

2020 SUMMER ANNUAL MONITORING SURVEY EVALUATION & MASTER PLAN UPDATE

October 2020

THE TOWN OF NAGS HEAD
NORTH CAROLINA



moffatt & nichol

Presentation Outline

➤ Overall Project Progress

➤ Data Collection

- ❖ Survey Transects
- ❖ Survey Equipment

➤ Project Methodology

- ❖ Shoreline Change
- ❖ Volume Change

➤ Key Events: August 2019 – June 2020

- ❖ Storm Activity
- ❖ Maintenance Activity

➤ Summary of Findings

- ❖ Shoreline & Volume Change (2019 – 2020)
- ❖ Background Erosion Rates (2011-2020)
- ❖ Dune Volume Change (2011-2020)

➤ Master Plan Update

➤ Q&A/Discussion

Overall Project Progress

➤ **Annual Beach Monitoring**

- ❖ 100% Complete

➤ **Master Plan – Year 1**

- ❖ Task 1 – Data Collection & Review – 50% Complete
- ❖ Task 2 – Modeling and Development of Nourishment Needs – 25% Complete
 - Completed GENCADE shoreline model calibration
 - Begun CSHORE beach profile setup

➤ **State CSDM Grant Process**

- ❖ Awaiting decision notifications from the State

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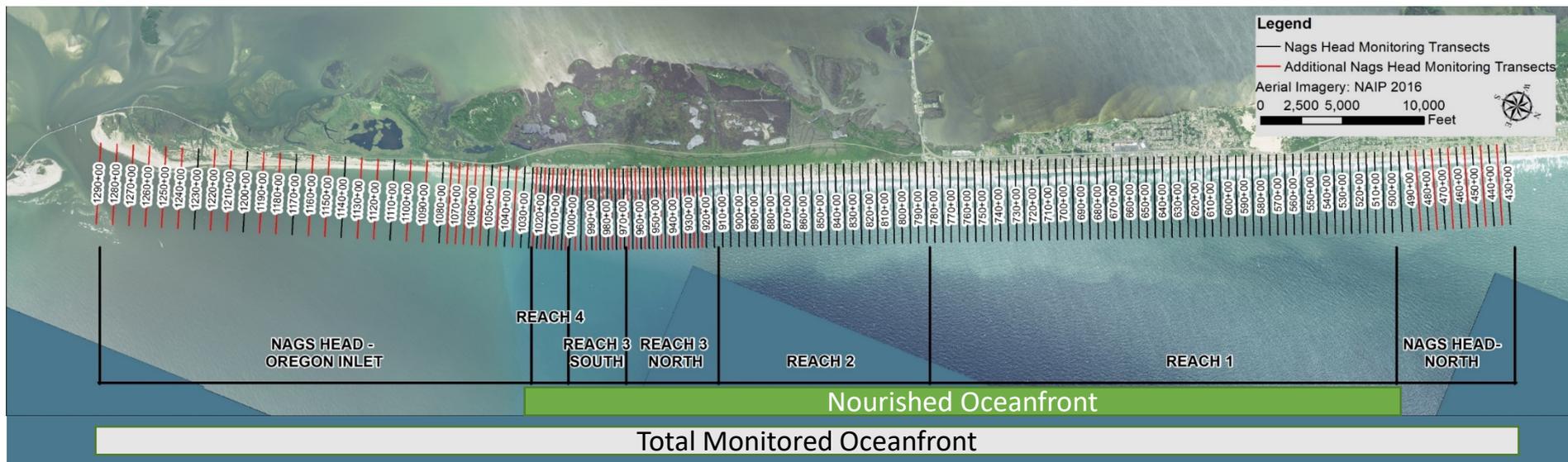
➤ Master Plan Update

➤ Q&A/Discussion

Data Collection - Survey Transects

- 2020 Summer Survey:
 - ❖ McKim & Creed: June 18-24, 2020
 - ❖ 173 Profiles (~250, 500 and 1000 ft spacing; Station 430+00 – 1290+00)
- Post – Dorian Survey
 - ❖ CSE: November 24, 2019
 - ❖ 107 Profiles (~500 ft spacing; Station 495+00 – 1025+00)
- 2019 Summer Survey (Post Construction Survey)
 - CSE: August 28, 2019
 - 122 Profiles (~500 and 1000 ft spacing; Station 430+00 – 1200+00)
- 2019 Pre-Nourishment Survey
 - CSE: April 8, 2019
 - 123 Profiles (~500 and 1000 ft spacing; Station 430+00 – 1230+00)

Data Collection - Survey Transects



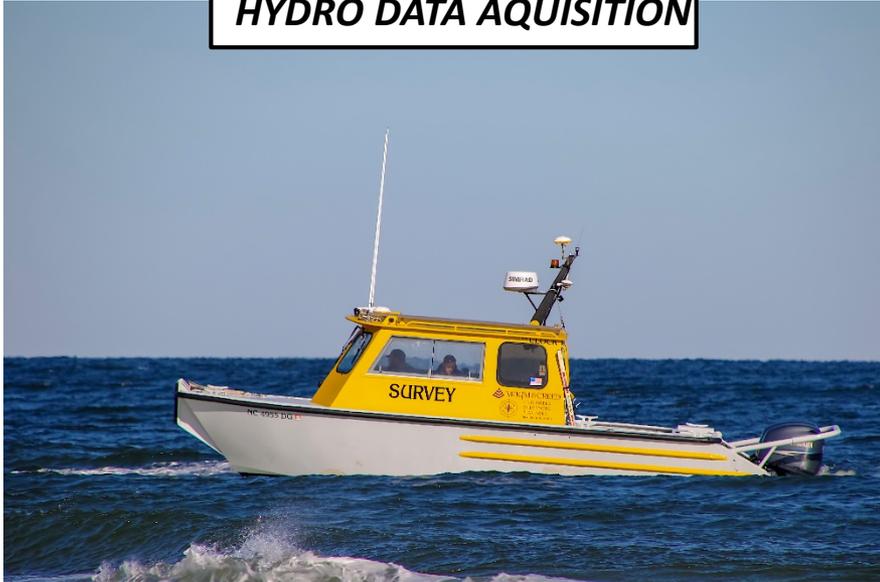
- 123 Monitoring Transects

- 51 Additional Transects

Survey Equipment

➤ Survey Performed by McKim & Creed

*Survey Vessel Clock
HYDRO DATA AQUISION*



*Trimble RTK-
TOPO DATA AQUISION*

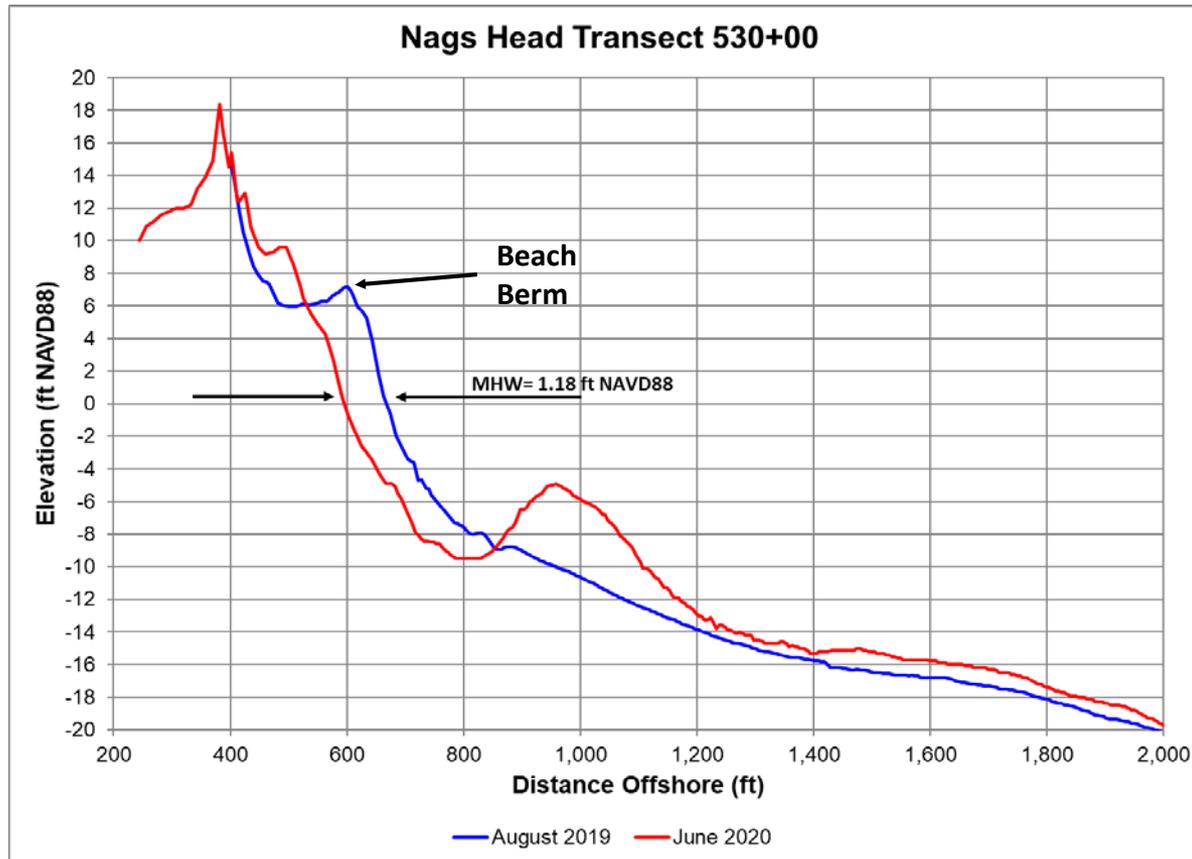


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Project Methodology – Shoreline Change

Mean High Water (MHW) = 1.18 ft NAVD88



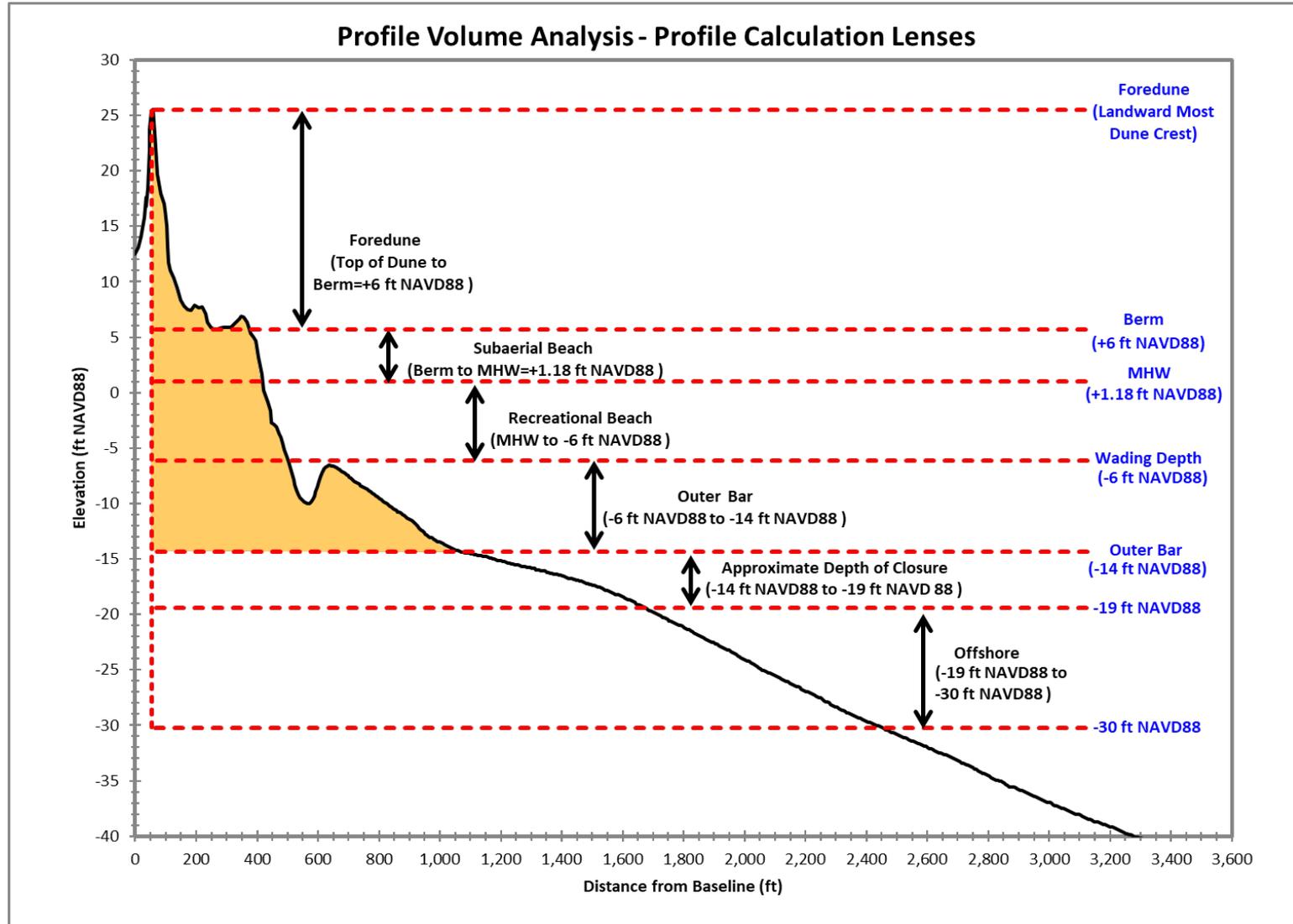
Project Methodology – Volume Change

- Calculate Volume Above Multiple Elevations:
 - ❖ +6ft NAVD88 – From the berm up into the dune
 - ❖ +1.18 ft NAVD88 – MHW Shoreline
 - ❖ -6 ft NAVD88 – Wading Depth
 - ❖ -14 ft NAVD88 – Outer Bar
 - ❖ -19 ft NAVD88 – Approximate Depth of Closure
 - ❖ -30 ft NAVD88 – Capture extreme event offshore sand movement

- Use Volumes For:
 - ❖ Calculating Annual Volume Changes
 - ❖ Calculating/Updating Background Erosion Rates

Project Methodology – Volume Change

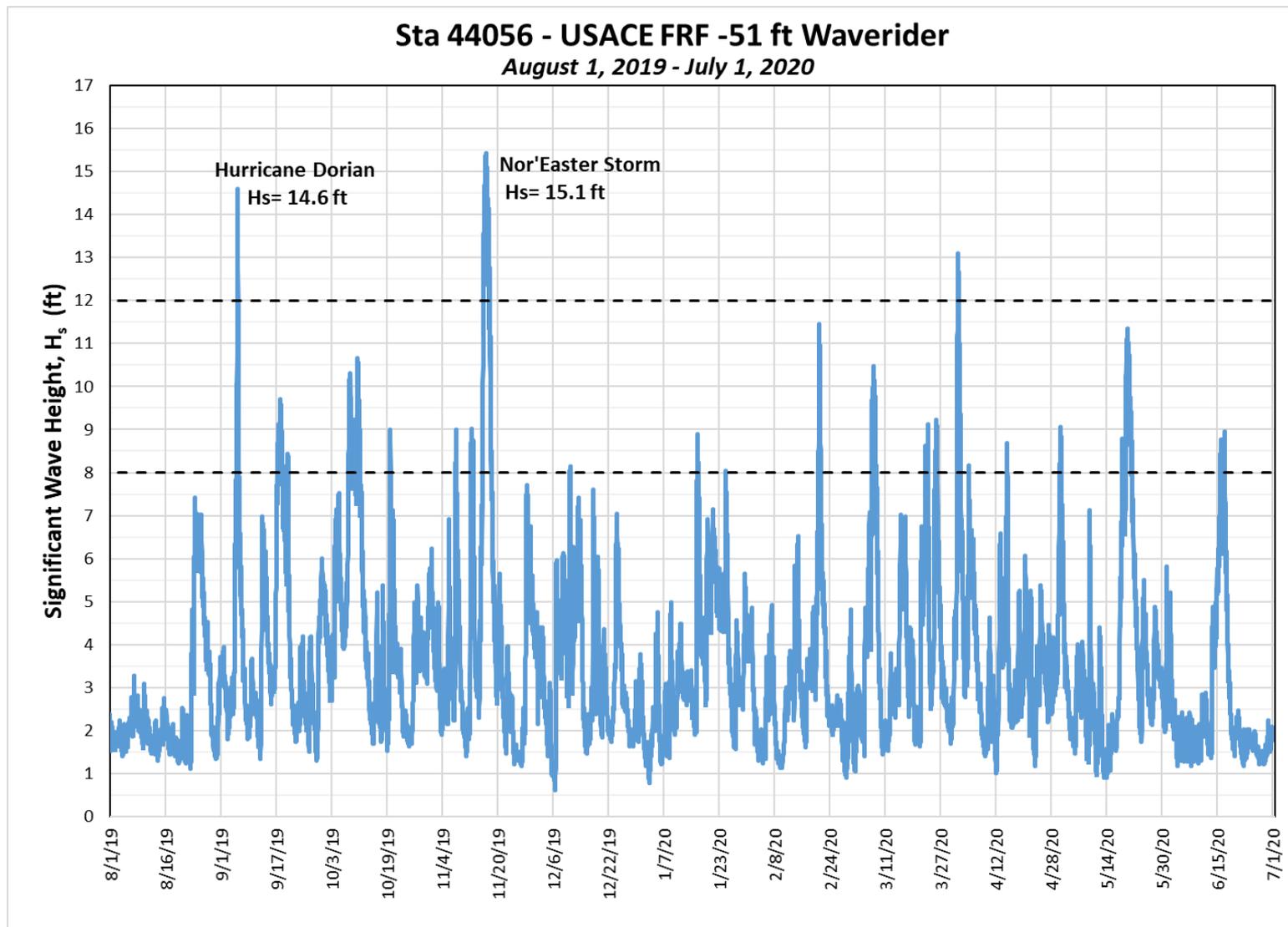
Volume Calculation Lenses



Presentation Outline

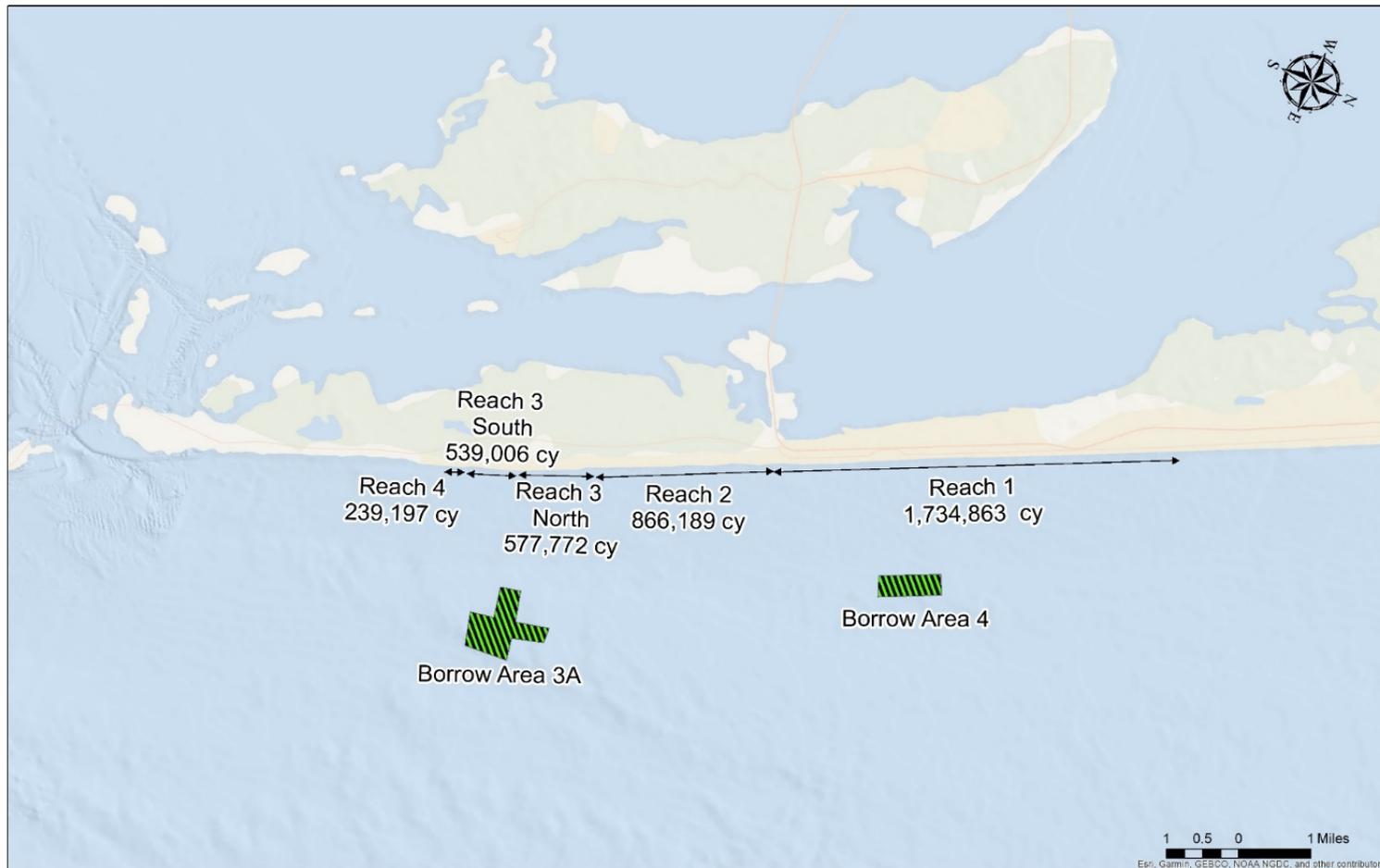
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Key Events 2019-2020 – Storm Activity



Key Events: August 2019 – June 2020

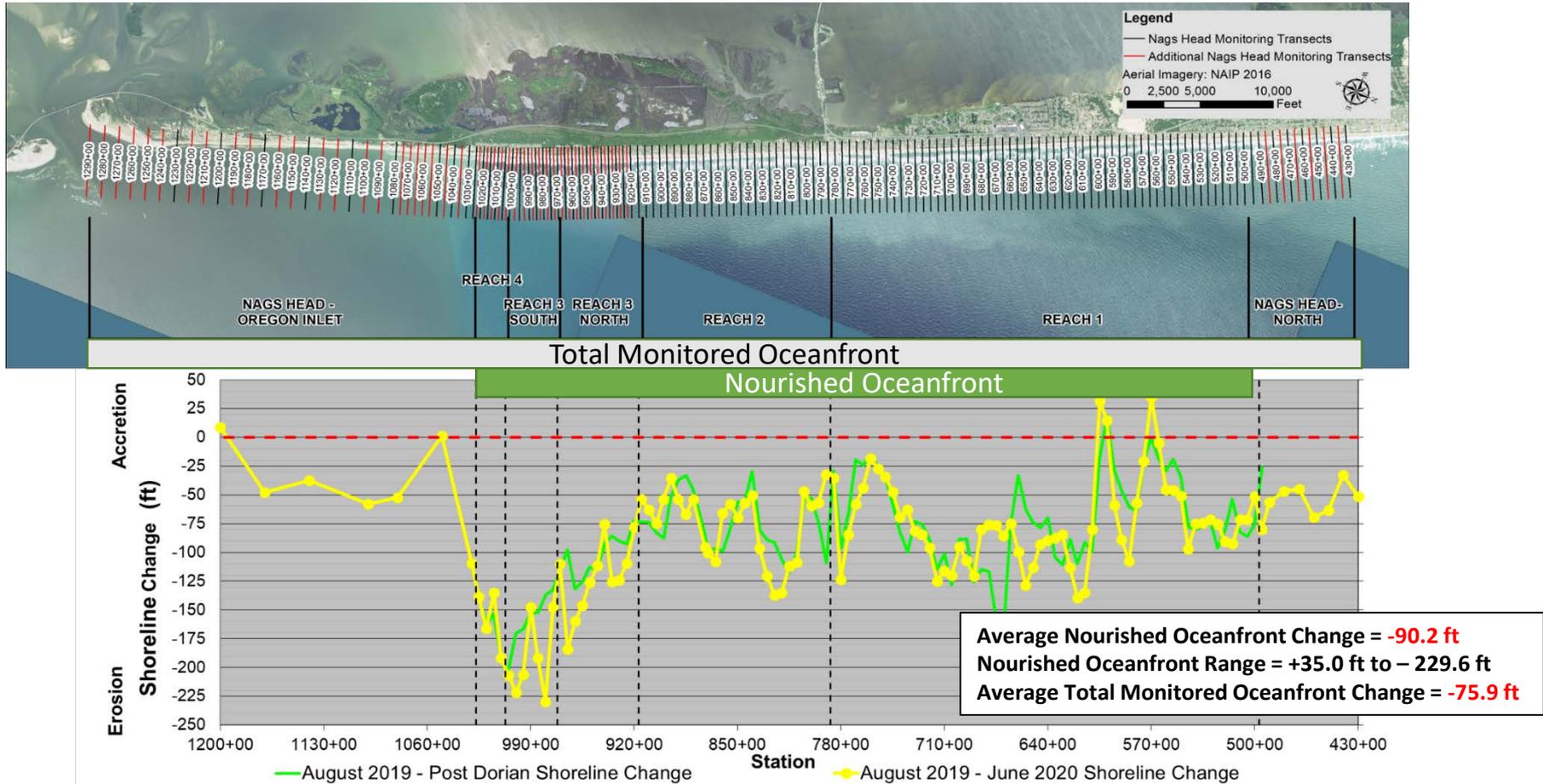
- 2019 Beach Nourishment Project. Approximately 4 million cy along ~10 miles



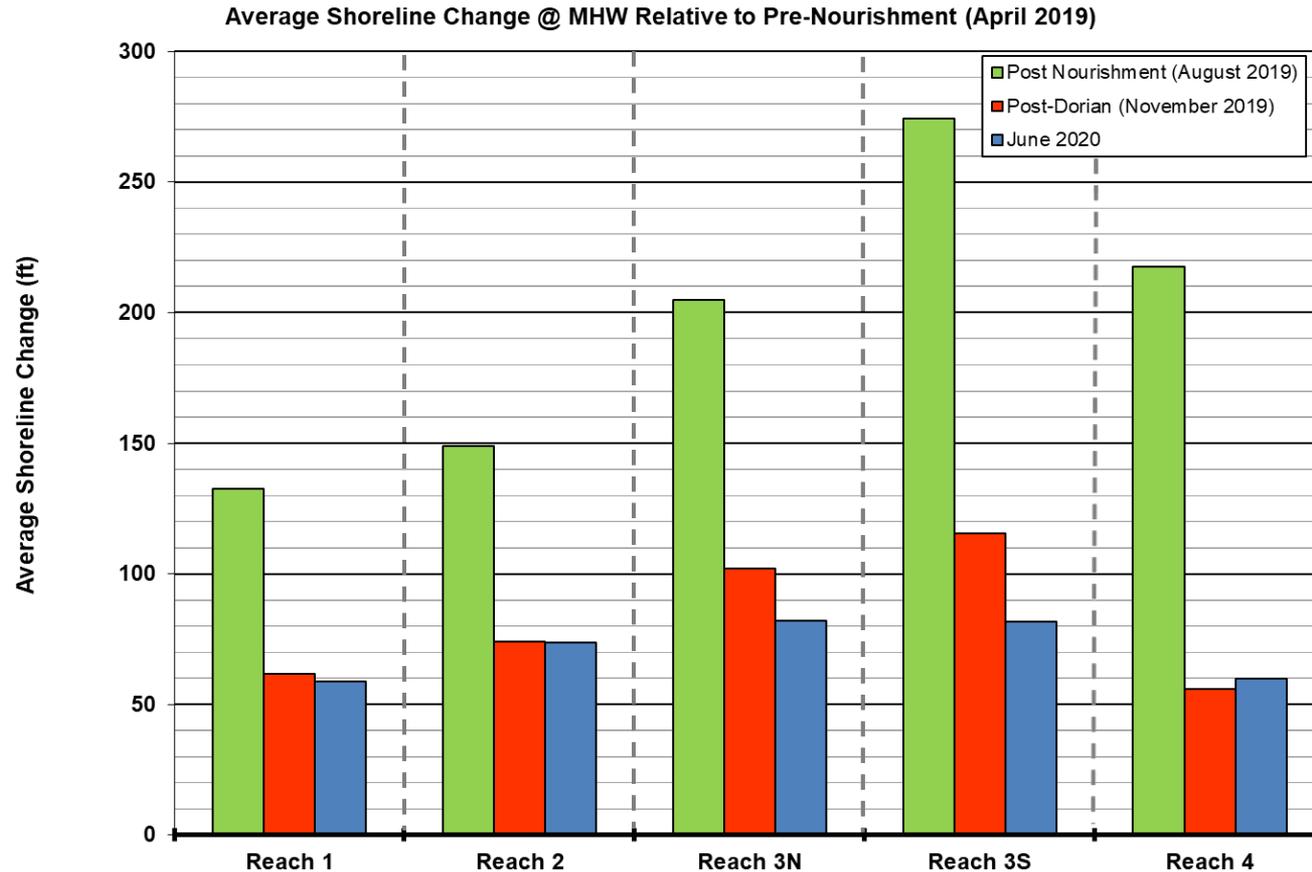
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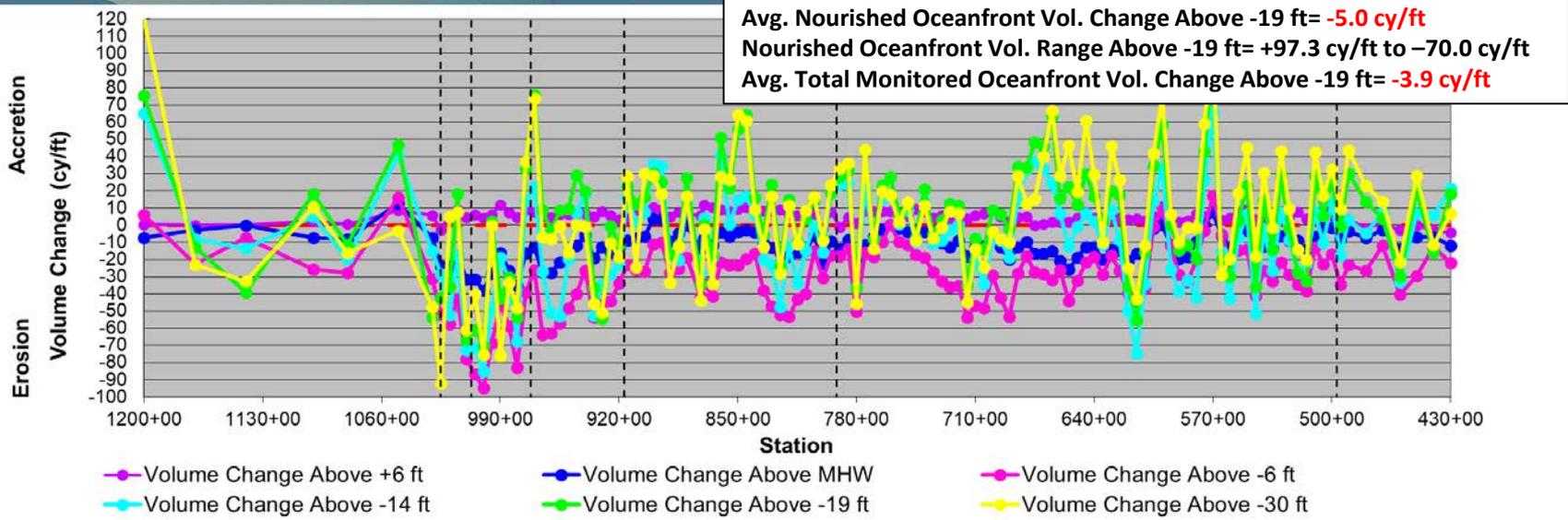
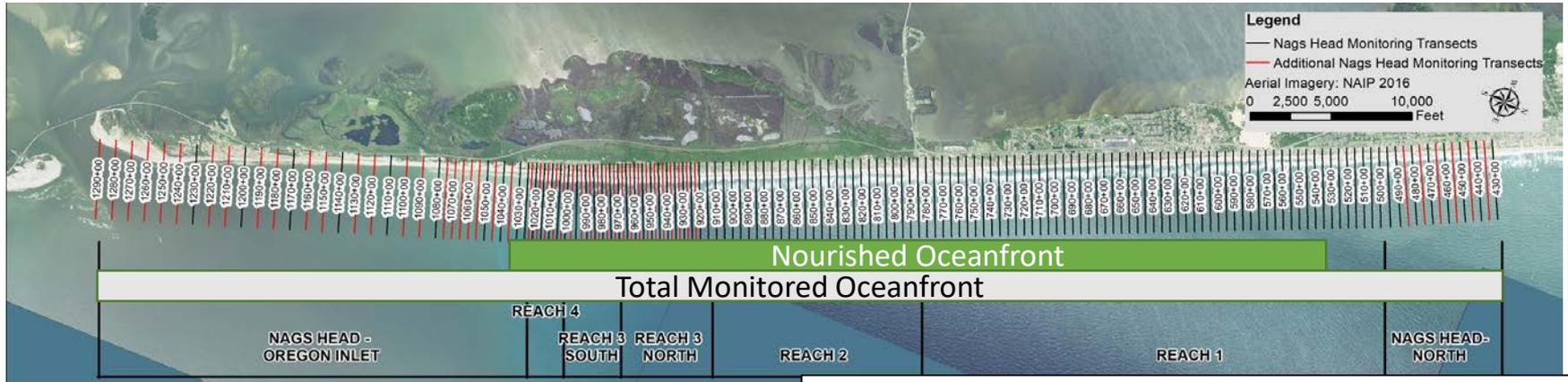
Summary of Findings – Shoreline Change 2019-2020



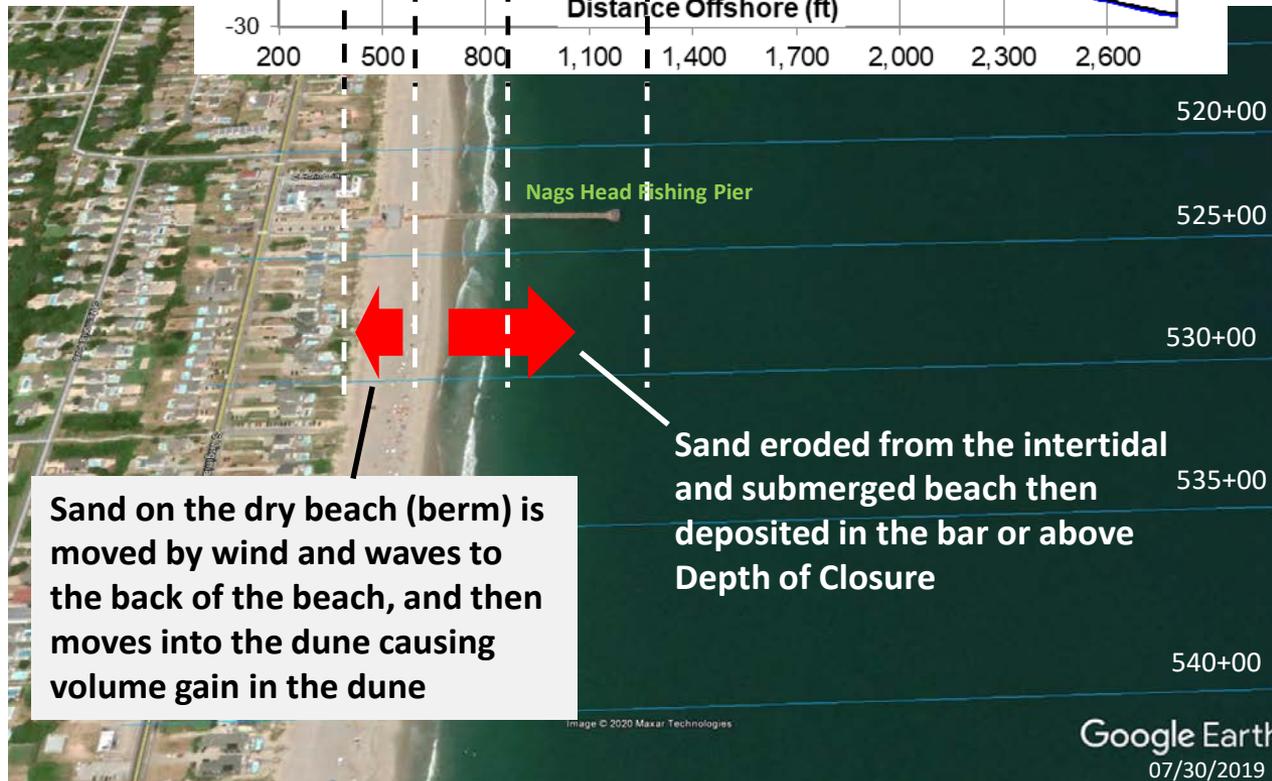
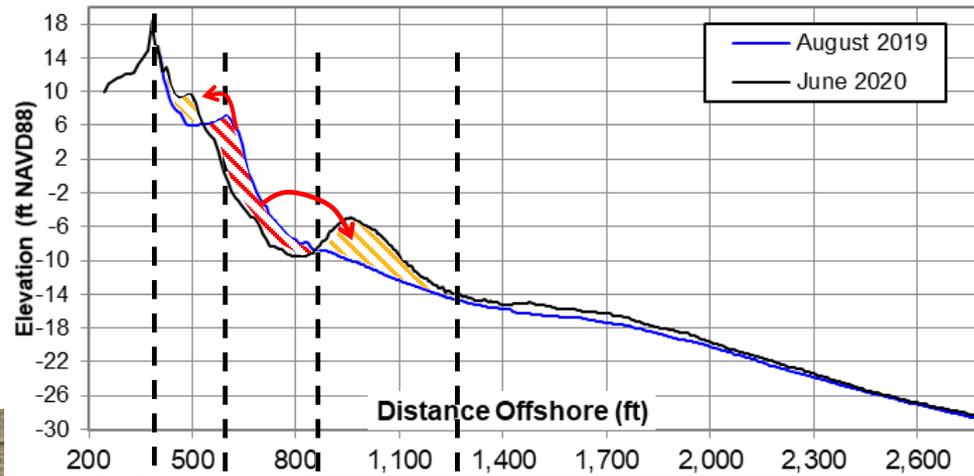
Summary of Findings – Shoreline Change – Nourished Oceanfront



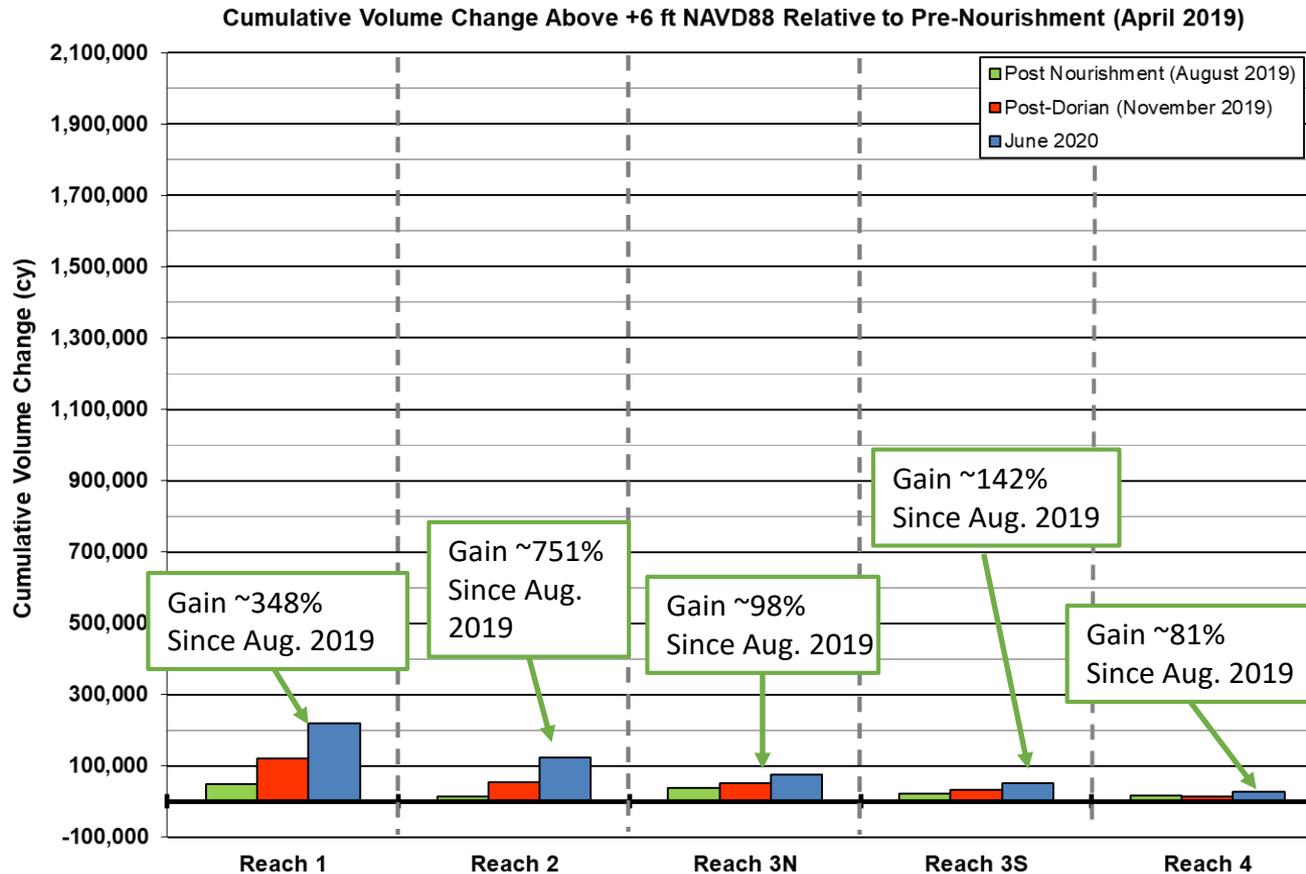
Summary of Findings – Volume Change 2019-2020



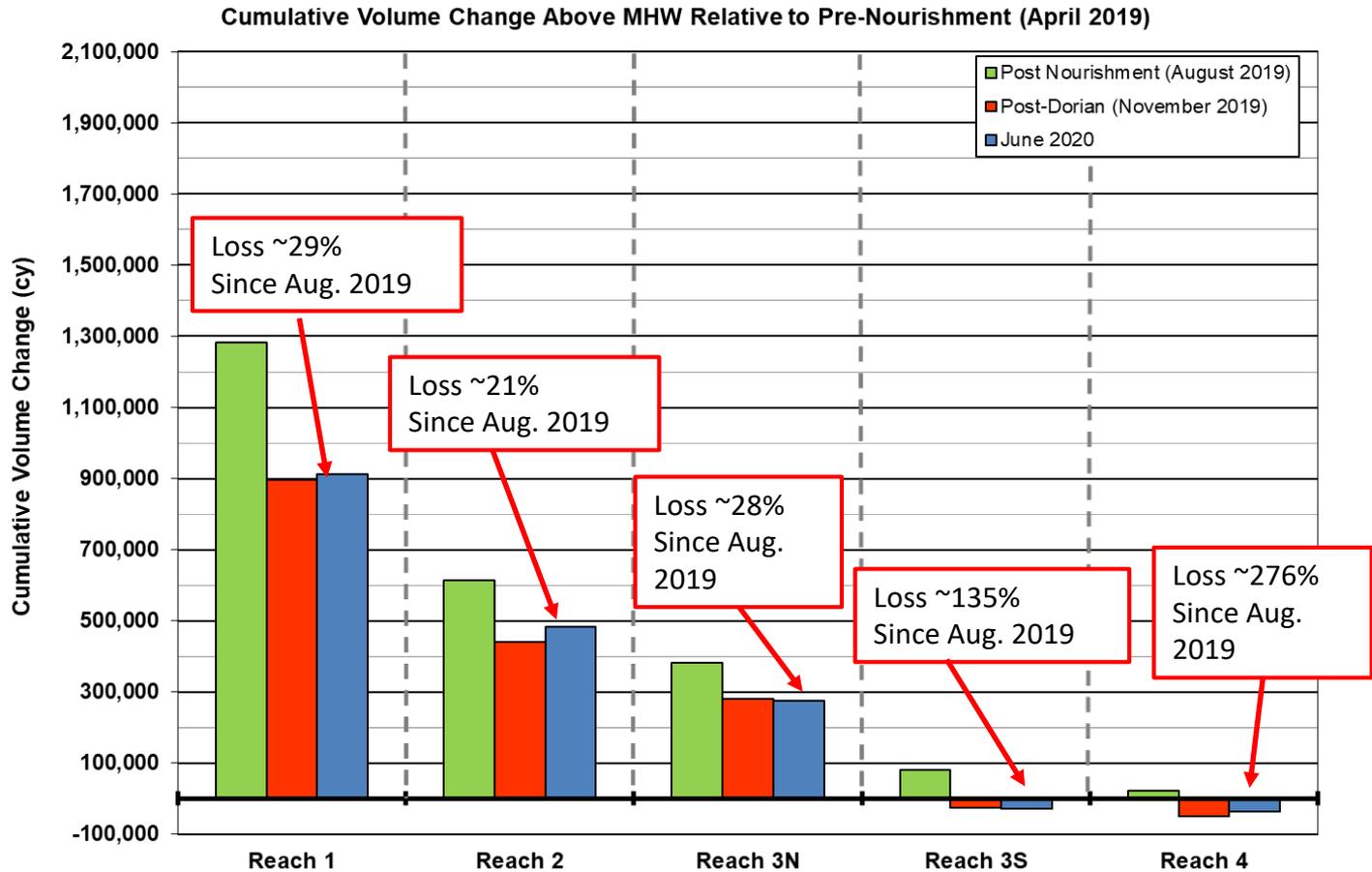
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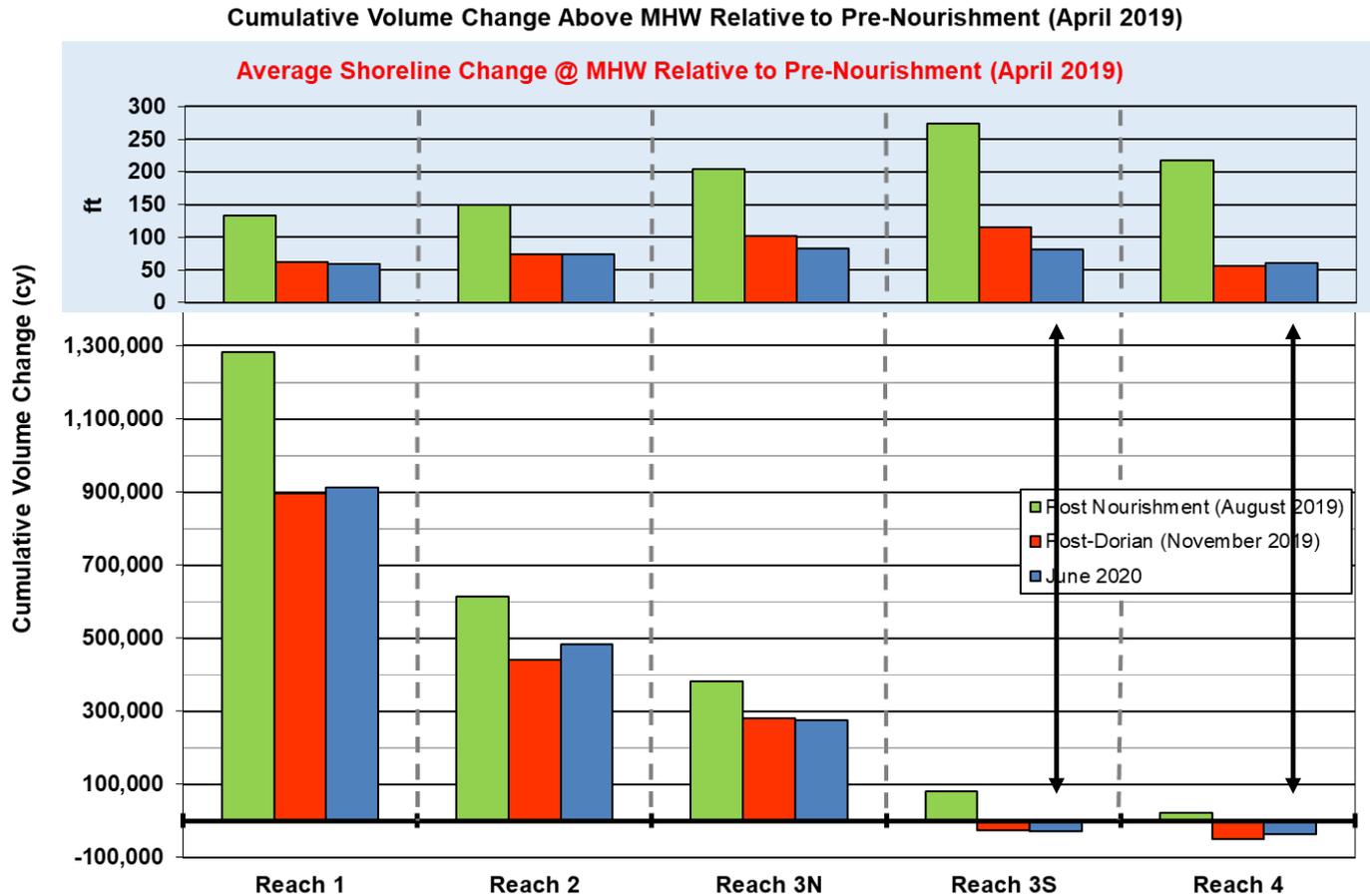
Summary of Findings – Nourished Oceanfront Volume Change



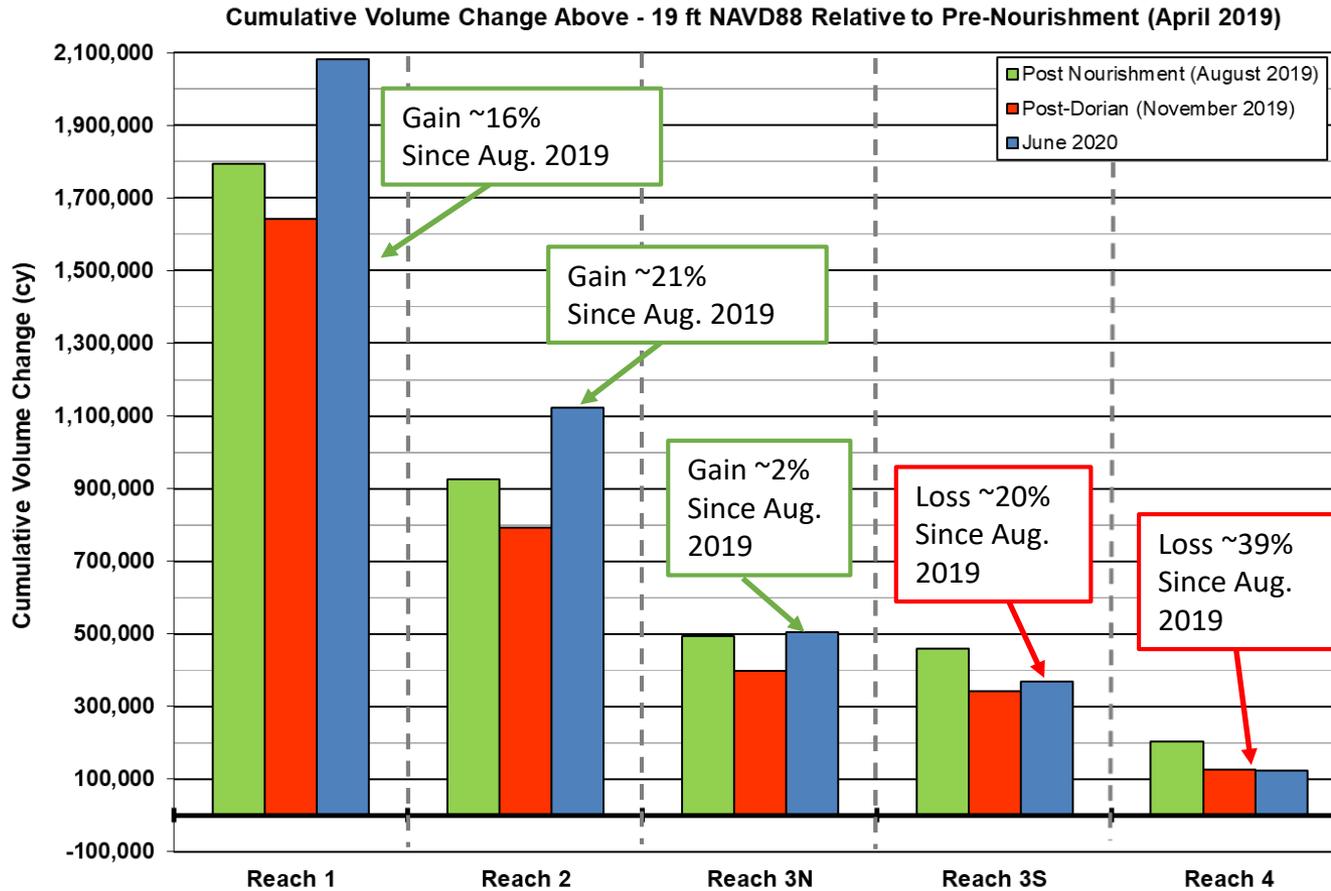
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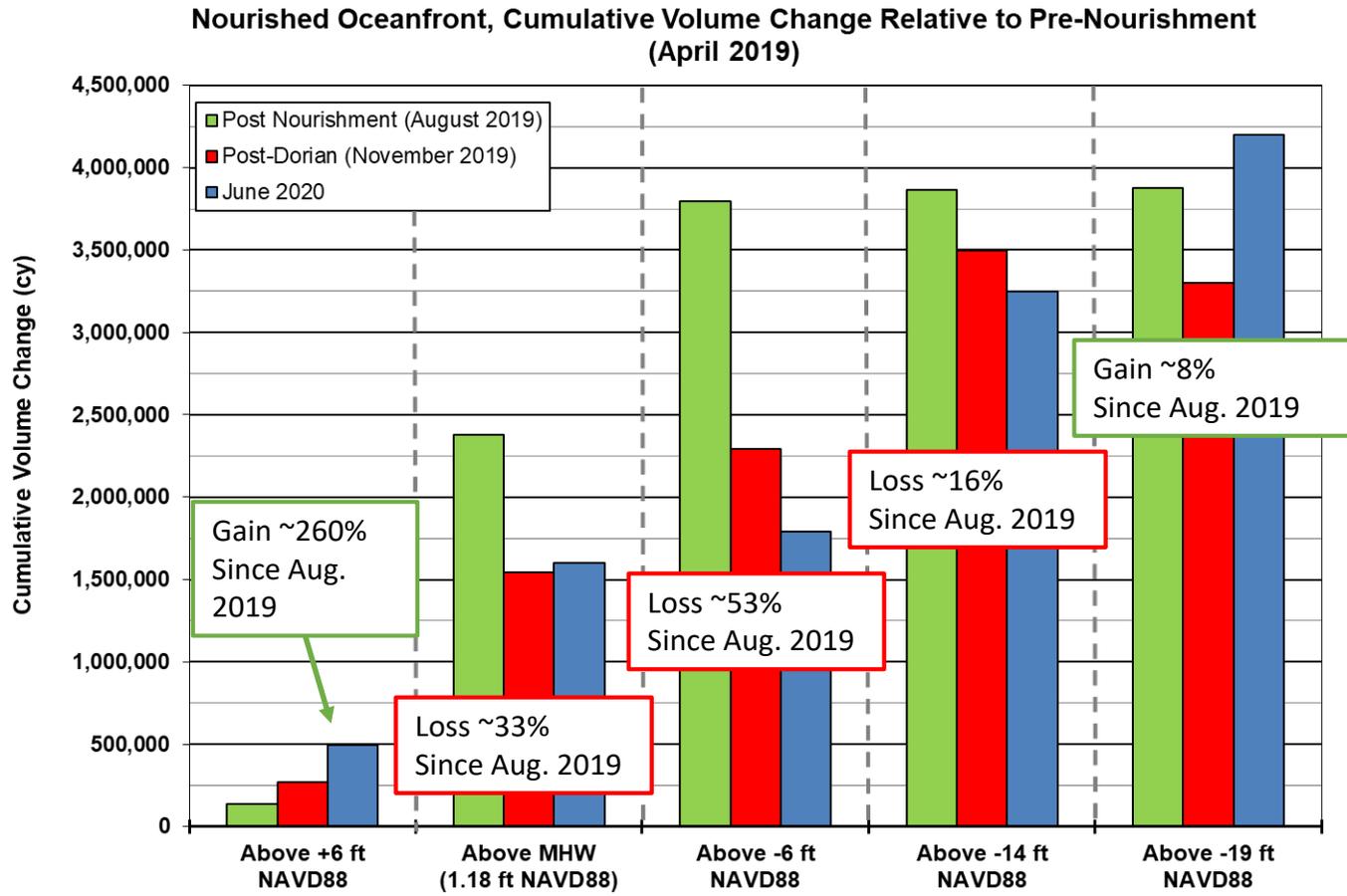
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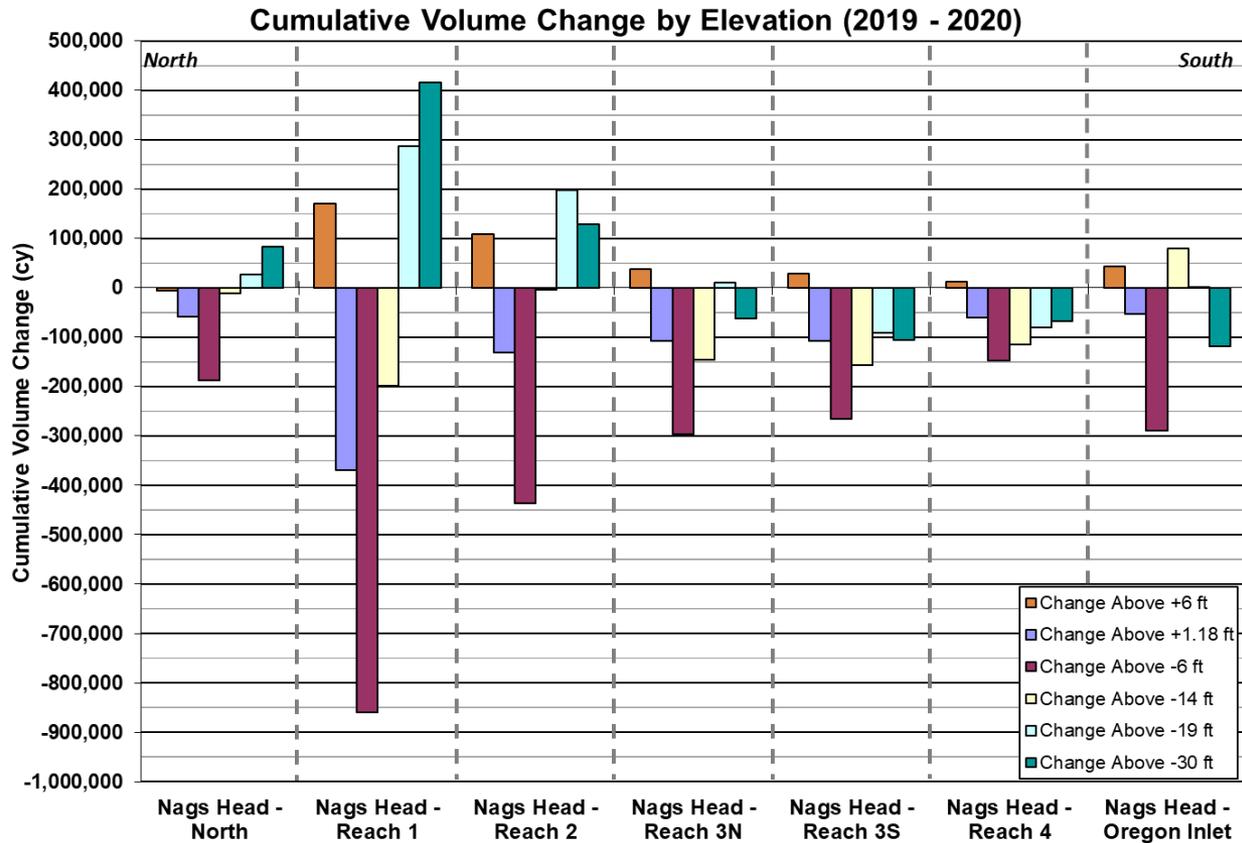
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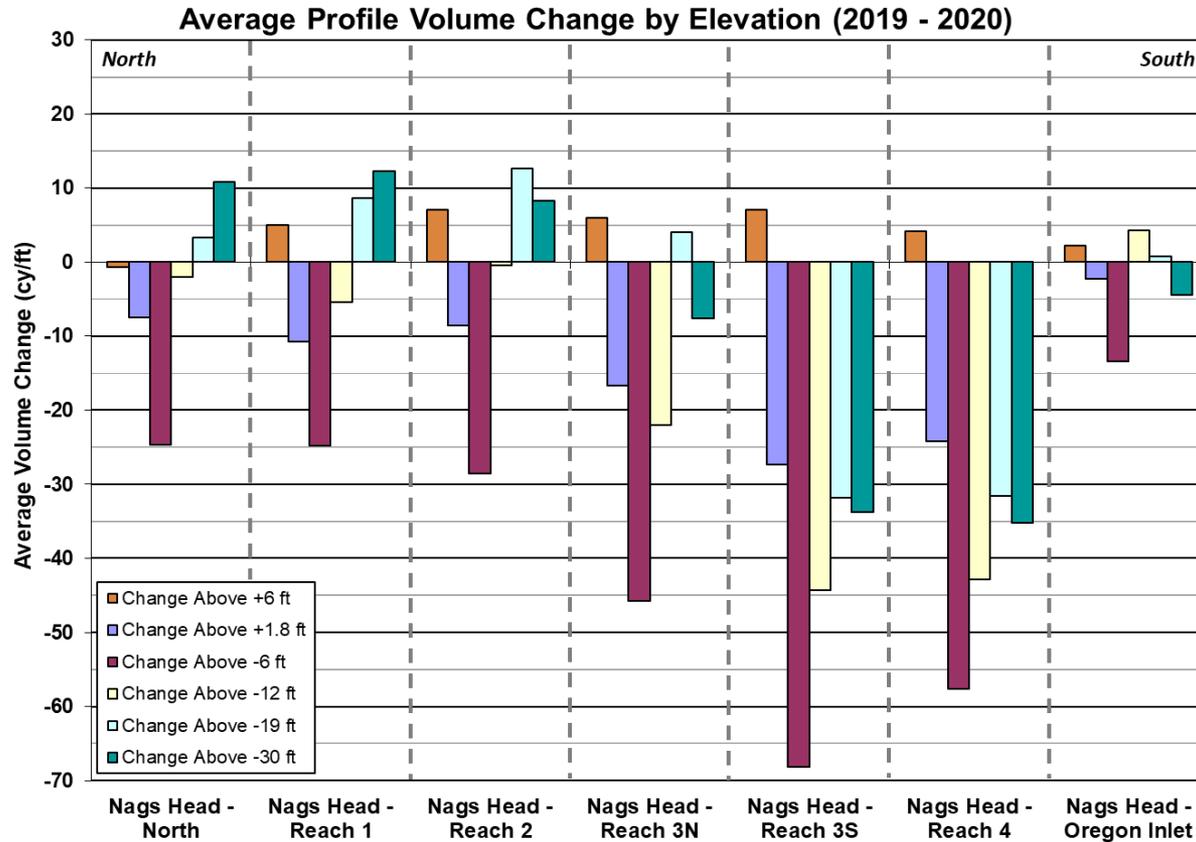
Summary of Findings – Nourished Oceanfront Volume Change



Summary of Findings – Total Monitored Oceanfront Volume Change 2019-2020



Summary of Findings – Total Monitored Oceanfront Volume Change 2019-2020



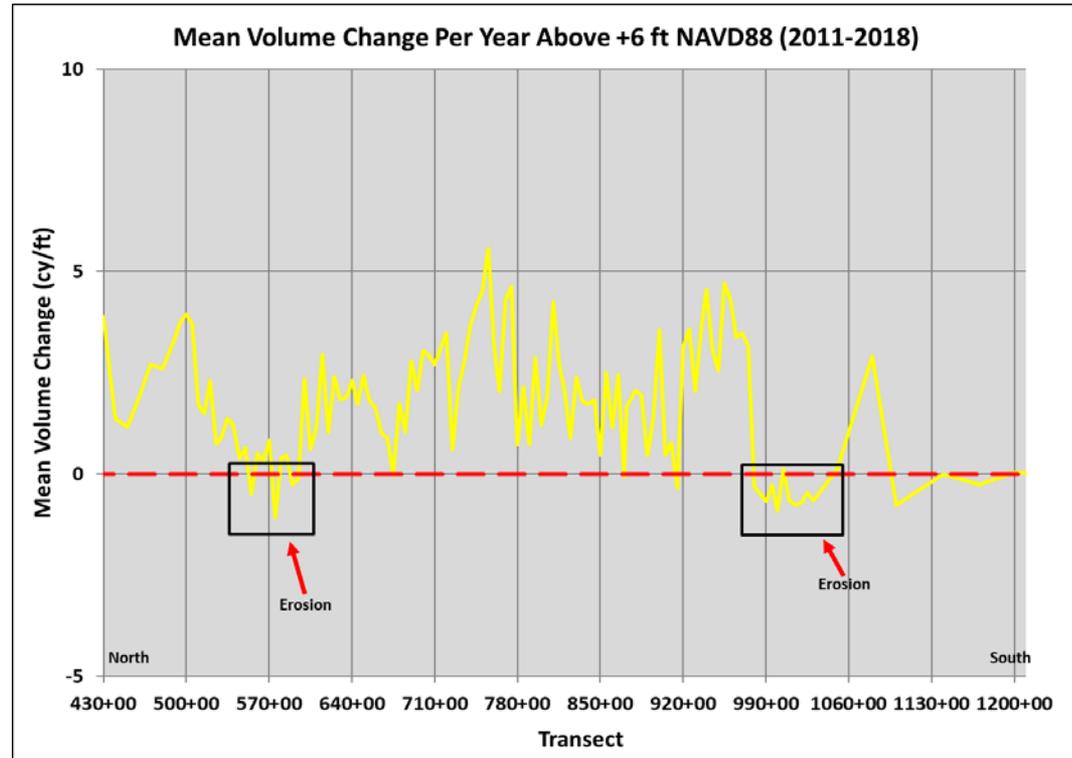
Summary of Findings – Background Erosion Rates

- Average Annual Background Erosion Rates (2011 - 2020)
 - Nourishment volumes subtracted from total volume changes above -19 ft NAVD88 between 2011 and 2020 and annualized over the nine-year time period.
 - Nags Head Reaches 3N, 3S, and 4 have considerably higher background erosion rates than the remainder of the oceanfront

Reach (Transects)	Length	Volume Change Above -19 ft NAVD88 (cy) 2011-2020	Nourishment Volume (cy)	Background Erosion (cy)	Average Annual Background Erosion Rates (cy/ft/yr)
Nags Head - Reach 1 (500+00 - 785+00)	29,000	834,453	1,734,863	-900,410	-3.45
Nags Head - Reach 2 (790+00 - 915+00)	13,000	19,345	866,189	-846,844	-7.24
Nags Head - Reach 3N (920+00 - 970+00)	5,500	-162,421	577,772	-740,193	-14.95
Nags Head - Reach 3S (975+00 - 1005+00)	3,500	34,083	539,006	-504,923	-16.03
Nags Head - Reach 4 (1010+00 - 1025+00)	2,000	-176,249	239,197	-415,446	-23.08
Nourished Oceanfront (500+00 - 1025+00)	53,000	549,213	3,957,027	-3,407,814	-7.14
Nags Head - North (430+00 - 495+00)	6,750	-189,002	0	-189,002	-3.11
Nags Head - Oregon Inlet (1030+00 - 1200+00)	17,250	-1,456,351	0	-1,456,351	-9.38
Total Monitored Oceanfront (430+00 - 1200+00)	77,000	-1,096,140	3,957,027	-5,053,167	-7.29

Summary of Findings – Dune Volume Change

- Dune Erosion observed at:
 - Reach 1, in front of Jockey's Ridge State Park, between East Hollowell Street and East Soundside Road
 - Reach 3-South and extending south through Reach 4.



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Master Plan Update

50% Complete



25% Complete

- Completed GENCADE shoreline model calibration
- Begun CSHORE beach profile model setup

Master Plan Update

October work to include CSHORE modeling of storm erosion, and detailed review of sediment borrow area data to establish long-term available sand resources



Master Plan Update



By Early Spring

- Existing and desired Level of Protection will be determined
- Profile Based Volumetric Triggers will be developed
- Long-term sand needs will be determined

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