

TOWN OF NAGS HEAD BOARD OF COMMISSIONERS MEETING – 16 SEPT 2015

Four Years After The 2011 Nourishment

– A Summary of the 2015 Beach Monitoring



***Photos taken
on 28 Jun 2015***





2011 Nourishment

The largest locally funded beach nourishment accomplished to date in the United States.

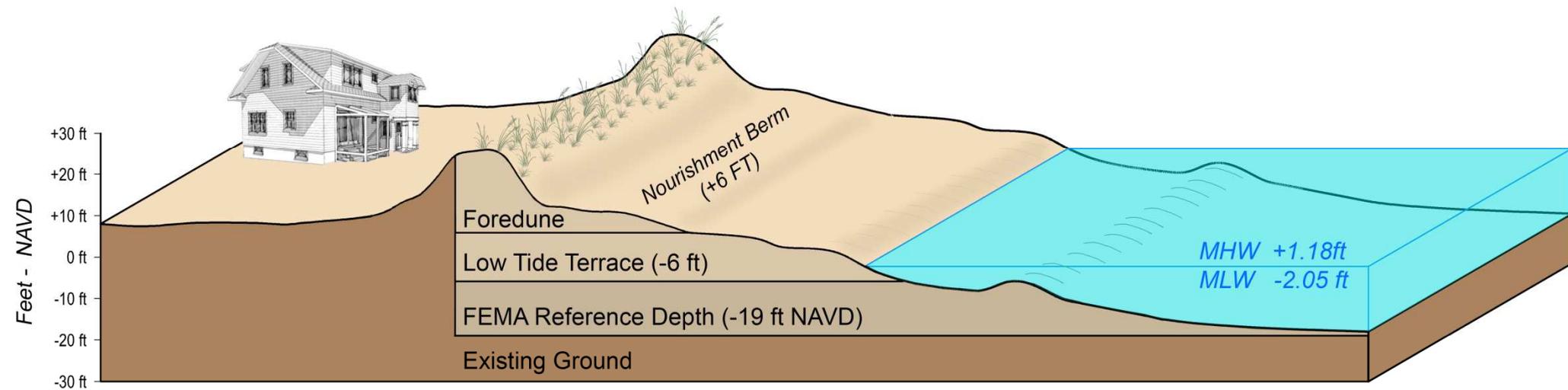
- 4.6 million cubic yards
- Along 10 miles
- Over 100 borings to discover pristine sand source offshore
- Project budget of \$37 million
- Unit Price – \$6.56 per cubic yard
- 5 years of environmental reviews
- 5 months of summer construction between 24 May and 27 Oct 2011



Post-Project Monitoring Requirements

- Beach compaction tests for first three years (2012-2014) – Completed
- Beach and inshore profile survey each June/ July before hurricane season – Ongoing
- Sediment sample collection and analysis every other year – Ongoing
- Orthophoto once every five years – Completed in 2014
- *Emergency beach and inshore profile survey after hurricanes – as needed*

Profile Volume Method



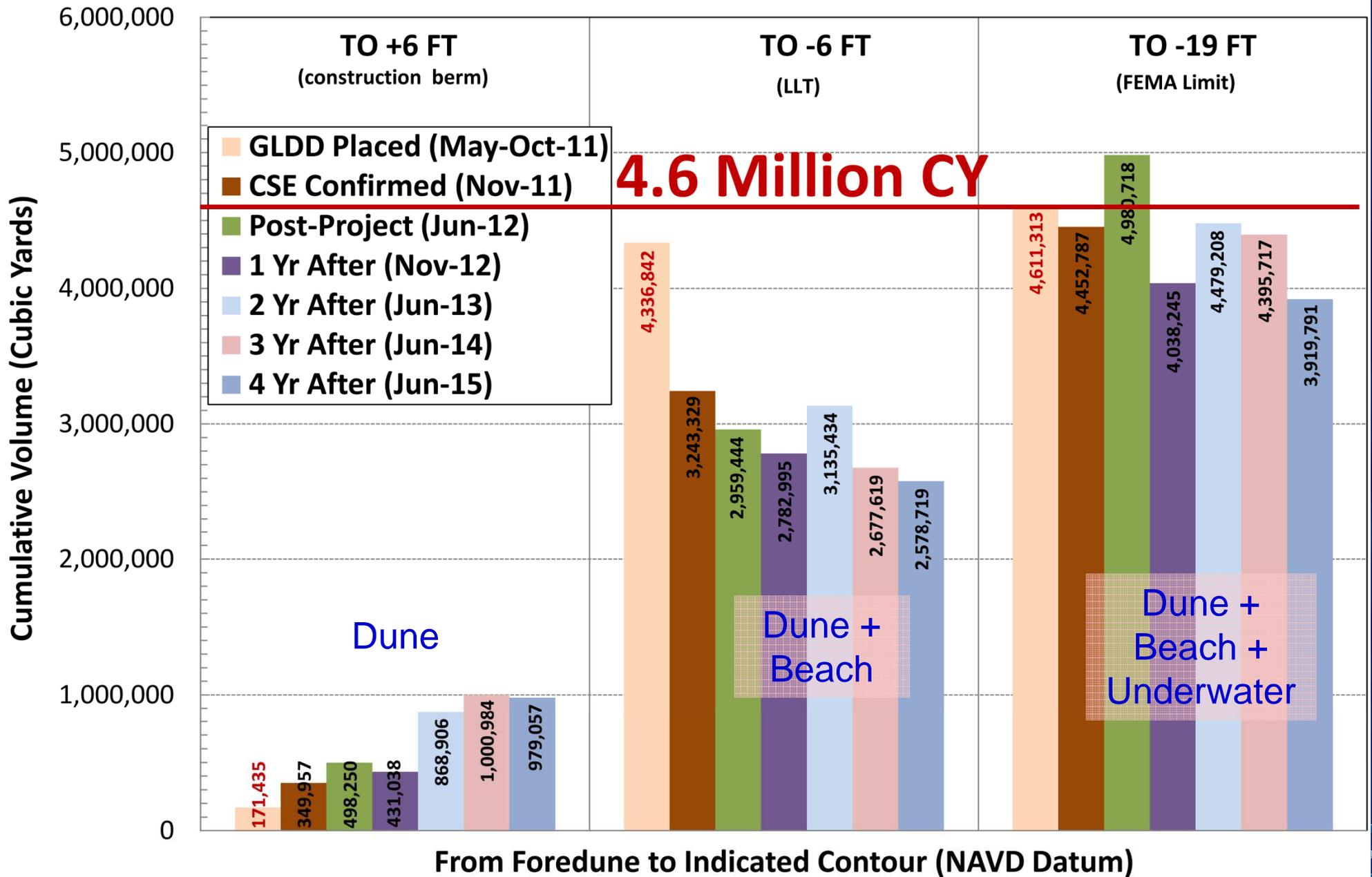
Lens 1 "Foredune" – From foredune to +6 ft NAVD

Lens 2 "Beach" – From +6 to -6 ft NAVD

Lens 3 "Underwater" – From -6 to -19 ft NAVD

Project Performance – Volume Changes

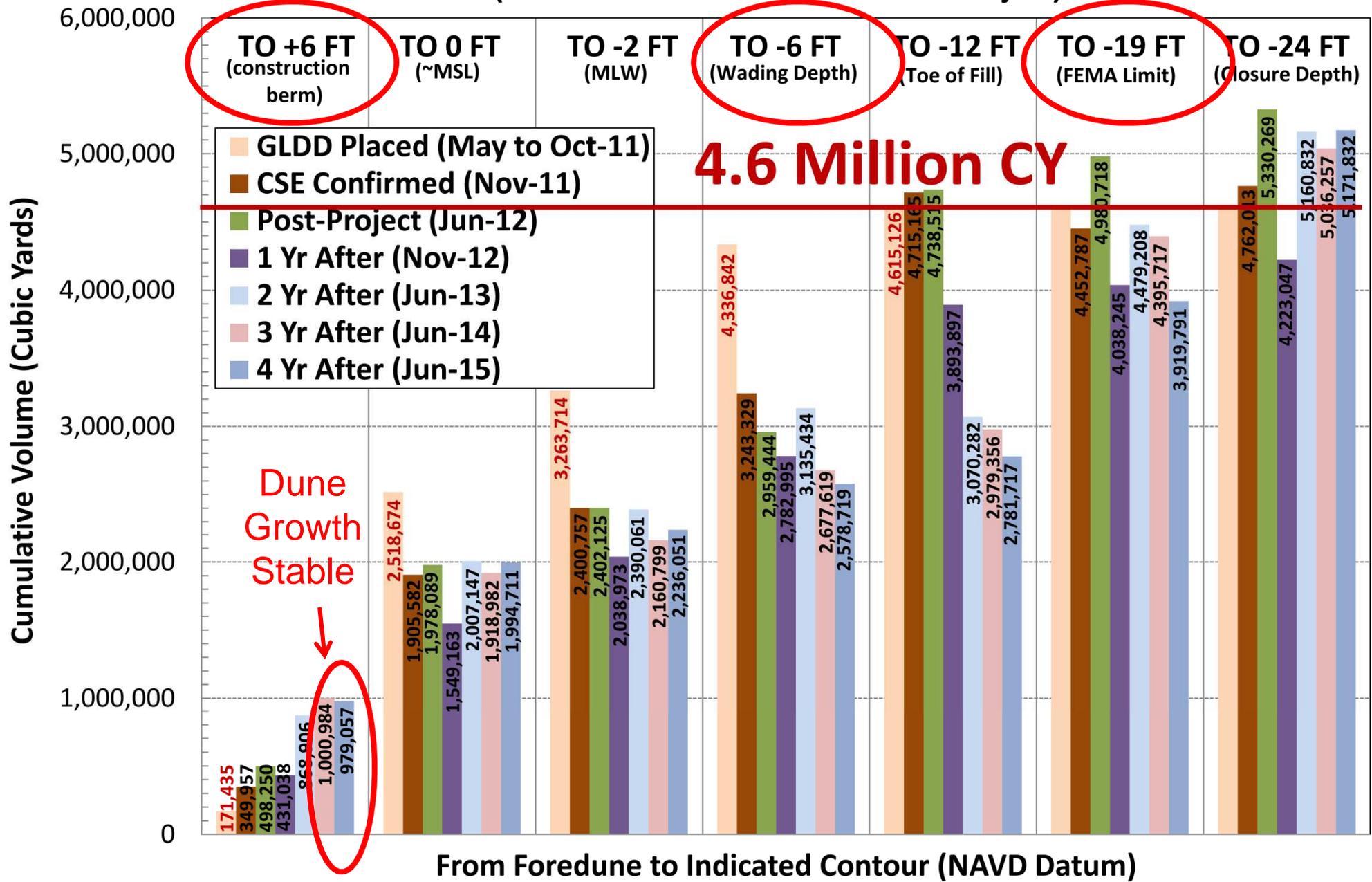
Nags Head Cumulative Beach Volume Changes (Relative To November 2010 - Pre-Project)



Project Performance – Volume Changes

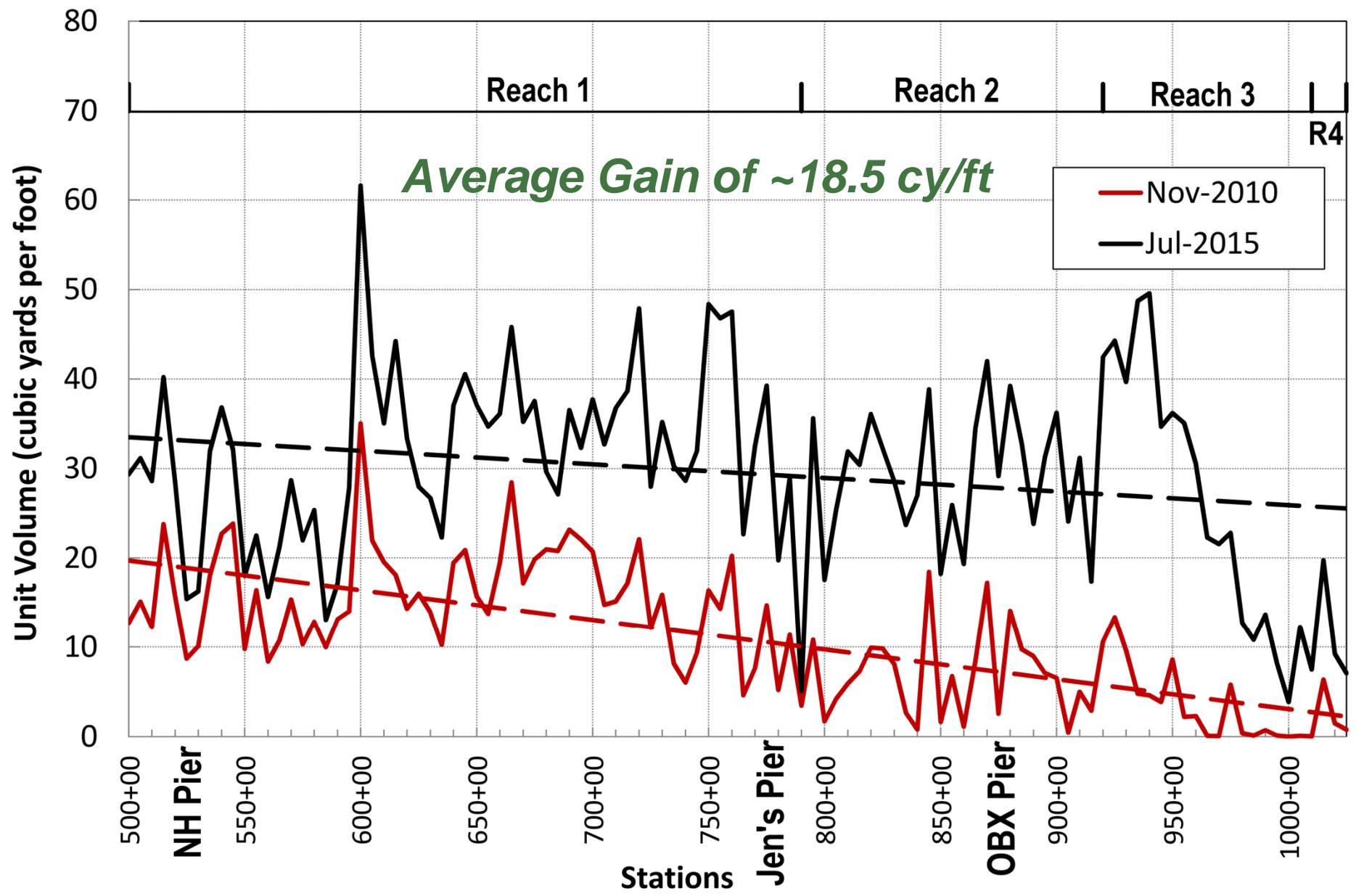
Nags Head Cumulative Beach Volume Changes

(Relative To November 2010 - Pre-Project)



Natural Growth of Dune

Nags Head Beach Unit Volume Changes — Pre to Post Nourishment "Foredune" – From Face of Dune to +6 FT NAVD



Sandspur Hotel near Project Station 735+00

28 Feb 2014



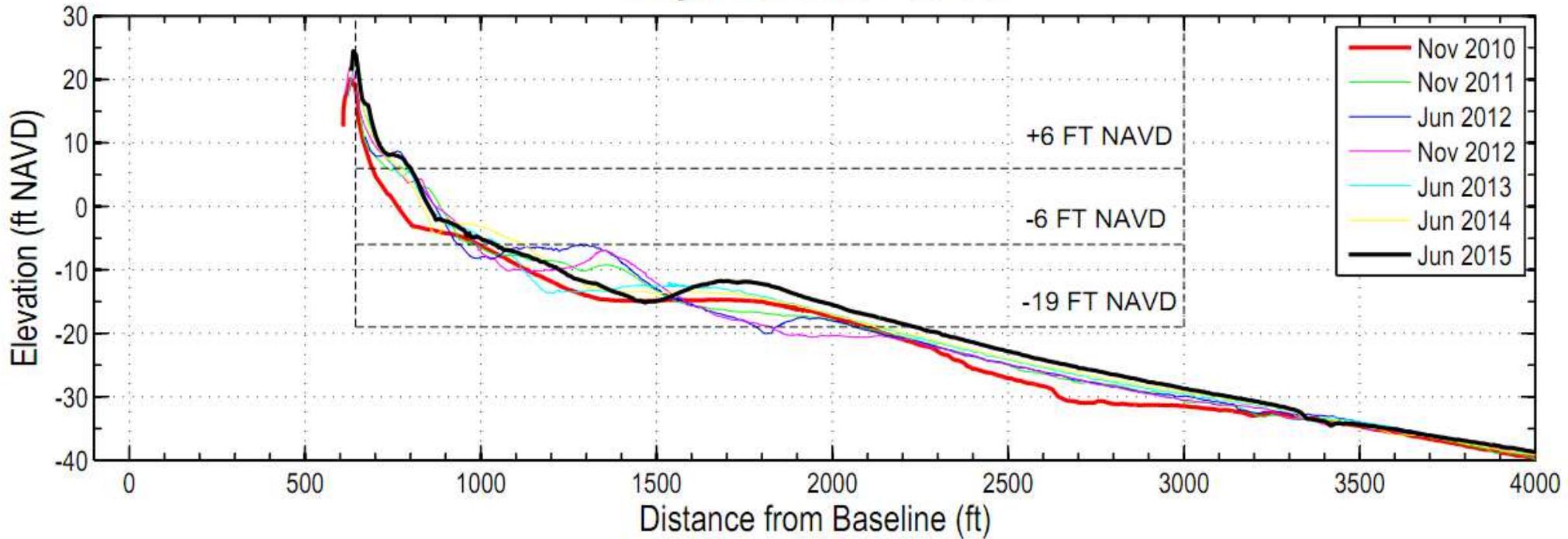
6 Jun 2014



27 Jun 2015



Nags Head Station 735+00



Unit Volume from the Face of Dune to Indicated Depth Contour (CY/FT)

Date	To +6 FT	To -6 FT	To to -19 FT
Nov 2010	8.2	71.2	440.4
Nov 2011	12.5	117.3	519.4
Jun 2012	15.4	114.5	528.7
Nov 2012	18.1	123.6	506.4
Jun 2013	24.0	126.3	534.8
Jun 2014	23.6	127.3	551.2
Jun 2015	30.3	133.7	583.7

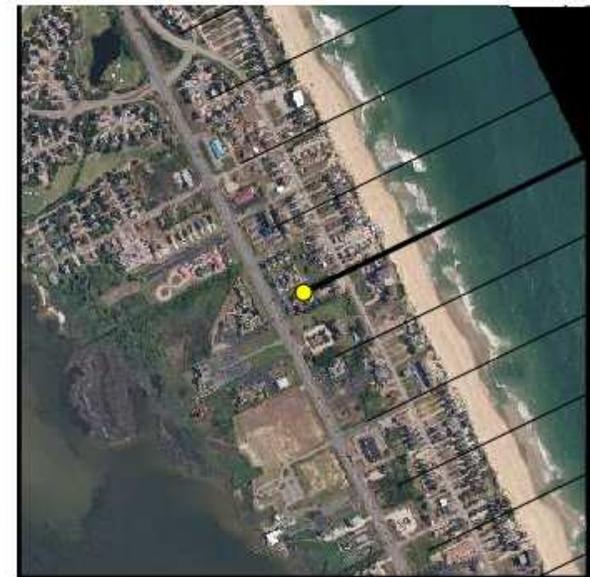
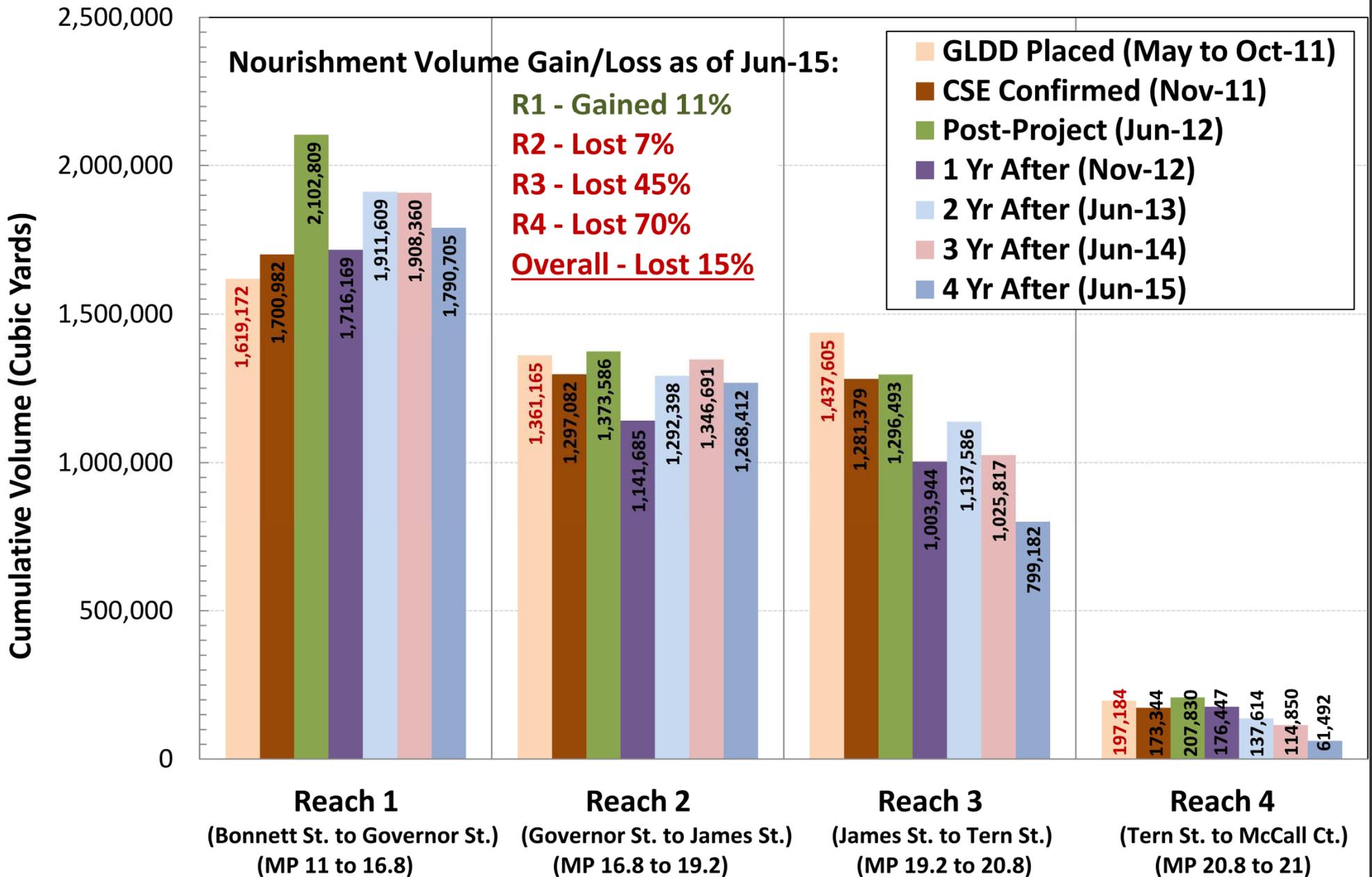


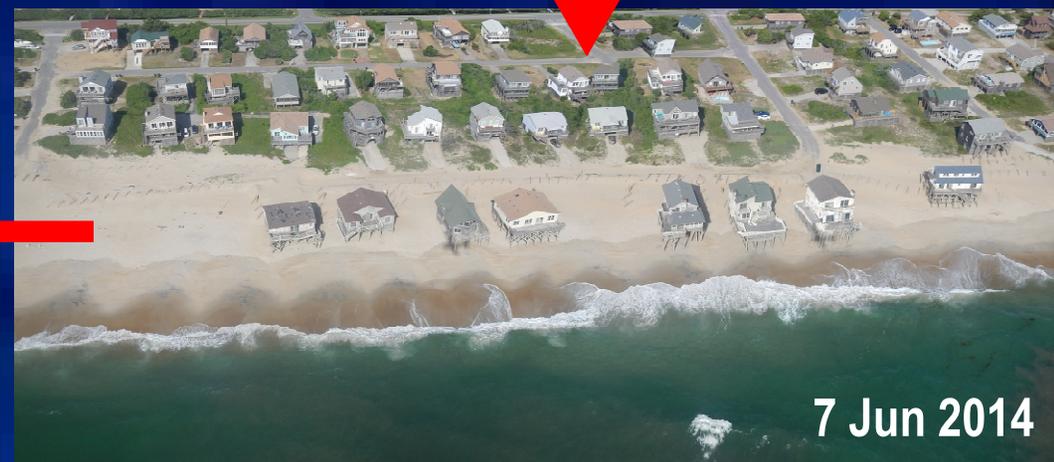
Photo: 7 Jun 2014 IMC

Project Performance – Volume Changes By Reach

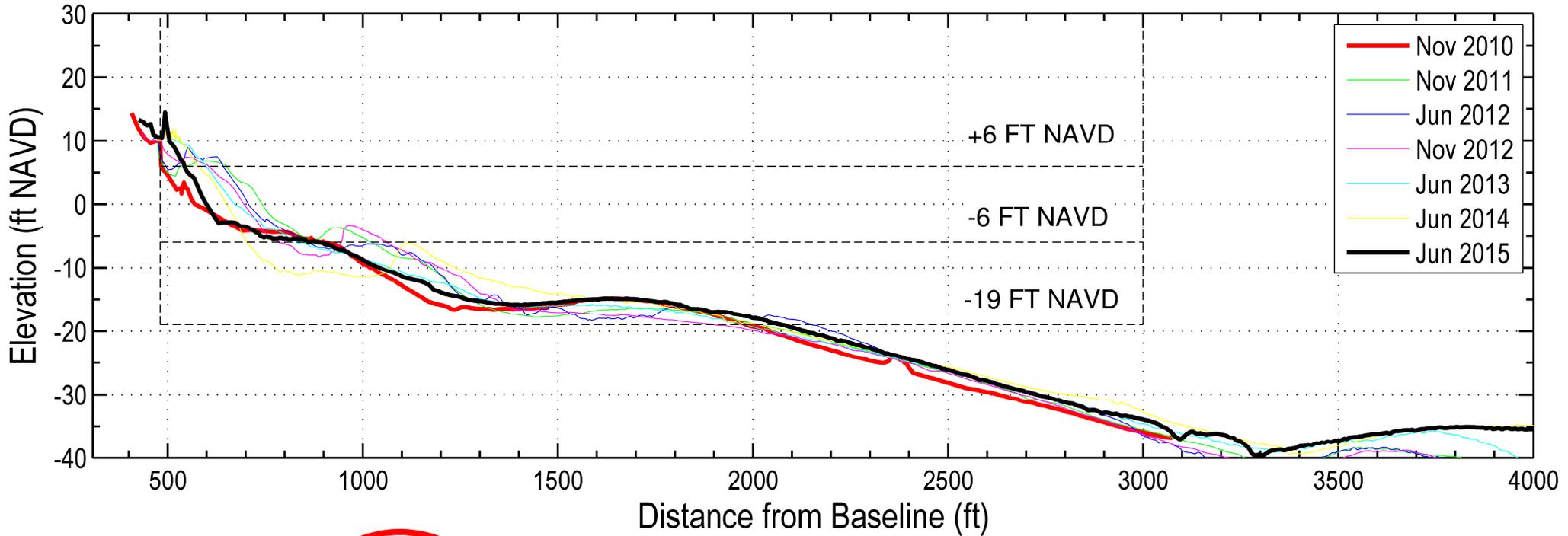
Nags Head Beach Volume Changes To **-19 FT** NAVD By Reach
 (Relative To November 2010 - Pre-Project)



Erosion Hot Spot – Seagull Drive – Reach 3



Nags Head Station 995+00



Unit Volume from the Face of Dune to Indicated Depth Contour (CY/FT)

Date	To +6 FT	To -6 FT	To to -19 FT
Nov 2010	0.1	57.0	429.9
Nov 2011	2.3	127.0	524.7
Jun 2012	6.3	114.1	521.2
Nov 2012	5.6	107.6	499.7
Jun 2013	14.0	107.1	493.6
Jun 2014	13.4	88.1	497.5
Jun 2015	8.2	73.1	476.3

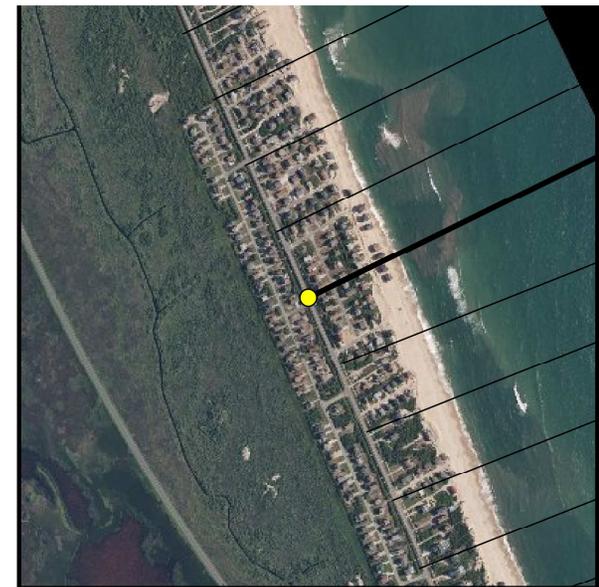


Photo: 7 Jun 2014 IMC

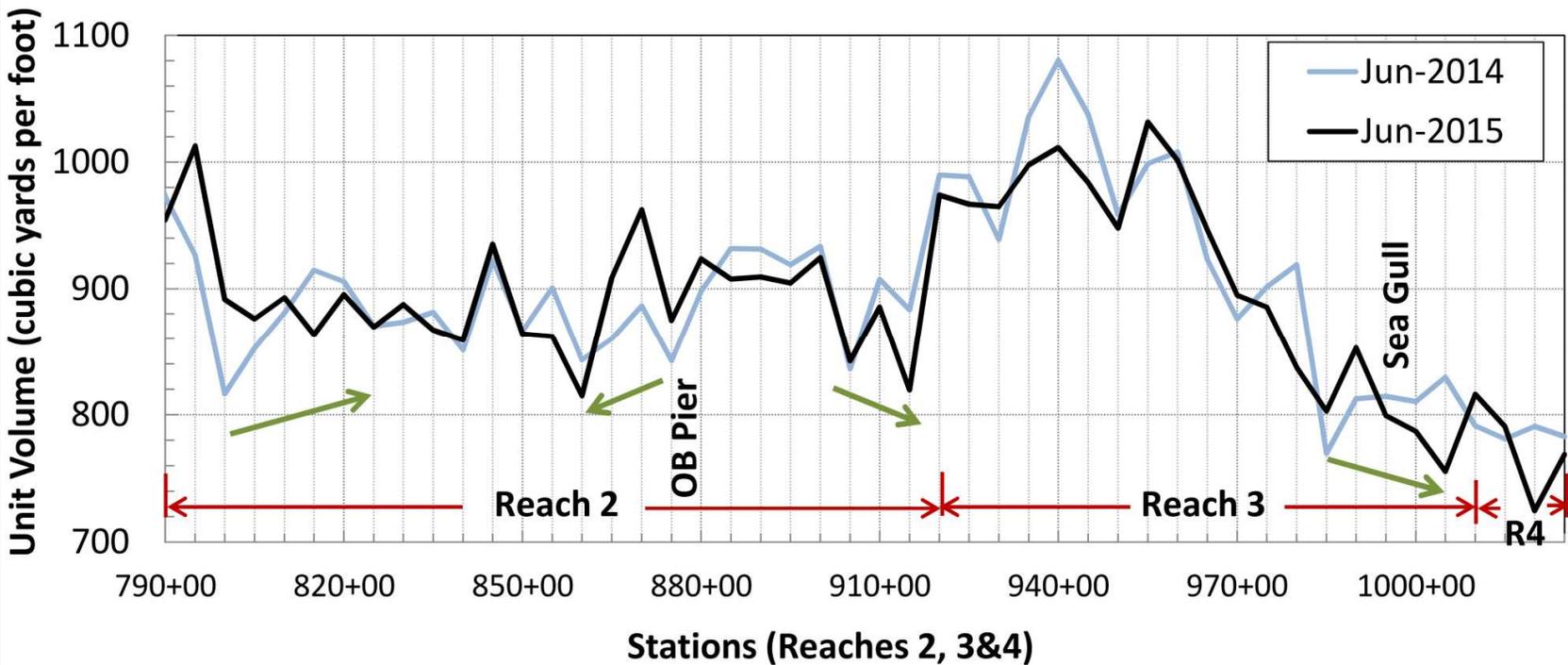
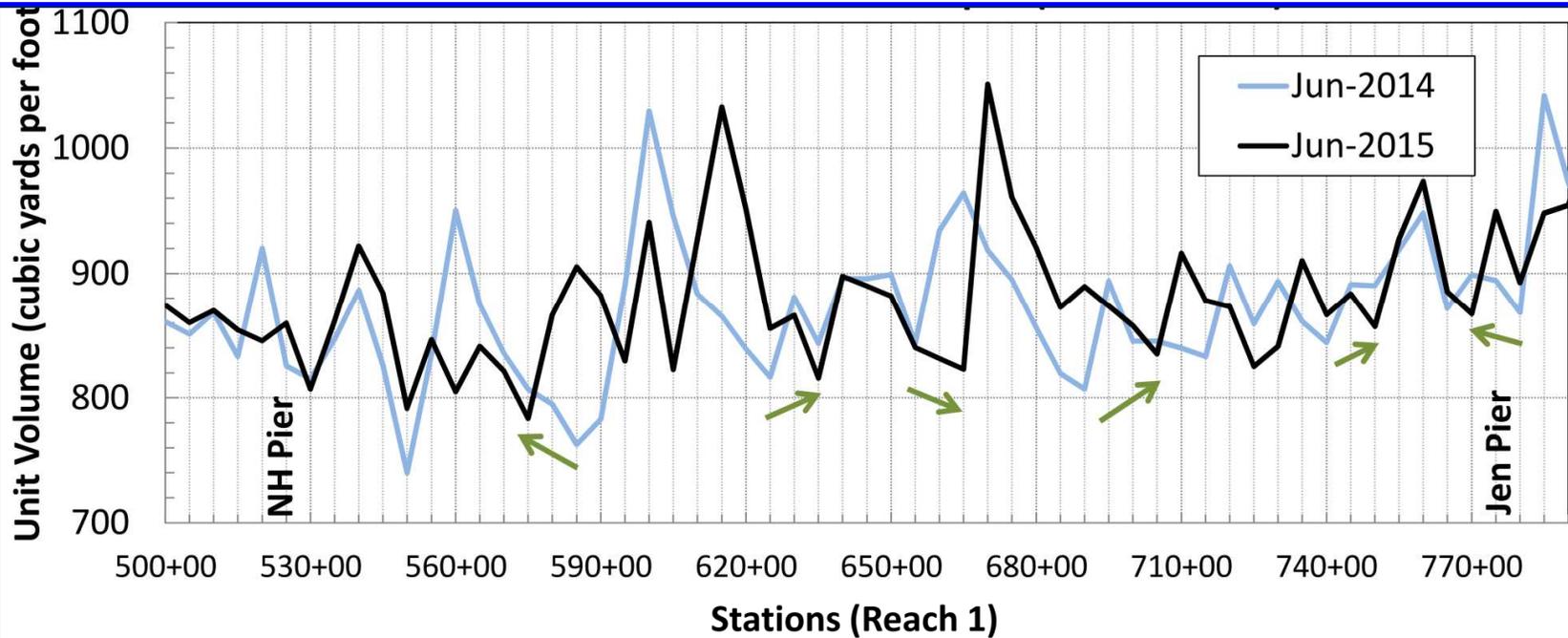
Erosion Hot Spot – Reach 4

- South Nags Head has higher historical erosion rate than north Nags Head
- Project End-losses
- Profile Adjustment
- Rhythmic Shoreline
- Migrating versus persistent hot spots



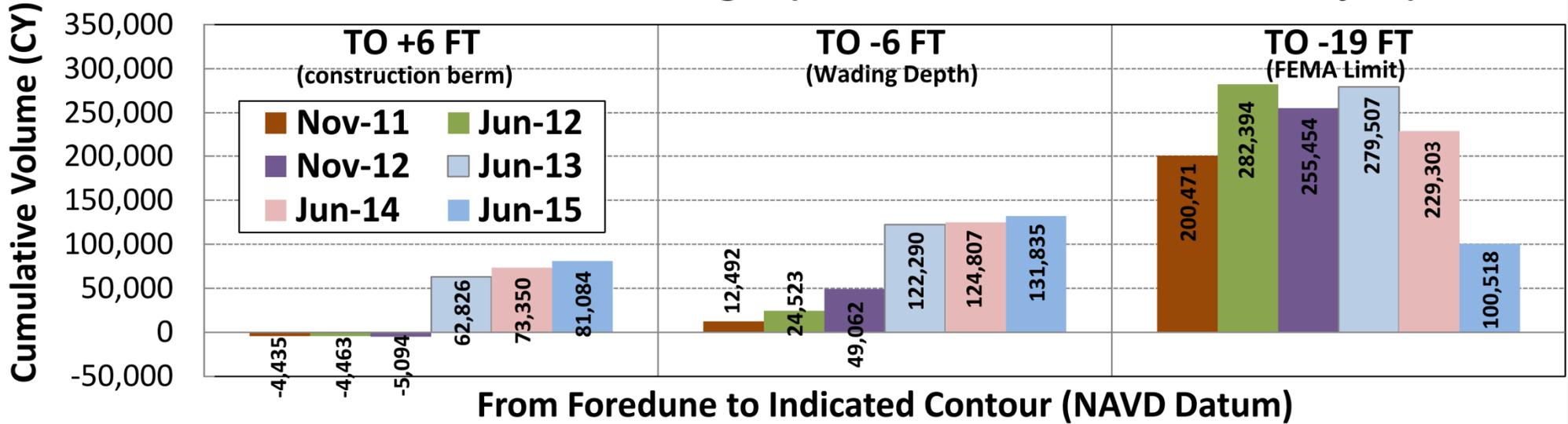
Migrating Versus Persistent Hot Spots

(Unit Volume to -24 FT NAVD Between 2014 and 2015)

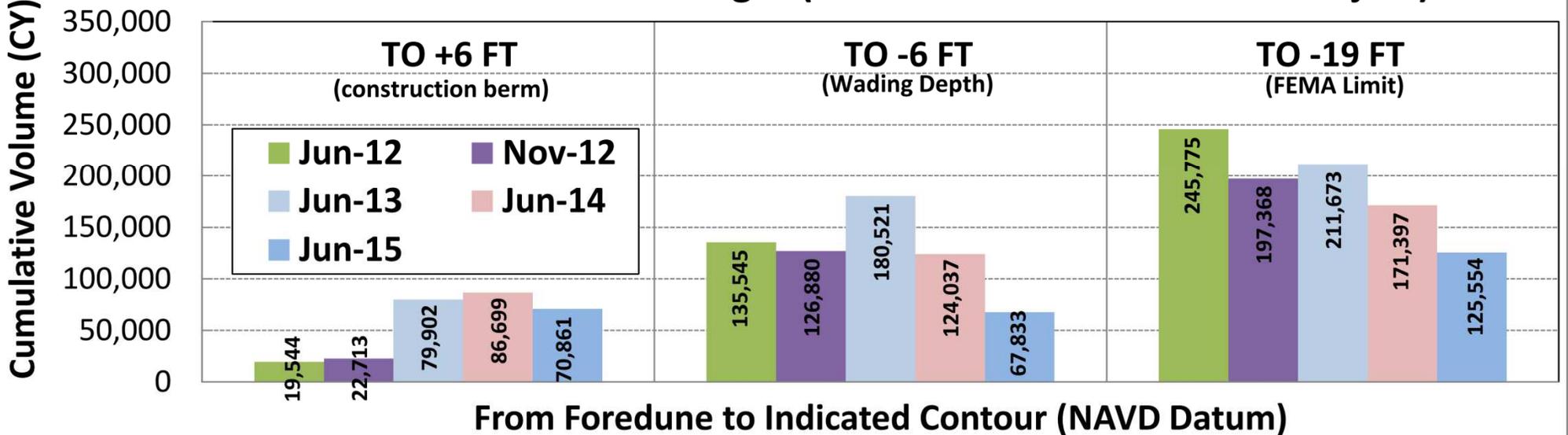


Upcoast and Downcoast – Similar Trend to Nags Head

Nags Head Upcoast (Between Stations 430+00 and 495+00) Cumulative Volume Changes (Relative To Nov-2010 - Pre-Project)



Nags Head Downcoast (Between Stations 1025+00 and 1080+00) Cumulative Volume Changes (Relative To Nov-2010 - Pre-Project)



Project Performance – Summary @ 4 years

• Nourishment Sand Remaining

- Approximately 1 million cy more sand between dune and dry beach – Similar to June 2014 Condition
- **85%** sand remaining to -19 ft NAVD (FEMA Offshore Limit)
- **112%** sand remaining to -24 ft NAVD (Depth Closure)
- North 5.5-mi of NH (Reach 1) gained ~11%; other reaches lost sand @ 7% (R2), 45% (R3), 70% (R4) of nourishment

• Upcoast and Downcoast Changes (Relative to pre-project)

- ~1.2-mi Upcoast gained ~100,000 cy to -19 ft NAVD
- ~1-mi Downcoast gained ~125,000 cy to -19 ft NAVD

• Annual Erosion Rate

- To -19 ft NAVD: **Lost** ~690,000 cy (~189,000 cy/yr or ~3.6 cy/ft/yr) (vs ~5.2 cy/ft/yr-Design)
- To -24 ft NAVD: **Gained** ~555,000 cy (~150,000 cy/yr or ~2.9 cy/ft/yr)

Recommendations

- Additional beach survey in Fall 2015 or 2016
- Borrow area sand survey in Summer 2016
- Continue with dune management plan
- Short-term remedial measures (eg. sand scraping @R4)
- Long-term solution:
 - Periodic Renourishment) – **Start Permitting!**
- Timetable for renourishment
 - January 2016 – Initiate work on Permit Application
 - 2016-2017 – Engineering, Envir docs & permit liaison
 - Early 2018 – Permit issuance
 - March 2018 – Construction document & bidding
 - May 2018 - Construction