginning Width=	133
	Annual Erosion=	-1		Annual Erosion=	-11
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	139		End Beach Width=	122
2009	Beginning Width=	139	2018	Beginning Width=	122
	Annual Erosion=	-16		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	2
	End Beach Width=	123		End Beach Width=	124
2010	Beginning Width=	123	2019	Beginning Width=	124
	Annual Erosion=			Annual Erosion=	-17
	Annual Accretion=	7		Annual Accretion=	
	End Beach Width=	130		End Beach Width=	107
2011	Beginning Width=	130	2020	Beginning Width=	107
	Annual Erosion=	-10		Annual Erosion=	-8
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	120		End Beach Width=	99
2012	Beginning Width=	120	2021	Beginning Width=	99
	Annual Erosion=	-11		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	1
	End Beach Width=	109		End Beach Width=	100
2013	Beginning Width=	109	2022	Beginning Width=	100
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	21		Annual Accretion=	23
	End Beach Width=	130		End Beach Width=	123
2014	Beginning Width=	130	2023	Beginning Width=	123
	Annual Erosion=			Annual Erosion=	-3
	Annual Accretion=	10		Annual Accretion=	
	End Beach Width=	140		End Beach Width=	120


R-70
Emergency-Berm 73,200 (2023)
R-58A to R-79 Upland Source
Fill Placement 57,330 CY (2021)
T-62 to R-74 Upland Source
Hurricane Ian (Sept. 2022)
Hurricane Irma (Sept. 2017)
Fill Placement 66,000 CY from
R-61 to R-64 & T-69 to R-72 (2013)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 18,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
-3.0 ft
23.0 ft
1.0 ft
-8.0 ft
-17.0 ft
2.0 ft
-11.0 ft
-3.0 ft
-16.0 ft
10.0 ft
21.0 ft
-11.0 ft
-10.0 ft
7.0 ft
-16.0 ft
-1.0 ft
-28.0 ft
99.0 ft
120
123
100
99
107
124
122
133
136
140
130
109
120
130
123
139
140
168
69
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-71

	2005 Beach Width=	62

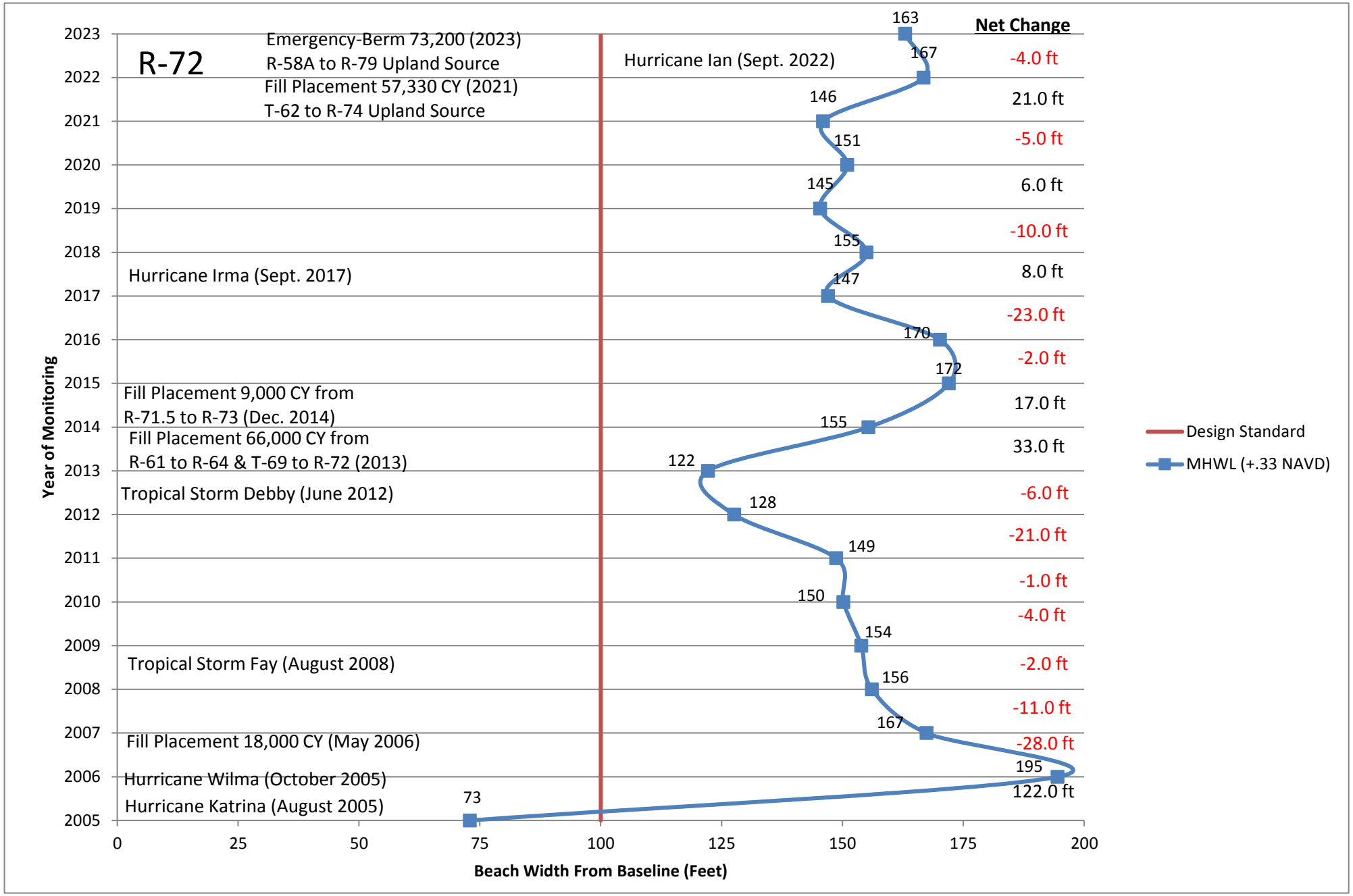
2006	Beginning Width=	62	2015	Beginning Width=	144
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	116		Annual Accretion=	3
	End Beach Width=	178		End Beach Width=	147
2007	Beginning Width=	178	2016	Beginning Width=	147
	Annual Erosion=	-33		Annual Erosion=	-8
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	145		End Beach Width=	139
2008	Beginning Width=	145	2017	Beginning Width=	139
	Annual Erosion=	-6		Annual Erosion=	-15
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	139		End Beach Width=	124
2009	Beginning Width=	139	2018	Beginning Width=	124
	Annual Erosion=	-10		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	13
	End Beach Width=	129		End Beach Width=	137
2010	Beginning Width=	129	2019	Beginning Width=	137
	Annual Erosion=			Annual Erosion=	-12
	Annual Accretion=	3		Annual Accretion=	
	End Beach Width=	132		End Beach Width=	125
2011	Beginning Width=	132	2020	Beginning Width=	125
	Annual Erosion=	-7		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	4
	End Beach Width=	125		End Beach Width=	129
2012	Beginning Width=	125	2021	Beginning Width=	129
	Annual Erosion=	-13		Annual Erosion=	-8
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	112		End Beach Width=	121
2013	Beginning Width=	112	2022	Beginning Width=	121
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	11		Annual Accretion=	26
	End Beach Width=	123		End Beach Width=	147
2014	Beginning Width=	123	2023	Beginning Width=	147
	Annual Erosion=			Annual Erosion=	-8
	Annual Accretion=	21		Annual Accretion=	
	End Beach Width=	144		End Beach Width=	139


R-71
Emergency-Berm 73,200 (2023)
R-58A to R-79 Upland Source
Fill Placement 57,330 CY (2021)
T-62 to R-74 Upland Source
Hurricane Irma (Sept. 2017)
Fill Placement 9,000 CY from
R-71.5 to R-73 (Dec. 2014)
Fill Placement 66,000 CY from
R-61 to R-64 & T-69 to R-72 (2013)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 26,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Hurricane Ian (Sept. 2022)
Net Change
-8.0 ft
26.0 ft
-8.0 ft
4.0 ft
-12.0 ft
13.0 ft
-15.0 ft
-8.0 ft
3.0 ft
21.0 ft
11.0 ft
-13.0 ft
-7.0 ft
3.0 ft
-10.0 ft
-6.0 ft
-33.0 ft
116.0 ft
139
147
121
129
125
137
124
139
147
144
123
112
125
132
129
139
145
178
62
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-72

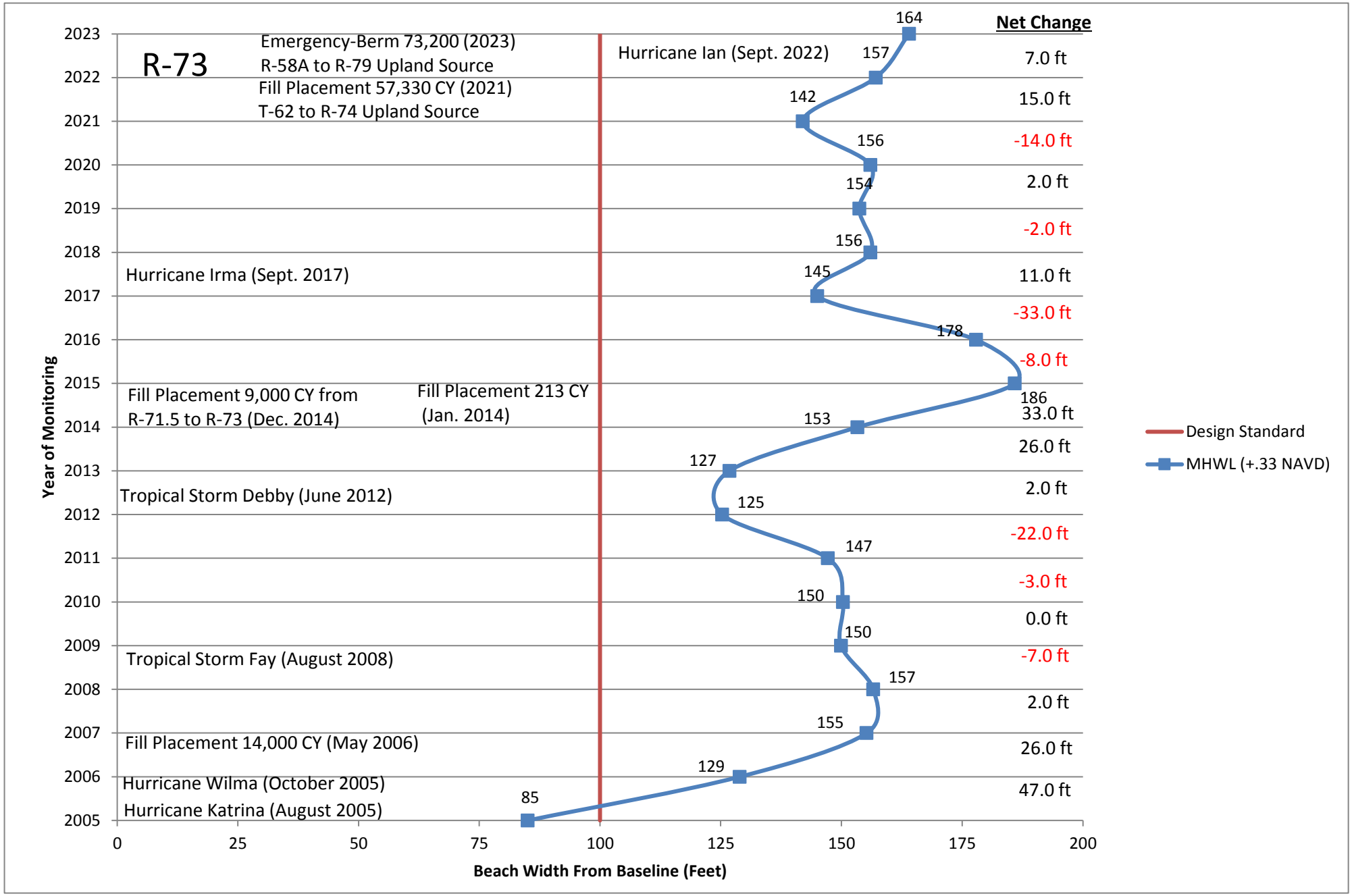
	2005 Beach Width=	73

2006	Beginning Width=	73	2015	Beginning Width=	155
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	122		Annual Accretion=	17
	End Beach Width=	195		End Beach Width=	172
2007	Beginning Width=	195	2016	Beginning Width=	172
	Annual Erosion=	-28		Annual Erosion=	-2
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	167		End Beach Width=	170
2008	Beginning Width=	167	2017	Beginning Width=	170
	Annual Erosion=	-11		Annual Erosion=	-23
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	156		End Beach Width=	147
2009	Beginning Width=	156	2018	Beginning Width=	147
	Annual Erosion=	-2		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	8
	End Beach Width=	154		End Beach Width=	155
2010	Beginning Width=	154	2019	Beginning Width=	155
	Annual Erosion=	-4		Annual Erosion=	-10
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	150		End Beach Width=	145
2011	Beginning Width=	150	2020	Beginning Width=	145
	Annual Erosion=	-1		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	6
	End Beach Width=	149		End Beach Width=	151
2012	Beginning Width=	149	2021	Beginning Width=	151
	Annual Erosion=	-21		Annual Erosion=	-5
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	128		End Beach Width=	146
2013	Beginning Width=	128	2022	Beginning Width=	146
	Annual Erosion=	-6		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	21
	End Beach Width=	122		End Beach Width=	167
2014	Beginning Width=	122	2023	Beginning Width=	167
	Annual Erosion=			Annual Erosion=	-4
	Annual Accretion=	33		Annual Accretion=	
	End Beach Width=	155		End Beach Width=	163


R-72
Emergency-Berm 73,200 (2023)
R-58A to R-79 Upland Source
Fill Placement 57,330 CY (2021)
T-62 to R-74 Upland Source
Hurricane Ian (Sept. 2022)
Hurricane Irma (Sept. 2017)
Fill Placement 9,000 CY from
R-71.5 to R-73 (Dec. 2014)
Fill Placement 66,000 CY from
R-61 to R-64 & T-69 to R-72 (2013)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 18,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
-4.0 ft
21.0 ft
-5.0 ft
6.0 ft
-10.0 ft
8.0 ft
-23.0 ft
-2.0 ft
17.0 ft
33.0 ft
-6.0 ft
-21.0 ft
-1.0 ft
-4.0 ft
-2.0 ft
-11.0 ft
-28.0 ft
122.0 ft
163
167
146
151
145
155
147
170
172
155
122
128
149
150
154
156
167
195
73
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-73

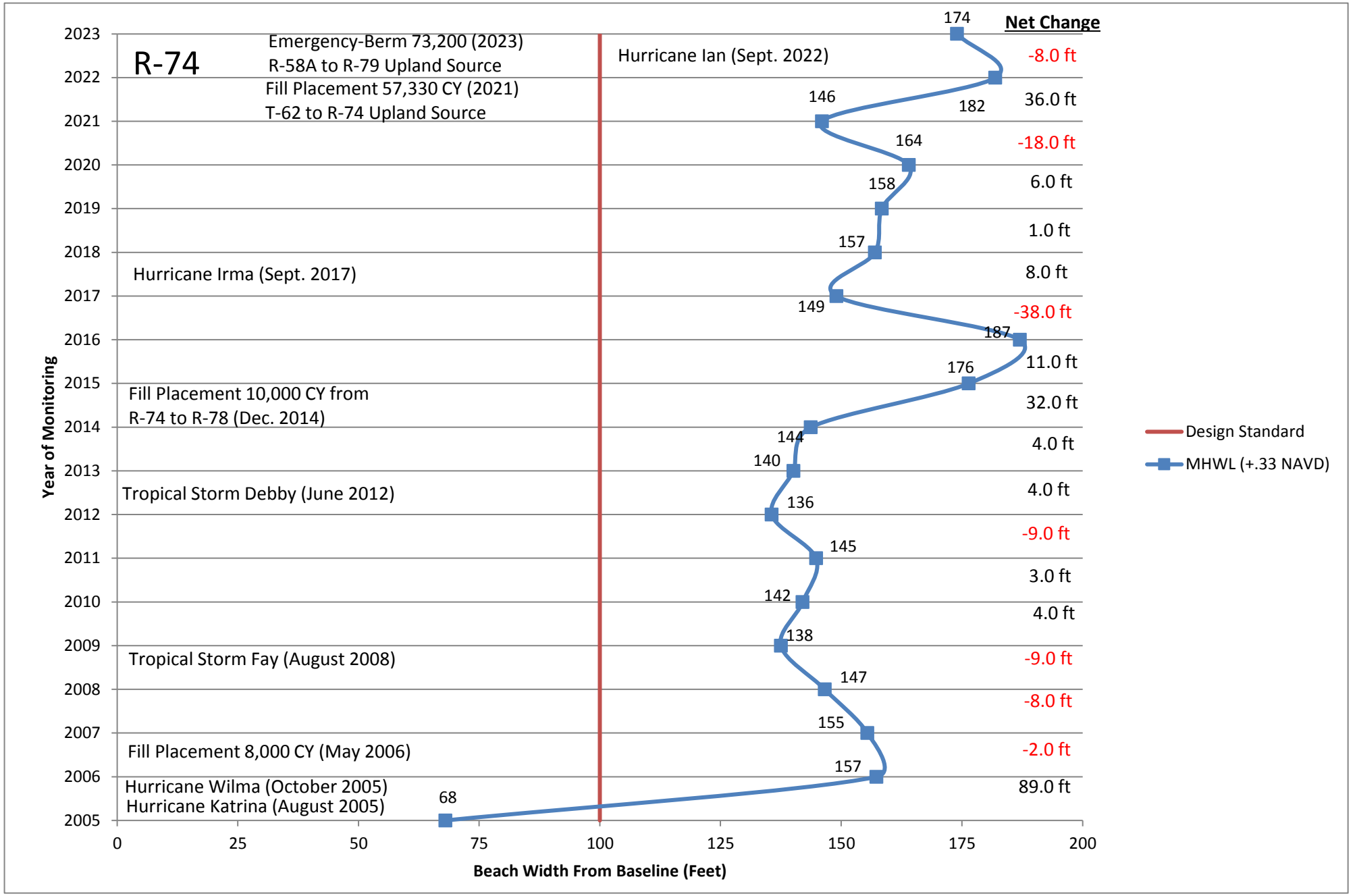
	2005 Beach Width=	85			
2006	Beginning Width=	85	2015	Beginning Width=	153
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	44		Annual Accretion=	33
	End Beach Width=	129		End Beach Width=	186
2007	Beginning Width=	129	2016	Beginning Width=	186
	Annual Erosion=			Annual Erosion=	-8
	Annual Accretion=	26		Annual Accretion=	
	End Beach Width=	155		End Beach Width=	178
2008	Beginning Width=	155	2017	Beginning Width=	178
	Annual Erosion=			Annual Erosion=	-33
	Annual Accretion=	2		Annual Accretion=	
	End Beach Width=	157		End Beach Width=	145
2009	Beginning Width=	157	2018	Beginning Width=	145
	Annual Erosion=	-7		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	11
	End Beach Width=	150		End Beach Width=	156
2010	Beginning Width=	150	2019	Beginning Width=	156
	Annual Erosion=			Annual Erosion=	-2
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	150		End Beach Width=	154
2011	Beginning Width=	150	2020	Beginning Width=	154
	Annual Erosion=	-3		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	2
	End Beach Width=	147		End Beach Width=	156
2012	Beginning Width=	147	2021	Beginning Width=	156
	Annual Erosion=	-22		Annual Erosion=	-14
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	125		End Beach Width=	142
2013	Beginning Width=	125	2022	Beginning Width=	142
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	2		Annual Accretion=	15
	End Beach Width=	127		End Beach Width=	157
2014	Beginning Width=	127	2023	Beginning Width=	157
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	26		Annual Accretion=	7
	End Beach Width=	153		End Beach Width=	164


R-73
Emergency-Berm 73,200 (2023)
R-58A to R-79 Upland Source
Fill Placement 57,330 CY (2021)
T-62 to R-74 Upland Source
Hurricane Ian (Sept. 2022)
Hurricane Irma (Sept. 2017)
Fill Placement 9,000 CY from
R-71.5 to R-73 (Dec. 2014)
Fill Placement 213 CY
(Jan. 2014)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 14,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
7.0 ft
15.0 ft
-14.0 ft
2.0 ft
-2.0 ft
11.0 ft
-33.0 ft
-8.0 ft
33.0 ft
26.0 ft
2.0 ft
-22.0 ft
-3.0 ft
0.0 ft
-7.0 ft
2.0 ft
26.0 ft
47.0 ft
164
157
142
156
154
156
145
178
186
153
127
125
147
150
150
157
155
129
85
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-74

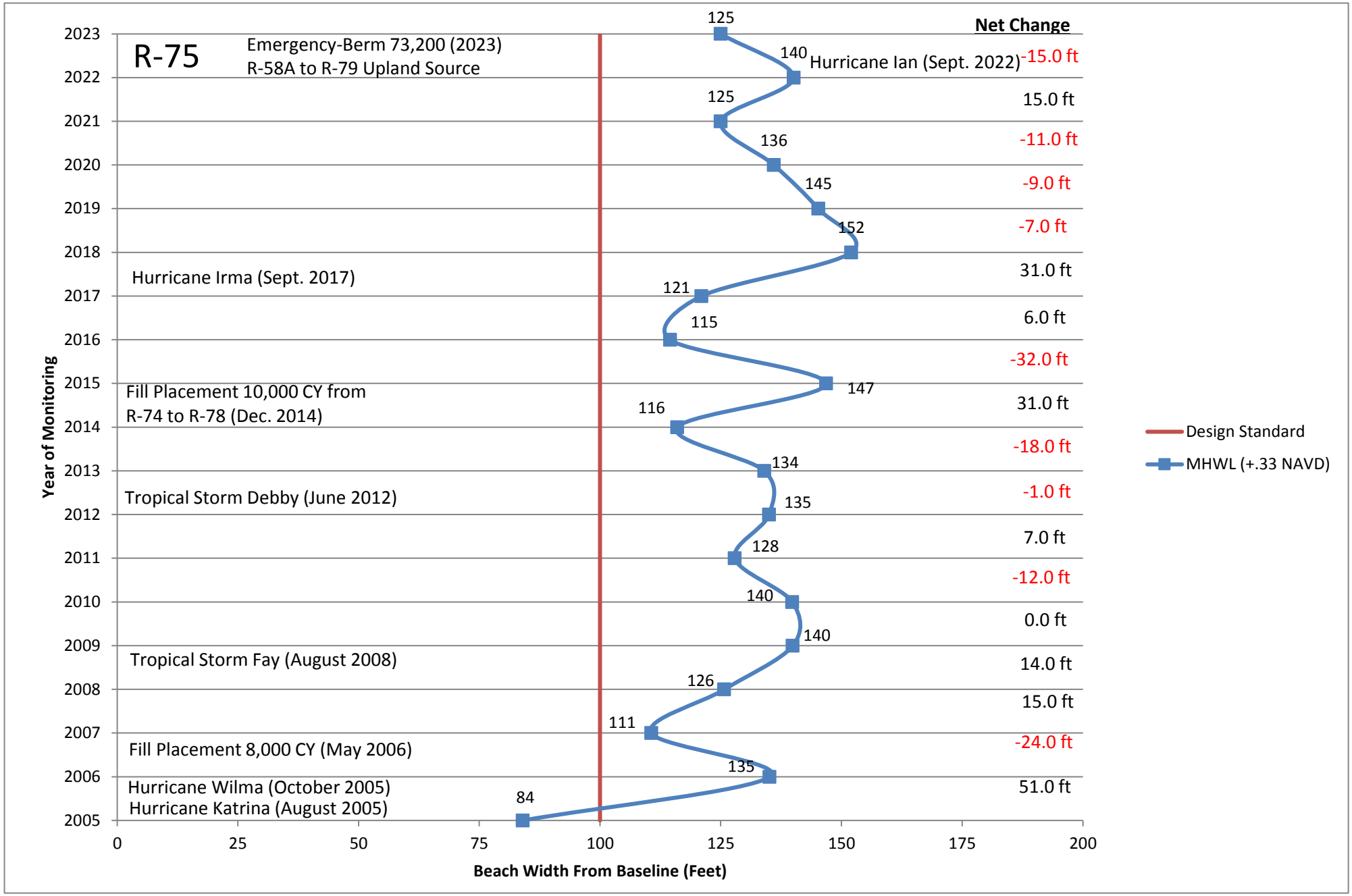
	2005 Beach Width=	68

2006	Beginning Width=	68	2015	Beginning Width=	144
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	89		Annual Accretion=	32
	End Beach Width=	157		End Beach Width=	176
2007	Beginning Width=	157	2016	Beginning Width=	176
	Annual Erosion=	-2		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	11
	End Beach Width=	155		End Beach Width=	187
2008	Beginning Width=	155	2017	Beginning Width=	187
	Annual Erosion=	-8		Annual Erosion=	-38
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	147		End Beach Width=	149
2009	Beginning Width=	147	2018	Beginning Width=	149
	Annual Erosion=	-9		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	8
	End Beach Width=	138		End Beach Width=	157
2010	Beginning Width=	138	2019	Beginning Width=	157
	Annual Erosion=	4		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	1
	End Beach Width=	142		End Beach Width=	158
2011	Beginning Width=	142	2020	Beginning Width=	158
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	3		Annual Accretion=	6
	End Beach Width=	145		End Beach Width=	164
2012	Beginning Width=	145	2021	Beginning Width=	164
	Annual Erosion=	-9		Annual Erosion=	-18
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	136		End Beach Width=	146
2013	Beginning Width=	136	2022	Beginning Width=	146
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	4		Annual Accretion=	36
	End Beach Width=	140		End Beach Width=	182
2014	Beginning Width=	140	2023	Beginning Width=	182
	Annual Erosion=			Annual Erosion=	-8
	Annual Accretion=	4		Annual Accretion=	
	End Beach Width=	144		End Beach Width=	174


R-74
Emergency-Berm 73,200 (2023)
R-58A to R-79 Upland Source
Fill Placement 57,330 CY (2021)
T-62 to R-74 Upland Source
Hurricane Ian (Sept. 2022)
Hurricane Irma (Sept. 2017)
Fill Placement 10,000 CY from
R-74 to R-78 (Dec. 2014)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 8,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
-8.0 ft
36.0 ft
-18.0 ft
6.0 ft
1.0 ft
8.0 ft
-38.0 ft
11.0 ft
32.0 ft
4.0 ft
4.0 ft
-9.0 ft
3.0 ft
4.0 ft
-9.0 ft
-8.0 ft
-2.0 ft
89.0 ft
174
182
146
164
158
157
149
187
176
144
140
136
145
142
138
147
155
157
68
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-75

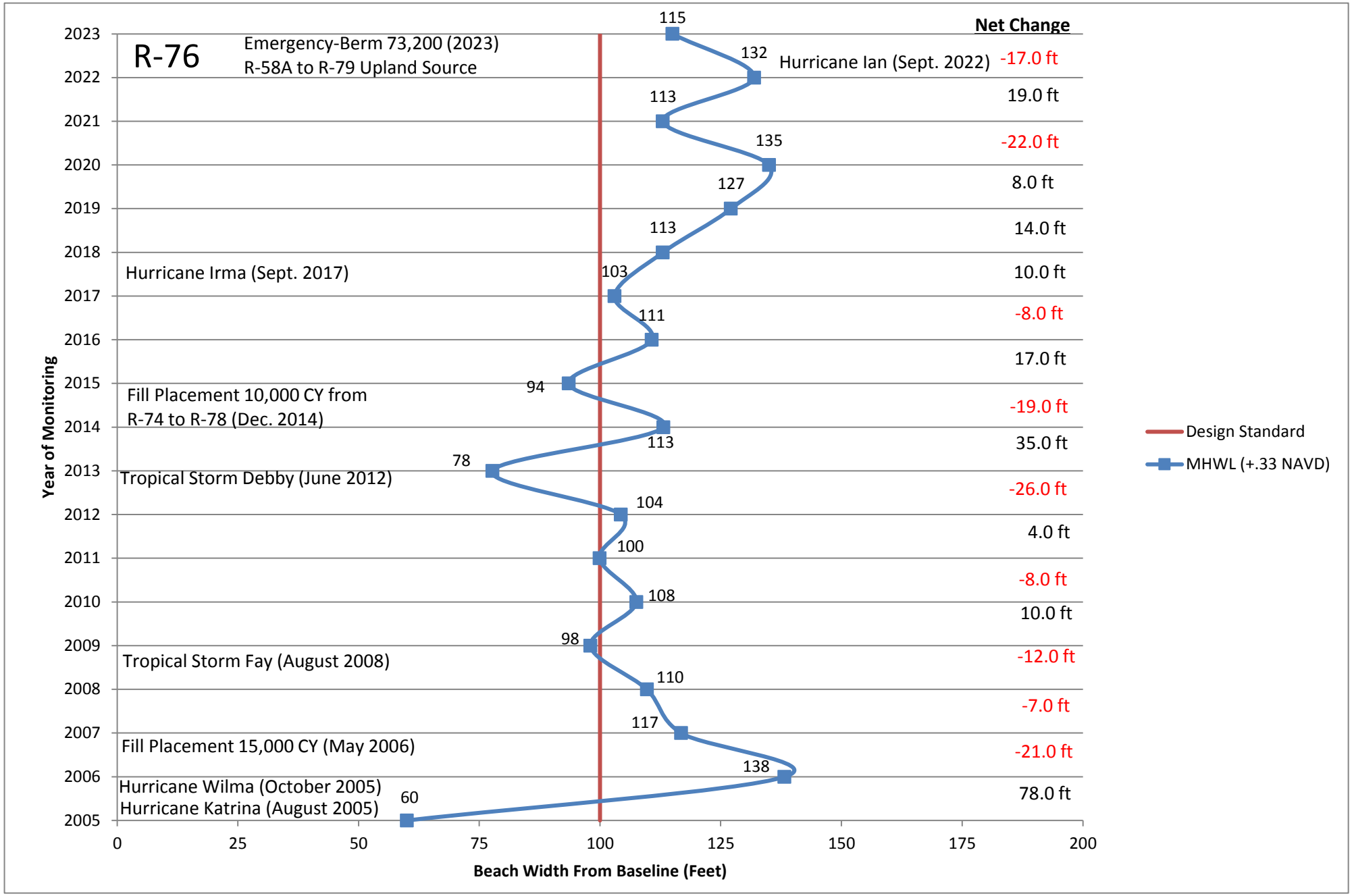
	2005 Beach Width=	84			
2006	Beginning Width=	84	2015	Beginning Width=	116
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	51		Annual Accretion=	31
	End Beach Width=	135		End Beach Width=	147
2007	Beginning Width=	135	2016	Beginning Width=	147
	Annual Erosion=	-24		Annual Erosion=	-32
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	111		End Beach Width=	115
2008	Beginning Width=	111	2017	Beginning Width=	115
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	15		Annual Accretion=	6
	End Beach Width=	126		End Beach Width=	121
2009	Beginning Width=	126	2018	Beginning Width=	121
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	14		Annual Accretion=	31
	End Beach Width=	140		End Beach Width=	152
2010	Beginning Width=	140	2019	Beginning Width=	152
	Annual Erosion=			Annual Erosion=	-7
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	140		End Beach Width=	145
2011	Beginning Width=	140	2020	Beginning Width=	145
	Annual Erosion=	-12		Annual Erosion=	-9
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	128		End Beach Width=	136
2012	Beginning Width=	128	2021	Beginning Width=	136
	Annual Erosion=			Annual Erosion=	-11
	Annual Accretion=	7		Annual Accretion=	
	End Beach Width=	135		End Beach Width=	125
2013	Beginning Width=	135	2022	Beginning Width=	125
	Annual Erosion=	-1		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	15
	End Beach Width=	134		End Beach Width=	140
2014	Beginning Width=	134	2023	Beginning Width=	140
	Annual Erosion=	-18		Annual Erosion=	-15
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	116		End Beach Width=	125


R-75
Emergency-Berm 73,200 (2023)
R-58A to R-79 Upland Source
Hurricane Ian (Sept. 2022)
Hurricane Irma (Sept. 2017)
Fill Placement 10,000 CY from
R-74 to R-78 (Dec. 2014)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 8,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
-15.0 ft
15.0 ft
-11.0 ft
-9.0 ft
-7.0 ft
31.0 ft
6.0 ft
-32.0 ft
31.0 ft
-18.0 ft
-1.0 ft
7.0 ft
-12.0 ft
0.0 ft
14.0 ft
15.0 ft
-24.0 ft
51.0 ft
125
140
125
136
145
152
121
115
147
116
134
135
128
140
140
126
111
135
84
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-76

	2005 Beach Width=	60

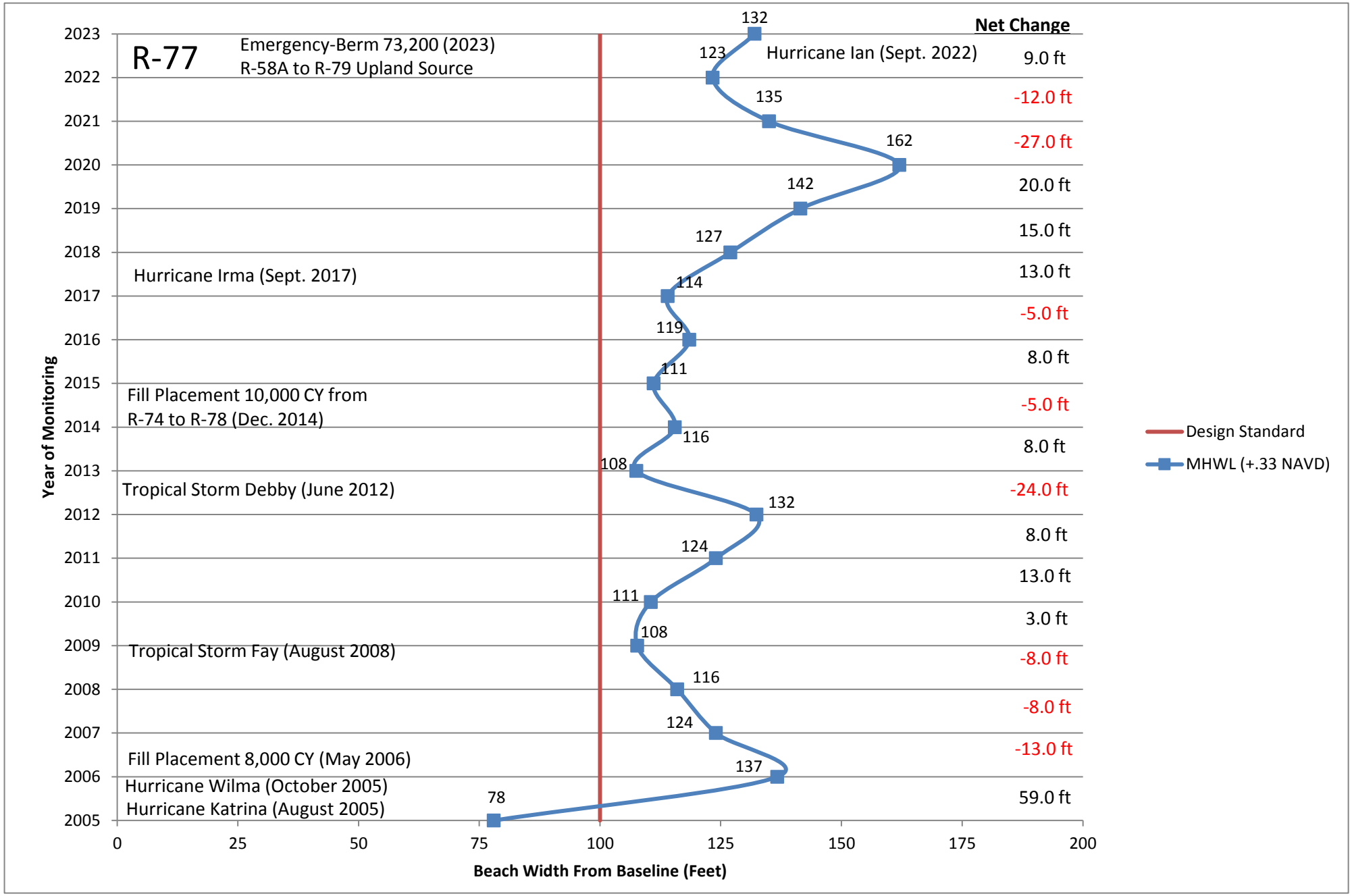
2006	Beginning Width=	60	2015	Beginning Width=	113
	Annual Erosion=			Annual Erosion=	-19
	Annual Accretion=	78		Annual Accretion=	
	End Beach Width=	138		End Beach Width=	94
2007	Beginning Width=	138	2016	Beginning Width=	94
	Annual Erosion=	-21		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	17
	End Beach Width=	117		End Beach Width=	111
2008	Beginning Width=	117	2017	Beginning Width=	111
	Annual Erosion=	-7		Annual Erosion=	-8
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	110		End Beach Width=	103
2009	Beginning Width=	110	2018	Beginning Width=	103
	Annual Erosion=	-12		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	10
	End Beach Width=	98		End Beach Width=	113
2010	Beginning Width=	98	2019	Beginning Width=	113
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	10		Annual Accretion=	14
	End Beach Width=	108		End Beach Width=	127
2011	Beginning Width=	108	2020	Beginning Width=	127
	Annual Erosion=	-8		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	8
	End Beach Width=	100		End Beach Width=	135
2012	Beginning Width=	100	2021	Beginning Width=	135
	Annual Erosion=			Annual Erosion=	-22
	Annual Accretion=	4		Annual Accretion=	
	End Beach Width=	104		End Beach Width=	113
2013	Beginning Width=	104	2022	Beginning Width=	113
	Annual Erosion=	-26		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	19
	End Beach Width=	78		End Beach Width=	132
2014	Beginning Width=	78	2023	Beginning Width=	132
	Annual Erosion=			Annual Erosion=	-17
	Annual Accretion=	35		Annual Accretion=	
	End Beach Width=	113		End Beach Width=	115


R-76
Emergency-Berm 73,200 (2023)
R-58A to R-79 Upland Source
Hurricane Ian (Sept. 2022)
Hurricane Irma (Sept. 2017)
Fill Placement 10,000 CY from
R-74 to R-78 (Dec. 2014)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 15,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
-17.0 ft
19.0 ft
-22.0 ft
8.0 ft
14.0 ft
10.0 ft
-8.0 ft
17.0 ft
-19.0 ft
35.0 ft
-26.0 ft
4.0 ft
-8.0 ft
10.0 ft
-12.0 ft
-7.0 ft
-21.0 ft
78.0 ft
115
132
113
135
127
113
103
111
94
113
78
104
100
108
98
110
117
138
60
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-77

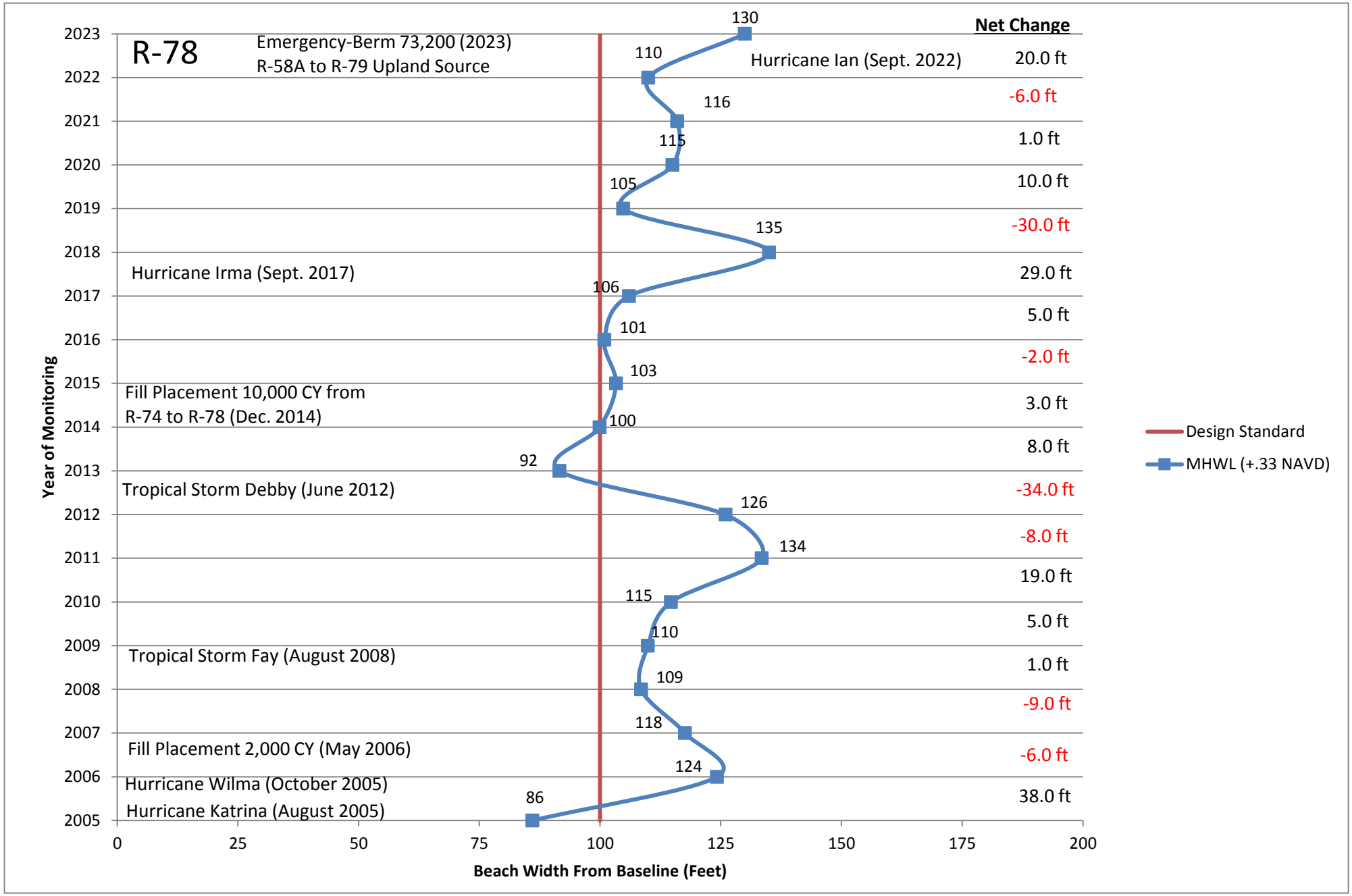
	2005 Beach Width=	78

2006	Beginning Width=	78	2015	Beginning Width=	116
	Annual Erosion=			Annual Erosion=	-5
	Annual Accretion=	59		Annual Accretion=	
	End Beach Width=	137		End Beach Width=	111
2007	Beginning Width=	137	2016	Beginning Width=	111
	Annual Erosion=	-13		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	8
	End Beach Width=	124		End Beach Width=	119
2008	Beginning Width=	124	2017	Beginning Width=	119
	Annual Erosion=	-8		Annual Erosion=	-5
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	116		End Beach Width=	114
2009	Beginning Width=	116	2018	Beginning Width=	114
	Annual Erosion=	-8		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	13
	End Beach Width=	108		End Beach Width=	127
2010	Beginning Width=	108	2019	Beginning Width=	127
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	3		Annual Accretion=	15
	End Beach Width=	111		End Beach Width=	142
2011	Beginning Width=	111	2020	Beginning Width=	142
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	13		Annual Accretion=	20
	End Beach Width=	124		End Beach Width=	162
2012	Beginning Width=	124	2021	Beginning Width=	162
	Annual Erosion=			Annual Erosion=	-27
	Annual Accretion=	8		Annual Accretion=	
	End Beach Width=	132		End Beach Width=	135
2013	Beginning Width=	132	2022	Beginning Width=	135
	Annual Erosion=	-24		Annual Erosion=	-12
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	108		End Beach Width=	123
2014	Beginning Width=	108	2023	Beginning Width=	123
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	8		Annual Accretion=	9
	End Beach Width=	116		End Beach Width=	132


R-77
Emergency-Berm 73,200 (2023)
R-58A to R-79 Upland Source
Hurricane Ian (Sept. 2022)
Hurricane Irma (Sept. 2017)
Fill Placement 10,000 CY from
R-74 to R-78 (Dec. 2014)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 8,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
9.0 ft
-12.0 ft
-27.0 ft
20.0 ft
15.0 ft
13.0 ft
-5.0 ft
8.0 ft
-5.0 ft
8.0 ft
-24.0 ft
8.0 ft
13.0 ft
3.0 ft
-8.0 ft
-8.0 ft
-13.0 ft
59.0 ft
132
123
135
162
142
127
114
119
111
116
108
132
124
111
108
116
124
137
78
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-78

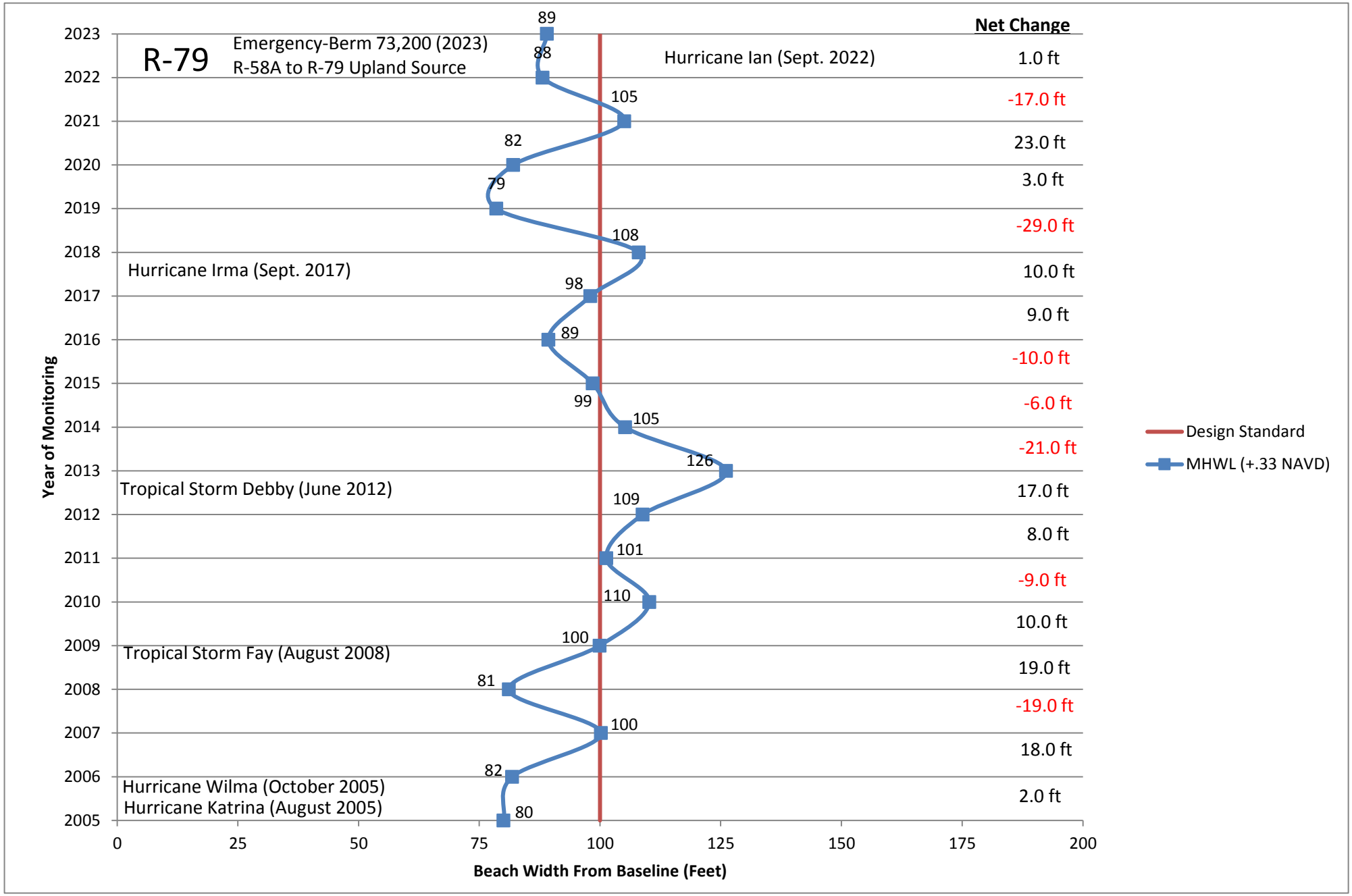
	2005 Beach Width=	86			
2006	Beginning Width=	86	2015	Beginning Width=	100
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	38		Annual Accretion=	3
	End Beach Width=	124		End Beach Width=	103
2007	Beginning Width=	124	2016	Beginning Width=	103
	Annual Erosion=	-6		Annual Erosion=	-2
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	118		End Beach Width=	101
2008	Beginning Width=	118	2017	Beginning Width=	101
	Annual Erosion=	-9		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	5
	End Beach Width=	109		End Beach Width=	106
2009	Beginning Width=	109	2018	Beginning Width=	106
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	1		Annual Accretion=	29
	End Beach Width=	110		End Beach Width=	135
2010	Beginning Width=	110	2019	Beginning Width=	135
	Annual Erosion=			Annual Erosion=	-30
	Annual Accretion=	5		Annual Accretion=	
	End Beach Width=	115		End Beach Width=	105
2011	Beginning Width=	115	2020	Beginning Width=	105
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	19		Annual Accretion=	10
	End Beach Width=	134		End Beach Width=	115
2012	Beginning Width=	134	2021	Beginning Width=	115
	Annual Erosion=	-8		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	1
	End Beach Width=	126		End Beach Width=	116
2013	Beginning Width=	126	2022	Beginning Width=	116
	Annual Erosion=	-34		Annual Erosion=	-6
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	92		End Beach Width=	110
2014	Beginning Width=	92	2023	Beginning Width=	110
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	8		Annual Accretion=	20
	End Beach Width=	100		End Beach Width=	130


R-78
Emergency-Berm 73,200 (2023)
R-58A to R-79 Upland Source
Hurricane Ian (Sept. 2022)
Hurricane Irma (Sept. 2017)
Fill Placement 10,000 CY from
R-74 to R-78 (Dec. 2014)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Fill Placement 2,000 CY (May 2006)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
20.0 ft
-6.0 ft
1.0 ft
10.0 ft
-30.0 ft
29.0 ft
5.0 ft
-2.0 ft
3.0 ft
8.0 ft
-34.0 ft
-8.0 ft
19.0 ft
5.0 ft
1.0 ft
-9.0 ft
-6.0 ft
38.0 ft
130
110
116
115
105
135
106
101
103
100
92
126
134
115
110
109
118
124
86
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-79

	2005 Beach Width=	80

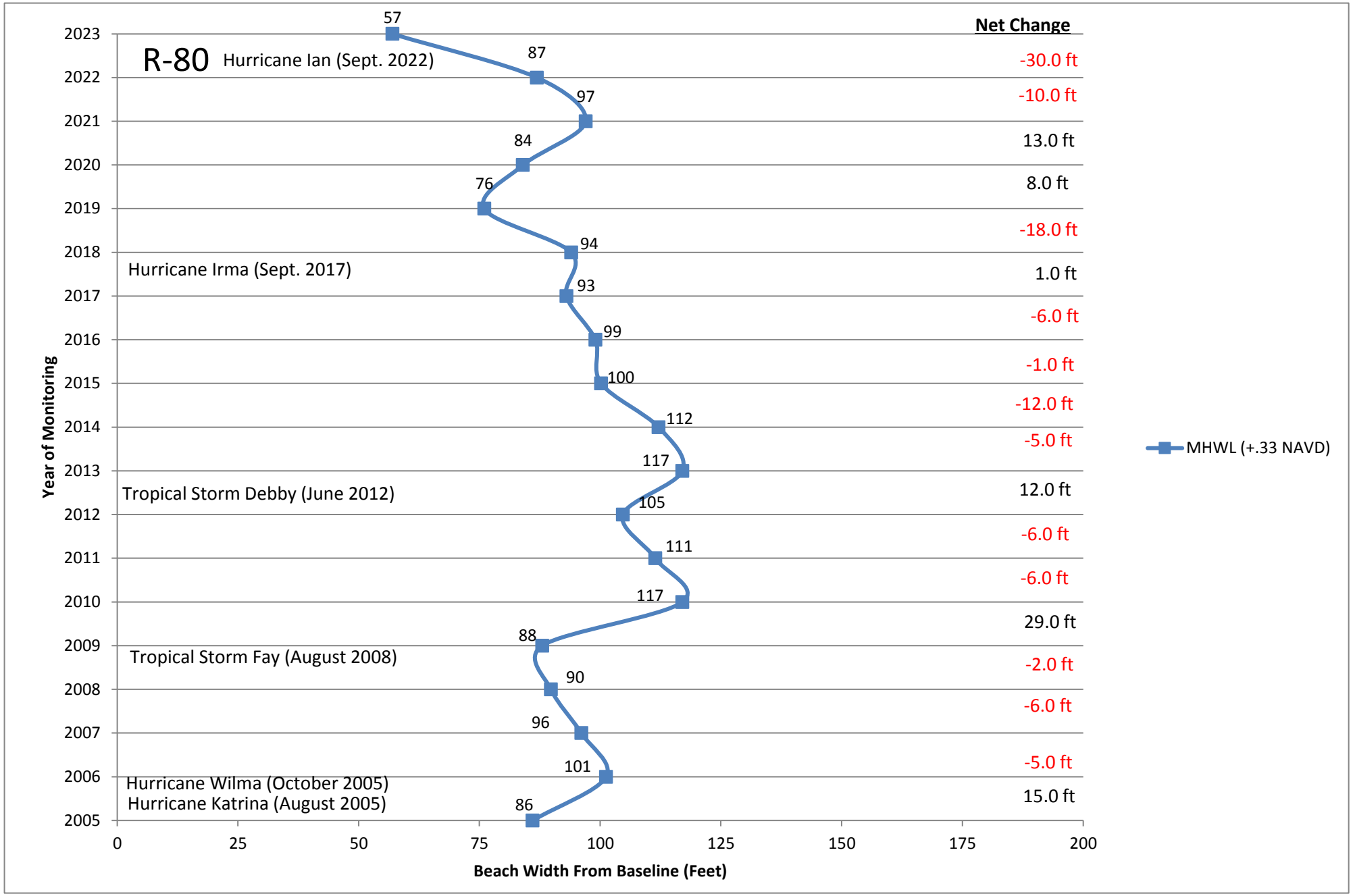
2006	Beginning Width=	80	2015	Beginning Width=	105
	Annual Erosion=			Annual Erosion=	-6
	Annual Accretion=	2		Annual Accretion=	
	End Beach Width=	82		End Beach Width=	99
2007	Beginning Width=	82	2016	Beginning Width=	99
	Annual Erosion=			Annual Erosion=	-10
	Annual Accretion=	18		Annual Accretion=	
	End Beach Width=	100		End Beach Width=	89
2008	Beginning Width=	100	2017	Beginning Width=	89
	Annual Erosion=	-19		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	9
	End Beach Width=	81		End Beach Width=	98
2009	Beginning Width=	81	2018	Beginning Width=	98
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	19		Annual Accretion=	10
	End Beach Width=	100		End Beach Width=	108
2010	Beginning Width=	100	2019	Beginning Width=	108
	Annual Erosion=			Annual Erosion=	-29
	Annual Accretion=	10		Annual Accretion=	
	End Beach Width=	110		End Beach Width=	79
2011	Beginning Width=	110	2020	Beginning Width=	79
	Annual Erosion=	-9		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	3
	End Beach Width=	101		End Beach Width=	82
2012	Beginning Width=	101	2021	Beginning Width=	82
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	8		Annual Accretion=	23
	End Beach Width=	109		End Beach Width=	105
2013	Beginning Width=	109	2022	Beginning Width=	105
	Annual Erosion=			Annual Erosion=	-17
	Annual Accretion=	17		Annual Accretion=	
	End Beach Width=	126		End Beach Width=	88
2014	Beginning Width=	126	2023	Beginning Width=	88
	Annual Erosion=	-21		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	1
	End Beach Width=	105		End Beach Width=	89


R-79
Emergency-Berm 73,200 (2023)
R-58A to R-79 Upland Source
Hurricane Ian (Sept. 2022)
Hurricane Irma (Sept. 2017)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
1.0 ft
-17.0 ft
23.0 ft
3.0 ft
-29.0 ft
10.0 ft
9.0 ft
-10.0 ft
-6.0 ft
-21.0 ft
17.0 ft
8.0 ft
-9.0 ft
10.0 ft
19.0 ft
-19.0 ft
18.0 ft
2.0 ft
89
88
105
82
79
108
98
89
99
105
126
109
101
110
100
81
100
82
80
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
Design Standard
MHWL (+.33 NAVD)

R-80

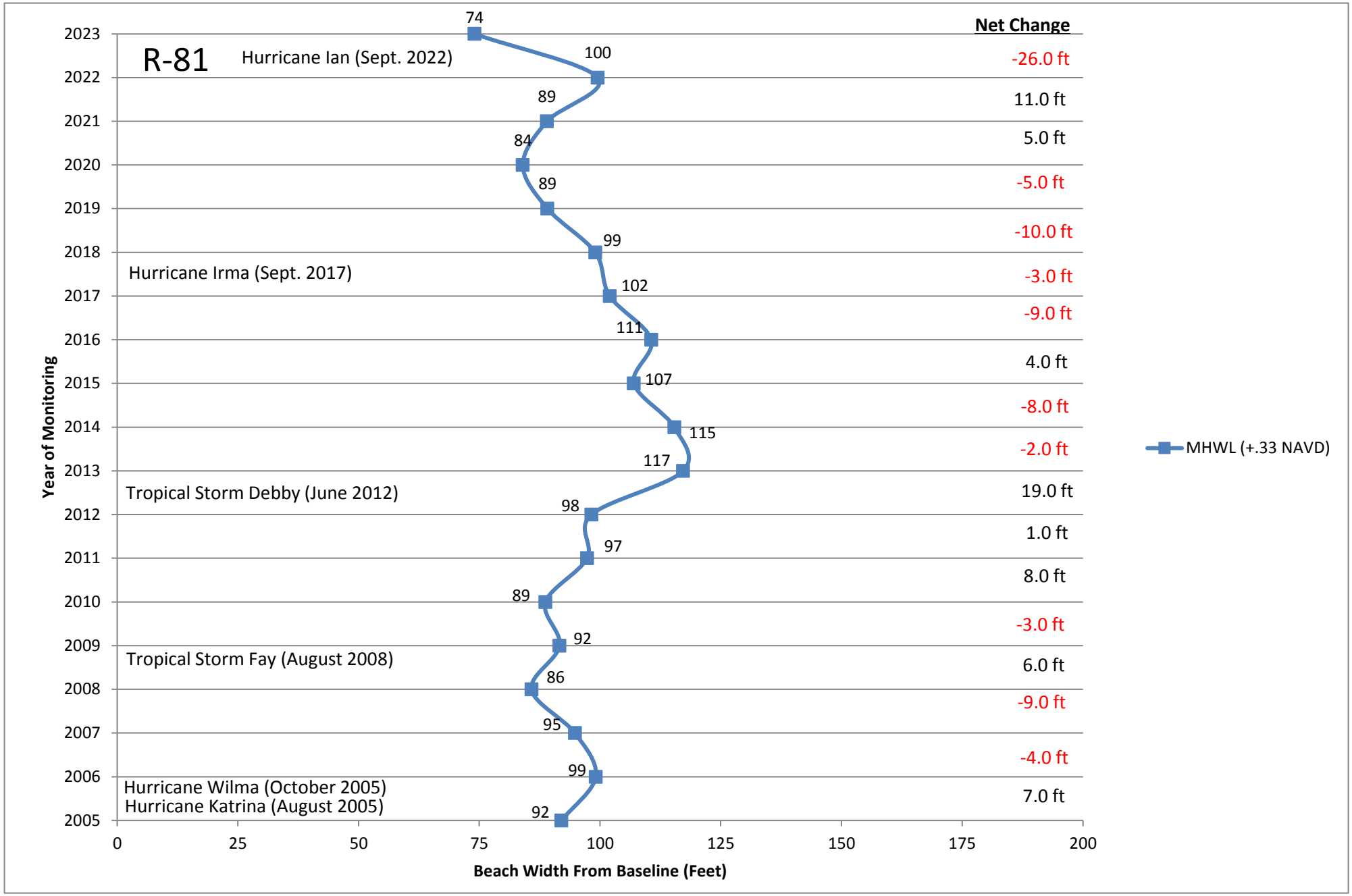
	2005 Beach Width=	86

2006	Beginning Width=	86	2015	Beginning Width=	112
	Annual Erosion=			Annual Erosion=	-12
	Annual Accretion=	15		Annual Accretion=	
	End Beach Width=	101		End Beach Width=	100
2007	Beginning Width=	101	2016	Beginning Width=	100
	Annual Erosion=	-5		Annual Erosion=	-1
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	96		End Beach Width=	99
2008	Beginning Width=	96	2017	Beginning Width=	99
	Annual Erosion=	-6		Annual Erosion=	-6
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	90		End Beach Width=	93
2009	Beginning Width=	90	2018	Beginning Width=	93
	Annual Erosion=	-2		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	1
	End Beach Width=	88		End Beach Width=	94
2010	Beginning Width=	88	2019	Beginning Width=	94
	Annual Erosion=			Annual Erosion=	-18
	Annual Accretion=	29		Annual Accretion=	
	End Beach Width=	117		End Beach Width=	76
2011	Beginning Width=	117	2020	Beginning Width=	76
	Annual Erosion=	-6		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	8
	End Beach Width=	111		End Beach Width=	84
2012	Beginning Width=	111	2021	Beginning Width=	84
	Annual Erosion=	-6		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	13
	End Beach Width=	105		End Beach Width=	97
2013	Beginning Width=	105	2022	Beginning Width=	97
	Annual Erosion=			Annual Erosion=	-10
	Annual Accretion=	12		Annual Accretion=	
	End Beach Width=	117		End Beach Width=	87
2014	Beginning Width=	117	2023	Beginning Width=	87
	Annual Erosion=	-5		Annual Erosion=	-30
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	112		End Beach Width=	57


R-80
Hurricane Ian (Sept. 2022)
Hurricane Irma (Sept. 2017)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
-30.0 ft
-10.0 ft
13.0 ft
8.0 ft
-18.0 ft
1.0 ft
-6.0 ft
-1.0 ft
-12.0 ft
-5.0 ft
12.0 ft
-6.0 ft
-6.0 ft
29.0 ft
-2.0 ft
-6.0 ft
-5.0 ft
15.0 ft
57
87
97
84
76
94
93
99
100
112
117
105
111
117
88
90
96
101
86
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
MHWL (+.33 NAVD)

R-81

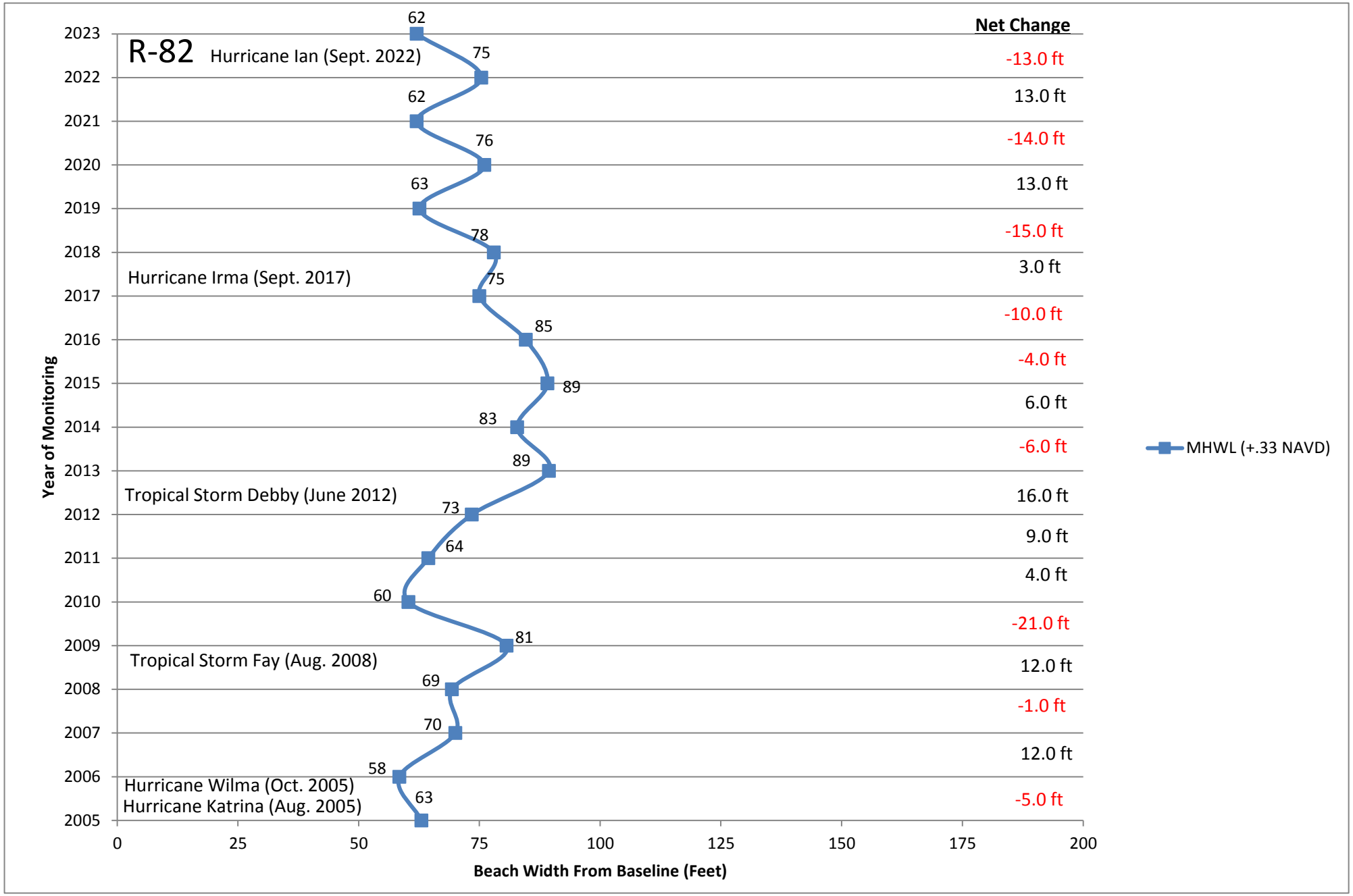
	2005 Beach Width=	92			
2006	Beginning Width=	92	2015	Beginning Width=	115
	Annual Erosion=			Annual Erosion=	-8
	Annual Accretion=	7		Annual Accretion=	
	End Beach Width=	99		End Beach Width=	107
2007	Beginning Width=	99	2016	Beginning Width=	107
	Annual Erosion=	-4		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	4
	End Beach Width=	95		End Beach Width=	111
2008	Beginning Width=	95	2017	Beginning Width=	111
	Annual Erosion=	-9		Annual Erosion=	-9
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	86		End Beach Width=	102
2009	Beginning Width=	86	2018	Beginning Width=	102
	Annual Erosion=			Annual Erosion=	-3
	Annual Accretion=	6		Annual Accretion=	
	End Beach Width=	92		End Beach Width=	99
2010	Beginning Width=	92	2019	Beginning Width=	99
	Annual Erosion=	-3		Annual Erosion=	-10
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	89		End Beach Width=	89
2011	Beginning Width=	89	2020	Beginning Width=	89
	Annual Erosion=			Annual Erosion=	-5
	Annual Accretion=	8		Annual Accretion=	
	End Beach Width=	97		End Beach Width=	84
2012	Beginning Width=	97	2021	Beginning Width=	84
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	1		Annual Accretion=	5
	End Beach Width=	98		End Beach Width=	89
2013	Beginning Width=	98	2022	Beginning Width=	89
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	19		Annual Accretion=	11
	End Beach Width=	117		End Beach Width=	100
2014	Beginning Width=	117	2023	Beginning Width=	100
	Annual Erosion=	-2		Annual Erosion=	-26
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	115		End Beach Width=	74


R-81
Hurricane Ian (Sept. 2022)
Hurricane Irma (Sept. 2017)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (August 2008)
Hurricane Wilma (October 2005)
Hurricane Katrina (August 2005)
Net Change
-26.0 ft
11.0 ft
5.0 ft
-5.0 ft
-10.0 ft
-3.0 ft
-9.0 ft
4.0 ft
-8.0 ft
-2.0 ft
19.0 ft
1.0 ft
8.0 ft
-3.0 ft
6.0 ft
-9.0 ft
-4.0 ft
7.0 ft
74
100
89
84
89
99
102
111
107
115
117
98
97
89
92
86
95
99
92
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
MHWL (+.33 NAVD)

R-82

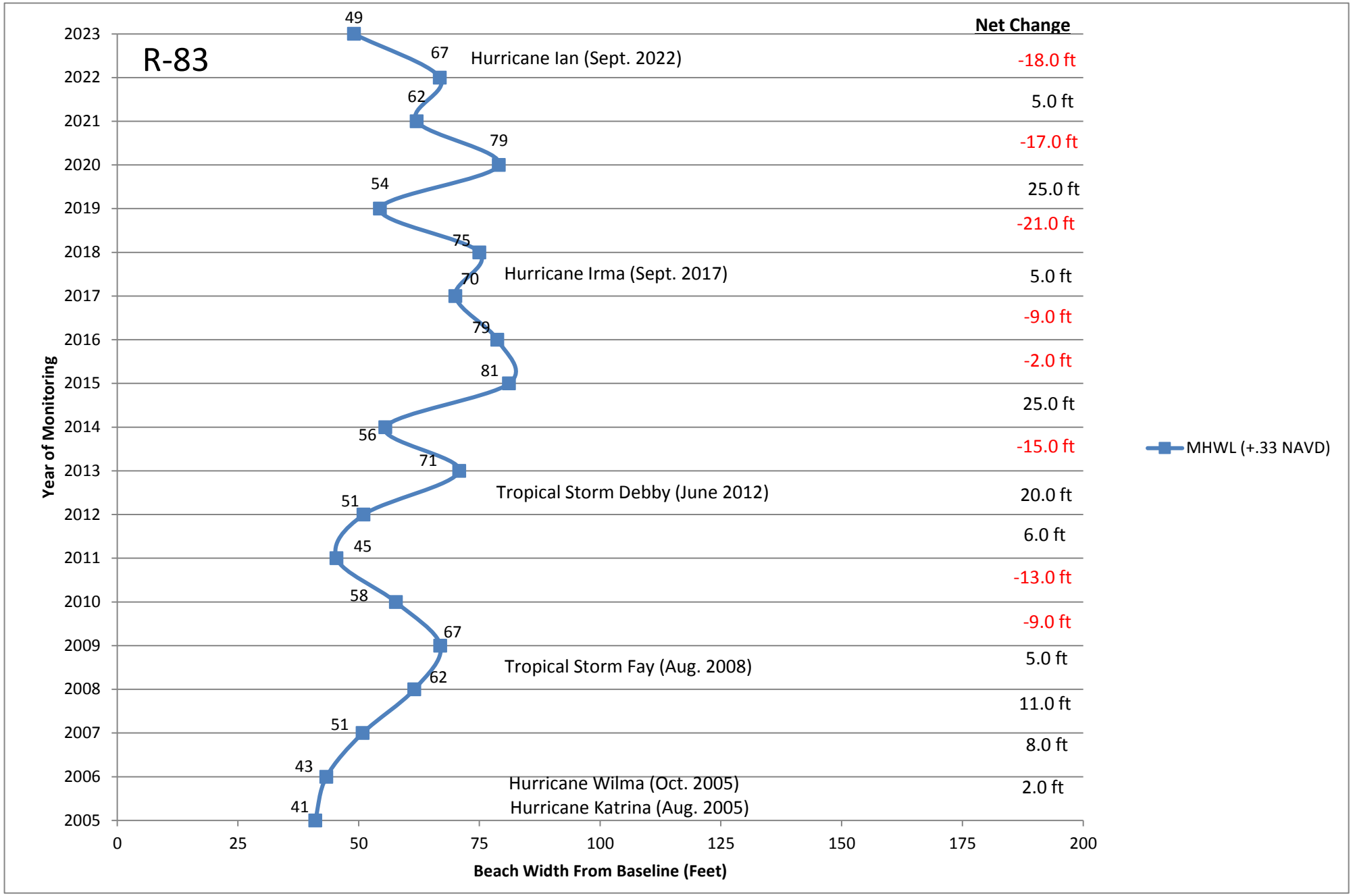
	2005 Beach Width=	63

2006	Beginning Width=	63	2015	Beginning Width=	83
	Annual Erosion=	-5		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	6
	End Beach Width=	58		End Beach Width=	89
2007	Beginning Width=	58	2016	Beginning Width=	89
	Annual Erosion=			Annual Erosion=	-4
	Annual Accretion=	12		Annual Accretion=	
	End Beach Width=	70		End Beach Width=	85
2008	Beginning Width=	70	2017	Beginning Width=	85
	Annual Erosion=	-1		Annual Erosion=	-10
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	69		End Beach Width=	75
2009	Beginning Width=	69	2018	Beginning Width=	75
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	12		Annual Accretion=	3
	End Beach Width=	81		End Beach Width=	78
2010	Beginning Width=	81	2019	Beginning Width=	78
	Annual Erosion=	-21		Annual Erosion=	-15
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	60		End Beach Width=	63
2011	Beginning Width=	60	2020	Beginning Width=	63
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	4		Annual Accretion=	13
	End Beach Width=	64		End Beach Width=	76
2012	Beginning Width=	64	2021	Beginning Width=	76
	Annual Erosion=			Annual Erosion=	-14
	Annual Accretion=	9		Annual Accretion=	
	End Beach Width=	73		End Beach Width=	62
2013	Beginning Width=	73	2022	Beginning Width=	62
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	16		Annual Accretion=	13
	End Beach Width=	89		End Beach Width=	75
2014	Beginning Width=	89	2023	Beginning Width=	75
	Annual Erosion=	-6		Annual Erosion=	-13
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	83		End Beach Width=	62


R-82
Hurricane Ian (Sept. 2022)
Hurricane Irma (Sept. 2017)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (Aug. 2008)
Hurricane Wilma (Oct. 2005)
Hurricane Katrina (Aug. 2005)
Net Change
-13.0 ft
13.0 ft
-14.0 ft
13.0 ft
-15.0 ft
3.0 ft
-10.0 ft
-4.0 ft
6.0 ft
-6.0 ft
16.0 ft
9.0 ft
4.0 ft
-21.0 ft
12.0 ft
-1.0 ft
12.0 ft
-5.0 ft
62
75
62
76
63
78
75
85
89
83
89
73
64
60
81
69
70
58
63
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
MHWL (+.33 NAVD)

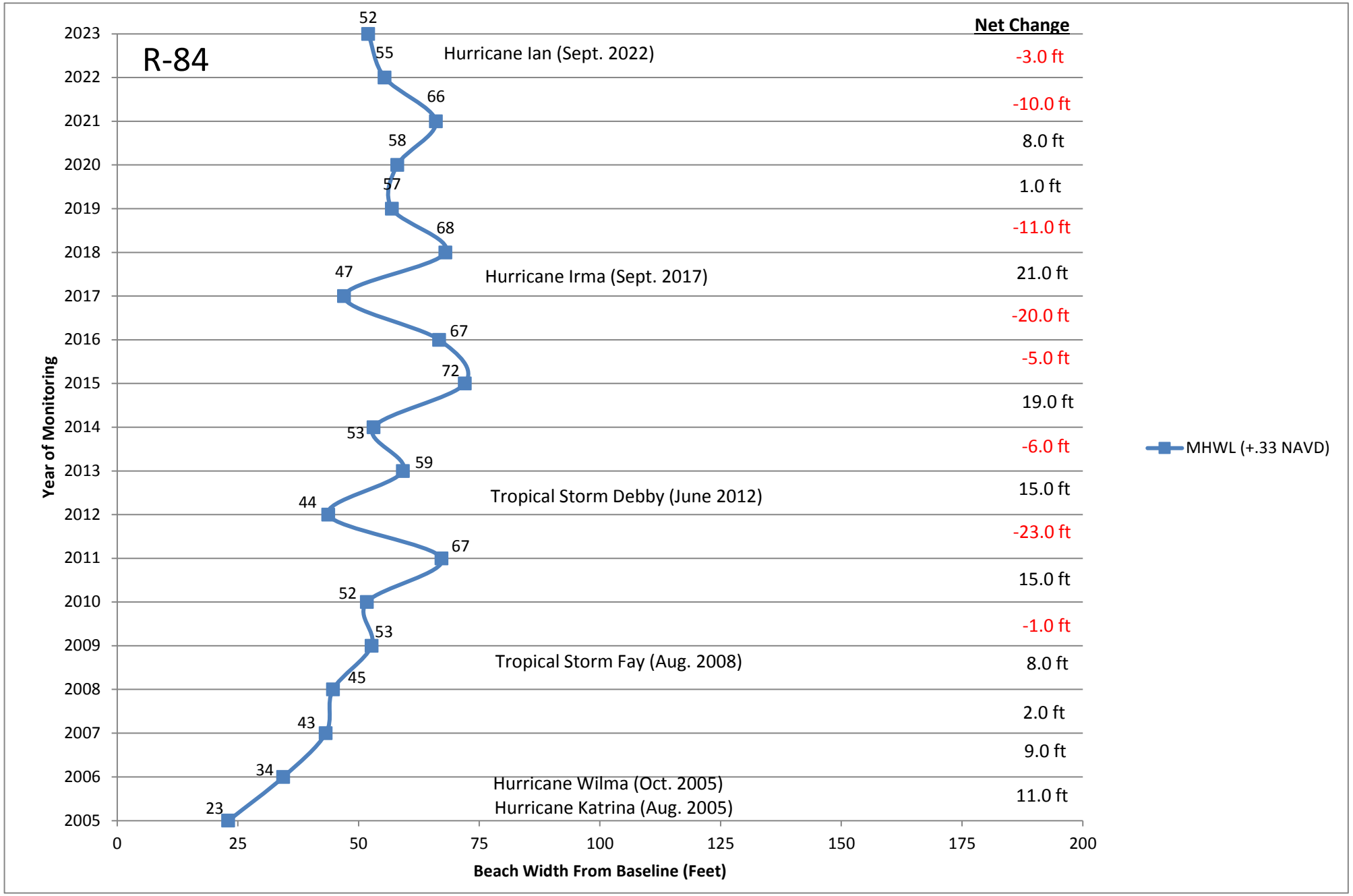
R-83

	2005 Beach Width=	41			
2006	Beginning Width=	41	2015	Beginning Width=	56
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	2		Annual Accretion=	25
	End Beach Width=	43		End Beach Width=	81
2007	Beginning Width=	43	2016	Beginning Width=	81
	Annual Erosion=			Annual Erosion=	-2
	Annual Accretion=	8		Annual Accretion=	
	End Beach Width=	51		End Beach Width=	79
2008	Beginning Width=	51	2017	Beginning Width=	79
	Annual Erosion=			Annual Erosion=	-9
	Annual Accretion=	11		Annual Accretion=	
	End Beach Width=	62		End Beach Width=	70
2009	Beginning Width=	62	2018	Beginning Width=	70
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	5		Annual Accretion=	5
	End Beach Width=	67		End Beach Width=	75
2010	Beginning Width=	67	2019	Beginning Width=	75
	Annual Erosion=	-9		Annual Erosion=	-21
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	58		End Beach Width=	54
2011	Beginning Width=	58	2020	Beginning Width=	54
	Annual Erosion=	-13		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	25
	End Beach Width=	45		End Beach Width=	79
2012	Beginning Width=	45	2021	Beginning Width=	79
	Annual Erosion=			Annual Erosion=	-17
	Annual Accretion=	6		Annual Accretion=	
	End Beach Width=	51		End Beach Width=	62
2013	Beginning Width=	51	2022	Beginning Width=	62
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	20		Annual Accretion=	5
	End Beach Width=	71		End Beach Width=	67
2014	Beginning Width=	71	2023	Beginning Width=	67
	Annual Erosion=	-15		Annual Erosion=	-18
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	56		End Beach Width=	49


R-83
Net Change
Hurricane Ian (Sept. 2022)
-18.0 ft
5.0 ft
-17.0 ft
25.0 ft
-21.0 ft
Hurricane Irma (Sept. 2017)
5.0 ft
-9.0 ft
-2.0 ft
25.0 ft
-15.0 ft
Tropical Storm Debby (June 2012)
20.0 ft
6.0 ft
-13.0 ft
-9.0 ft
Tropical Storm Fay (Aug. 2008)
5.0 ft
11.0 ft
8.0 ft
Hurricane Wilma (Oct. 2005)
Hurricane Katrina (Aug. 2005)
2.0 ft
49
67
62
79
54
75
70
79
81
56
71
51
45
58
67
62
51
43
41
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
MHWL (+.33 NAVD)

R-84

	2005 Beach Width=	23			
2006	Beginning Width=	23	2015	Beginning Width=	53
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	11		Annual Accretion=	19
	End Beach Width=	34		End Beach Width=	72
2007	Beginning Width=	34	2016	Beginning Width=	72
	Annual Erosion=			Annual Erosion=	-5
	Annual Accretion=	9		Annual Accretion=	
	End Beach Width=	43		End Beach Width=	67
2008	Beginning Width=	43	2017	Beginning Width=	67
	Annual Erosion=			Annual Erosion=	-20
	Annual Accretion=	2		Annual Accretion=	
	End Beach Width=	45		End Beach Width=	47
2009	Beginning Width=	45	2018	Beginning Width=	47
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	8		Annual Accretion=	21
	End Beach Width=	53		End Beach Width=	68
2010	Beginning Width=	53	2019	Beginning Width=	68
	Annual Erosion=	-1		Annual Erosion=	-11
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	52		End Beach Width=	57
2011	Beginning Width=	52	2020	Beginning Width=	57
	Annual Erosion=			Annual Erosion=	
	Annual Accretion=	15		Annual Accretion=	1
	End Beach Width=	67		End Beach Width=	58
2012	Beginning Width=	67	2021	Beginning Width=	58
	Annual Erosion=	-23		Annual Erosion=	
	Annual Accretion=			Annual Accretion=	8
	End Beach Width=	44		End Beach Width=	66
2013	Beginning Width=	44	2022	Beginning Width=	66
	Annual Erosion=			Annual Erosion=	-11
	Annual Accretion=	15		Annual Accretion=	
	End Beach Width=	59		End Beach Width=	55
2014	Beginning Width=	59	2023	Beginning Width=	55
	Annual Erosion=	-6		Annual Erosion=	-3
	Annual Accretion=			Annual Accretion=	
	End Beach Width=	53		End Beach Width=	52


R-84
Net Change
Hurricane Ian (Sept. 2022)
Hurricane Irma (Sept. 2017)
Tropical Storm Debby (June 2012)
Tropical Storm Fay (Aug. 2008)
Hurricane Wilma (Oct. 2005)
Hurricane Katrina (Aug. 2005)
52
55
66
58
57
68
47
67
72
53
59
44
67
52
53
45
43
34
23
-3.0 ft
-10.0 ft
8.0 ft
1.0 ft
-11.0 ft
21.0 ft
-20.0 ft
-5.0 ft
19.0 ft
-6.0 ft
15.0 ft
-23.0 ft
15.0 ft
-1.0 ft
8.0 ft
2.0 ft
9.0 ft
11.0 ft
2023
2022
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2007
2006
2005
Year of Monitoring
0
25
50
75
100
125
150
175
200
Beach Width From Baseline (Feet)
MHWL (+.33 NAVD)