2024 – 2025 Season

Delaware Annual Beach Change Report:

Ocean Coast

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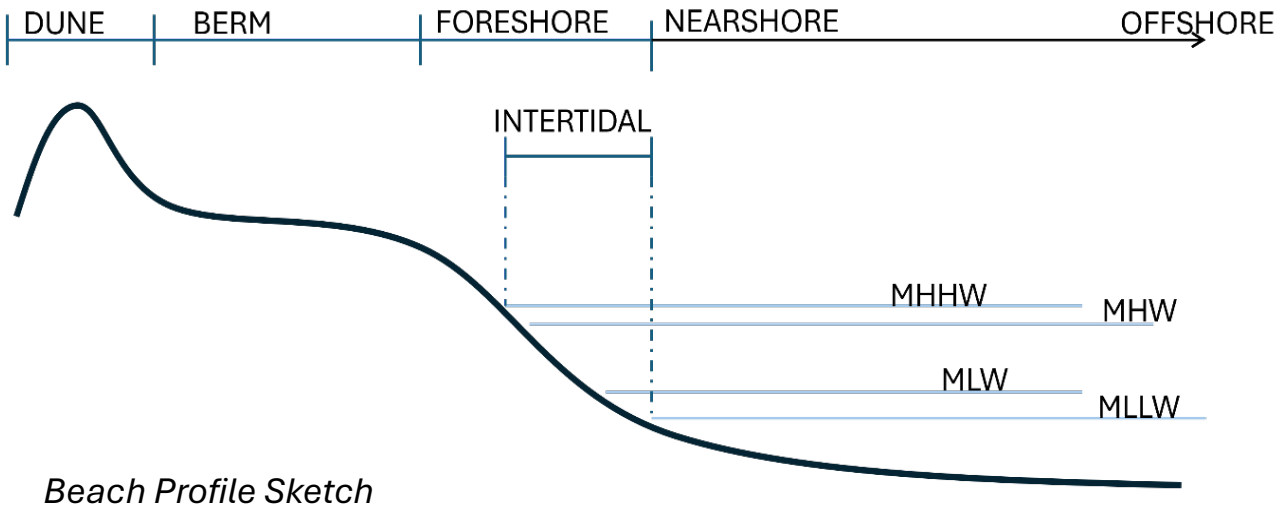
Abbreviations

CF/LF	Cubic Feet per Linear Foot (volume per unit length)
DNREC	Department of Natural Resources and Environmental Control
GPS	Global Positioning System
LRP	Location Reference Point
MHHW	Mean Higher High Water
MHW	Mean High Water
MLLW	Mean Lower Low Water
MLW	Mean Low Water
NAVD	North American Vertical Datum
RTK	Real Time Kinematics
SWMS	Shoreline and Waterway Management Section
TS	Tropical Storm
USACE	United States Army Corps of Engineers

Beach Profile Definitions

Berm	The relatively flat portion of the beach profile directly seaward of the dune that is typically above the MHHW elevation.
Dune	Natural or man-made geological feature that is shoreward of the berm and is characterized by a steep slope to the highest elevations along the beach profile.
Foreshore Slope	The natural slope directly seaward of the berm that is caused by tides and up rushing waves.
Intertidal Zone	The portion of the foreshore slope and nearshore that is between the MHHW and MLLW elevations.
MHHW	The average elevation reached by the higher of the two daily high tides over a 19-year tidal epoch. The value is computed by and available from NOAA.
MHW	The average elevation reached by all the high tides over a 19-year tidal epoch. These elevations exclude any storm surge or non-tidal residuals caused by onshore winds.
MLLW	The average elevation reached by the lower of the two daily low tides over a 19-year tidal epoch.
MLW	The average elevation reached by all the low tides over a 19-year tidal epoch.
Nearshore	For the purposes of this report, the nearshore is considered to extend from the lower portions of the intertidal zone to the surf zone where waves break, but onshore of most boating traffic.



Beach Profile Sketch

Executive Summary

Since 2022, DNREC's Shoreline and Waterway Management Section (SWMS) has published a yearly report titled, "Delaware Annual Beach Change Report: Ocean Coast." The report shares the results of the Delaware ocean coast beach surveys and provides perspective on what causes the changes that are being observed. Survey data are compared to recent storm events, natural processes, and beach nourishment projects that are major drivers of shoreline change.

Twice per year, 40 beach profiles including the dune, berm, and nearshore bathymetry are surveyed from Cape Henlopen State Park to Fenwick Island at the northern and southern ends, respectively. The report presents data from the two most recent summer and winter surveys and describes seasonal changes as well as long-term erosion and accretion trends. The 'Summer 2023' survey dates span two days, where data collection occurred in beach communities south of Indian River Inlet on 9/20/2023 and north of the Inlet on 10/4/2023. SWMS survey crew completed the subsequent Winter 2024, Summer 2024, and Winter 2025 surveys in one day on 3/13/2024, 8/13/2024, and 2/24/2025, respectively. Beach communities are organized from north to south, and all survey lines were renamed as of the last published report for the 2023-2024 Season.

Introduction

DNREC envisions the state of Delaware as a place where people embrace a commitment to the protection, enhancement, and enjoyment of the environment in their daily lives. Therefore, SWMS is tasked with maintaining and improving Delaware's beaches and waterways. The shoreline is managed through regulation of coastal construction activities and implementation of dune and beach management practices. By protecting and improving eroded beaches, SWMS works to enable continued recreational use of Delaware's coastal resources and enhanced resiliency to protect property and infrastructure from the damaging effects of coastal storms and erosion.

Monitoring beach change over time is a key component to shoreline management. During summer and winter seasons, beach profiles are measured along Delaware's ocean coast. Topographic and bathymetric data are collected from the dune out to a nearshore wading depth of about 4-feet deep using a RTK Trimble System paired with GPS. This system tracks the location and elevation of the ground where data points are collected. This information is combined with bathymetric data collected by a hydrographic survey vessel, which surveys from a depth of about 30-feet to the nearshore area to ensure overlap between the topographic and bathymetric profiles. Locations of the 40 profiles or Location Reference Point (LRP) lines from Cape Henlopen State Park to Fenwick Island are shown in Figure 1.

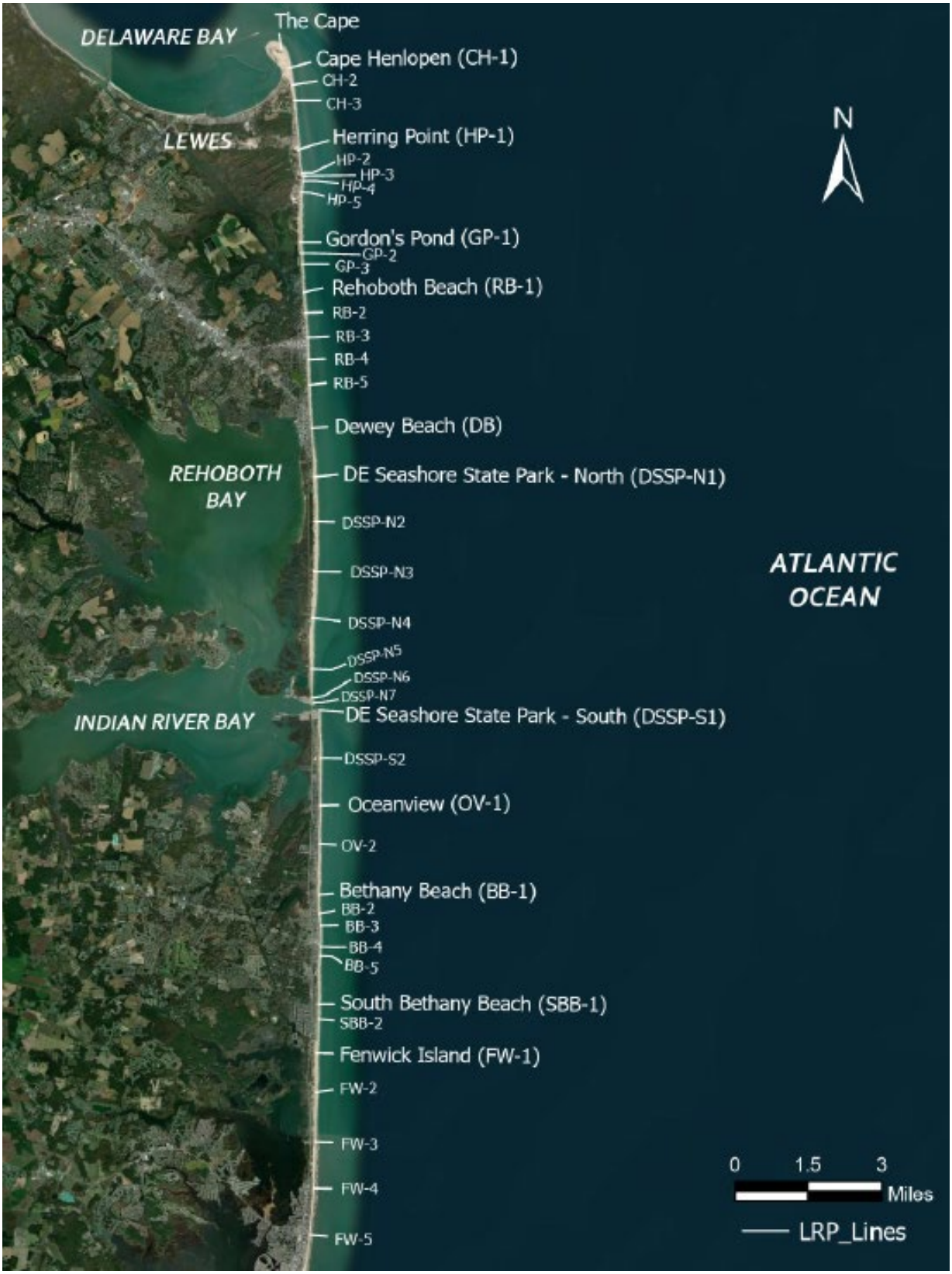


Figure 1: Ocean Coast Survey Location Map

Delaware's Ocean Coast

The Atlantic coast of Delaware is located entirely in Sussex County and extends from the spit, or point, at Cape Henlopen State Park to the southern state border at Fenwick Island (Figure 1). The sandy shoreline is approximately 24 miles (126,500 feet) long and includes six incorporated communities, several private unincorporated developments, and three state parks.

Cape Henlopen State Park is located at the northernmost section of Delaware's ocean coast and set at the mouth of Delaware Bay. In the central part of the coastline is Delaware Seashore State Park. This area is over six miles in length and serves as both critical habitat and host to a variety of recreational opportunities including beachgoing, fishing, surfing, boating, etc. The park is situated both north and south of Indian River Inlet, which provides the only waterway that connects the Atlantic Ocean to two Delaware inland bays. Fenwick Island State Park is a three-mile stretch of shoreline located in the southern part of Delaware's ocean coast between South Bethany Beach and the Town of Fenwick Island. Connecting each of the State Parks is a series of former fire control towers that signify the critical role Delaware played in coastal defense during World War II.

Geology of the Delaware Coastal Plain

Delaware lies within two geologic provinces, the Appalachian Piedmont and the Atlantic Coastal Plain, that are separated by the Fall Zone (or Fall Line). The extreme northern portion of the state is within the Appalachian Piedmont province, while Delaware's ocean coast is located entirely in the Atlantic Coastal Plain and nearly 85 miles from the Fall Zone.

The oldest recorded sediments were deposited in the Coastal Plain about 120 million years ago, when streams transported clays and sands southeast from the Appalachian Mountains and deposited them in coastal rivers and marshes. Sea level rise and fall over geologic history also contributed to the deposition of marine sediments across the Delaware Coastal Plain. The most recent depositional period occurred 2.4 million years ago during the early Pleistocene, when glacial retreat and warming temperatures transported weathered rocks and soils of the Appalachian Piedmont towards the ocean. The Delaware coastal plain is currently estimated to be 7,800 feet thick near Fenwick Island [1].

Longshore Sediment Transport

Delaware's ocean coast experiences longshore sediment transport in a south to north direction. This is evidenced by the historic northward growth of the spit, or point, at Cape Henlopen. However, longshore transport is interrupted by physical structures such as jetties, groins and inlets, and their associated hydraulics. The jetties at Indian River Inlet essentially divide Delaware's Atlantic coast into two halves, the north and the south ocean coasts. Sand transported northward along the south ocean coast is interrupted by the jetties at Indian River Inlet. As a result, sand accumulates along the beach side of the south jetty as well as in the ebb shoal adjacent to the mouth of Indian River Inlet. Consequently, the beach side of the north jetty experiences a sand deficit.

Sand transported northward along the north ocean coast is also interrupted by constructed jetties and groins or accumulated on Cape Henlopen [1]. Further, some of the sand on the Cape is sheared offshore and deposited into Hen and Chicken Shoal by the ebb tidal flow exiting Delaware Bay. In recent decades, the Cape has exhibited a curved migration trajectory, compared to its historical relatively linear trajectory. Geophysical studies of the ebb shoal processes at Indian River Inlet and Hen and Chicken Shoal as well as Cape Henlopen are beyond the scope of this report but are important in assessing long term, sustainable shoreline management strategies.

History of Indian River Inlet & Erosion Control

Indian River Inlet was first recorded on a land survey map in 1670, and dredging began in 1876 to improve navigation [2]. However, despite many attempts, shoaling continued and the inlet closed several times until a federal project was approved in 1937 to stabilize the channel [3]. Construction of the inlet jetties completed in 1940, and the subsequent effects were extensive.

The presence of the inlet jetties interrupts the natural northward flow of sand along Delaware's ocean coast via the longshore current; therefore, the south side of the south jetty experiences long-term accretion while the north side of the north jetty consistently erodes. Shoreline data from 1944 to 1977 suggest the southern shore accreted approximately 250 feet while the northern shoreline eroded over 300 feet during the same timeframe [4]. From 1957 to 1990, erosion control included periodic nourishment of the north side beach using dredged material from both the inlet channel and flood shoal.

In 1990, the U.S. Army Corps of Engineers constructed the sand-bypass facility to provide a consistent source of sand to the north side beach. The sand bypass utilizes a semi-mobile system to pump sand from the south side beach, across the inlet to the north side beach. For many years, the sand bypass system reduced the need for dredging and nourishment; however, it has been inoperable since 2020. Recent conversion of the original diesel pumps into an electric system was completed and tested during Summer 2025.

USACE Coastal Storm Damage Reduction Projects

The U.S. Army Corps of Engineers, in partnership with DNREC, have managed coastal storm damage reduction projects along Delaware's ocean coast for over 20 years; this includes Rehoboth and Dewey Beach, Bethany and South Bethany Beach, and Fenwick Island [5]. These projects are designed to reduce storm damage to infrastructure like roads and buildings through dredging sand from offshore borrow sites and then pumping it onto the beach. The initial storm damage reduction projects were constructed between 2005 and 2008 with periodic nourishment planned for a three-to-four-year interval depending on the availability of funding. All projects were last re-nourished in 2023, and the details are described in Table 1.

Table 1: USACE Delaware Coastal Storm Damage Reduction Projects

Project	Design Info	Length Of Beach	Last Nourished
Rehoboth & Dewey Beach	Dune with elevation +13.2 feet NAVD88 and 150-foot berm.	2.5 miles	Spring 2023
Bethany & South Bethany Beach	Dune with elevation +16.0 feet NAVD88 and 150-foot berm.	2 miles	Summer 2023
Fenwick Island	Dune with elevation +17.7 feet NAVD88 and 200-foot berm.	1.2 miles	Summer 2023

The 2024-2025 Storm Season

NOAA Coastal Flood Events

Storm events and flooding have significant impacts on Delaware's Atlantic coastline. The NOAA National Centers for Environmental Information (NCEI) Storm Event Database describes several occurrences within the 'Delaware Beaches Zone' that resulted in a Coastal Flood designation [6]. A Coastal Flood Event is defined as flooding of coastal areas due to the vertical rise above normal water level caused by strong, persistent onshore wind, high astronomical tide, and/or low atmospheric pressure, resulting in damage, erosion, flooding, fatalities, or injuries [7].

Table 2 lists the NOAA Coastal Flood Events recorded for the Delaware Beaches during the 2024-2025 season. It is important to note, these events do not cause inland flooding along much of the Delaware Atlantic Coast due to the USACE Coastal Storm Damage Reduction Projects mentioned above. However, the flood elevation entering the inland bays does cause flooding along the bayside of Atlantic Coast communities.

Table 2: NOAA Coastal Flood Events Recorded for The Delaware Beaches

Date	Description Of Event
Sept. 23, 2023	**Tropical Storm Ophelia**. Steady onshore flow along the coast causing widespread tidal flooding.
Sept. 26, 2023	High- & low-pressure systems resulted in steady onshore flow along the coast causing widespread tidal flooding.
Dec. 18, 2023	An area of low pressure resulted in strong onshore flow and a push of water onshore and up the Delaware Bay and River, where moderate coastal flooding was observed.
Jan. 10, 2024	A strong system with steady southerly flow pushed water into coastal communities. Water levels in tidal areas were also higher due to 2-4+ inches of rainfall.

Jan. 13, 2024	Strong S to SE winds. Widespread tidal flooding and a push of water up the Delaware Bay and through the back bays. Resulted in tidal inundation of roads and structures.
Feb. 13, 2024	A strong coastal system caused surge of 2-3 feet above astronomical tides, resulting in impactful coastal flooding during high tides along much of the Atlantic coast.
April 12, 2024	High astronomical tides and strong southerly flow resulted in higher water levels, mainly along Delaware Bay, and some flooding in the back bays.
Sept. 23, 2024	An offshore coastal storm and full moon resulted in higher tides and moderate coastal flooding.
Nov. 15, 2024	High tides associated with the full moon and light onshore flow brought moderate tidal flooding to the coast.

USGS Hydrologic Gauge Stations

Hydrologic gauges can be used to determine the maximum water elevations resulting from storm events affecting the Delaware coastline. The U.S. Geological Survey (USGS) owns and maintains a series of gauges that collect real-time water level data at stations located just bayward of Delaware's ocean coast [8]. Hydrologic data are disseminated to collaborators, like NOAA's National Weather Service, for forecasting and understanding impacts from tidal flooding [9]. Figure 2 below shows two tidal gauge locations from north to south as Rehoboth Bay at Dewey Beach and Indian River Inlet.

Peak water elevations (in feet MHHW) measured at each station during the 2024-2025 storm season are listed in Table 3 and coincide with the Coastal Flood Events described above. Based on NOAA's flood impact forecasting, hydrologic data suggest a 'moderate' level of flooding occurred at one or both stations during each event [9]. However, as mentioned above, the vast majority of coastal flooding along Atlantic Coast communities is from the inland bays, since the USACE Coastal Storm Damage Reduction Projects have been effective at greatly reducing flood risks directly along the Atlantic shoreline.

The highest water levels were recorded on 9/23/2023 at both gauge stations, resulting from the impact of Tropical Storm (TS) Ophelia (Table 3).

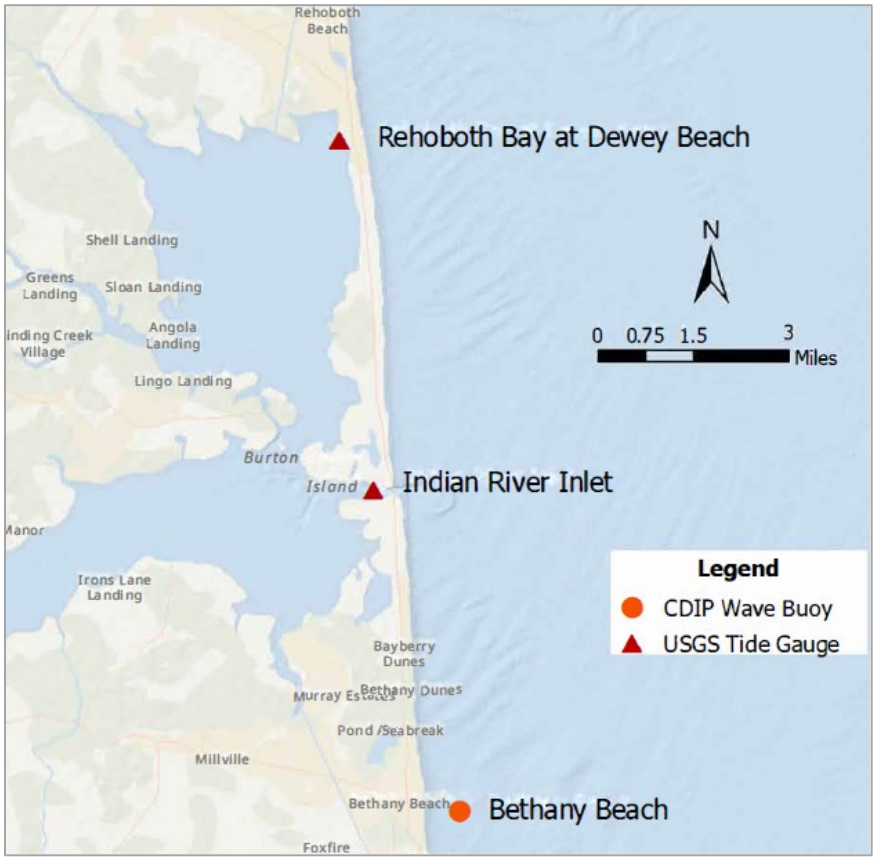


Figure 2: Water level and wave monitoring stations

Table 3: Maximum water level elevations recorded by USGS hydrologic gauges

NOAA Coastal Flood Event	Dewey Beach MHHW, feet	Indian R Inlet MHHW, feet
23-Sep-23	2.98	2.64
18-Dec-23	2.33	2.34
15-Nov-24	2.28	2.22
NOAA Flood Prediction	Moderate (2.3 to 3.2-feet)	Moderate (2.1 to 3.0-feet)

CDIP - Wave Monitoring Buoy Station

Coastal erosion is most damaging during storms when high waves and strong currents combine to suspend and move sand off beaches. Therefore, a network of buoys was established by the Coastal Data Information Program (CDIP) for continuous wave monitoring along the coastlines of the United States [10]. In Delaware, there is one CDIP buoy located 0.5 miles east of Bethany Beach (Figure 2). Real-time wave measurements are used to understand storm intensity by calculating wave power, or the rate of energy transfer by the wave to the exposed beach. Wave power is important because as waves generate more power, they often have greater potential for causing erosion.

The wave power (P) formula is given by:

$$P = 0.5 * \rho * g * H^2 * T$$

Where: P = wave power, ρ = density of seawater (1025 kg/m^3), g = gravitation acceleration (9.81 m/s^2), H = wave height, and T = wave period. This formula produces wave power in *kilowatts (kW) per meter of wavefront length*. In Table 4, wave power is calculated for three events that produced the greatest wave heights recorded by the Bethany Beach CDIP buoy during the 2024-2025 season.

Table 4: Wave data from the Bethany Beach CDIP buoy

DATE	WAVE HEIGHT meters	WAVE PERIOD seconds	WAVE POWER Kilowatts (kW) per meter of wavefront
23-Sep-23	3.37	9.1	520
18-Dec-23	3.09	14.3	687
10-Jan-24	3.26	9.9	529

On 9/23/2023, TS Ophelia impacted the Delaware coastline and produced waves with the largest height of the three events. This is expected since wind creates waves, and tropical storms, by definition, sustain a maximum wind surface speed of 34 - 63 knots [6]. These surface or wind waves are generated

locally and have shorter periods (< 10 s), resulting in less power. Similarly, the 1/10/2024 storm produced heavy rainfall and strong, steady winds, which generated waves comparable to TS Ophelia.

The 12/18/2023 event was different, however, as longer-period (> 10 s), more powerful waves were measured. This event was generated farther away as deep, longer waves travel great distances and contain more energy compared to waves produced by surface winds. Therefore, NOAA describes this event as resulting in a “strong onshore push of water” (Table 2).

While TS Ophelia resulted in higher water elevations, waves produced by the 12/18/2024 storm had a more powerful impact on the shoreline. Regardless, the power output from waves, in general, is quite substantial as 600 kW is enough power to supply hundreds of homes simultaneously or an industrial plant that serves an entire town. While outside the scope of this report, wave power could be a promising renewable energy source given its high potential and consistent output.

Typical Seasonal to Annual Beach Change

Storm-driven erosion and overwash [11] control seasonal-to-annual-scale beach change along Delaware’s Atlantic coastline. While storm events are episodic, increases in frequency and intensity promote the likelihood of coastal erosion [12]. Nor'easters typically cause the most annual erosion on Delaware beaches. Hurricanes and tropical storms are less frequent and more transient but can cause major shoreline change and coastal erosion. Typically, during fall and winter months energetic waves and storm surge cause volume loss, resulting in beach profiles with upper beach face erosion and dune scarping. During spring and summer months, calmer waves and less frequent/intense storms commonly result in beach accretion. Figure 3 demonstrates a schematic of typical beach profiles during summer versus winter months. It is possible that some beaches may not fully recover the volume lost between seasons [13]. Insufficient seasonal recovery is common on beaches along the Atlantic coast and in the world, leading to a long-term erosion. [14].

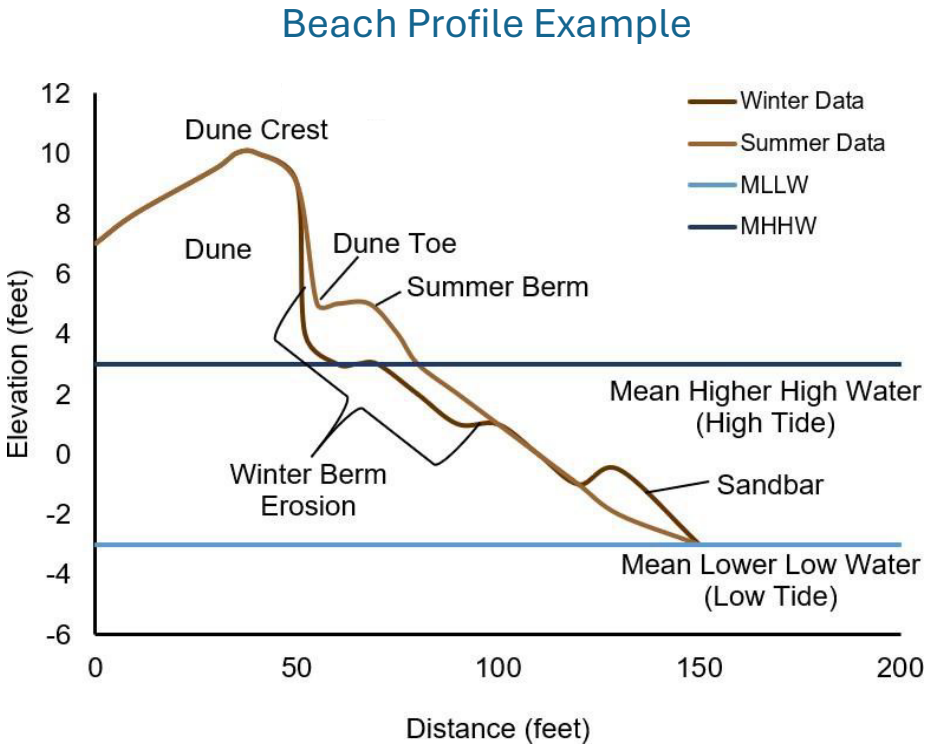


Figure 3: Schematic of a typical beach profile during summer vs winter

Annual Beach Change by Community

Beach change is determined by calculating the measured volume difference between seasons for each transect or LRP line. Beach volume is measured along a 1-dimension transect and reported in cubic feet per linear foot of beach length (cf/lf). Two beach volumes are reported for each LRP line based on the mean high water (MHW) and mean low water (MLW) contours as demonstrated in Figure 4. The MHW volume represents the material between the crest of the dune and the intersection of the MHW contour. The MLW volume includes the material between the MHW and MLW contours, in addition to the MHW volume. If erosion causes considerable change of the dune crest, the inland limit of the volume calculation is selected where all seasonal profiles converge.

The upper extent of the beach above the MHW contour, where most beachgoers sit, is only reached during storm tides and/or when powerful wave action is occurring. Therefore, the MHW volume is an indicator of beach

resiliency to flooding, overwash, and hazardous wave action. The MLW volume and the comparison of the MHW and MLW volumes are better indicators of seasonal beach change. During the stormy season when the upper beach erodes, sand washes down to the intertidal zone or just offshore. Some of the eroded material that ends up in the intertidal zone may be captured in the MLW data. By comparing the MHW and MLW volumes, seasonal erosion and accretion trends can be identified.

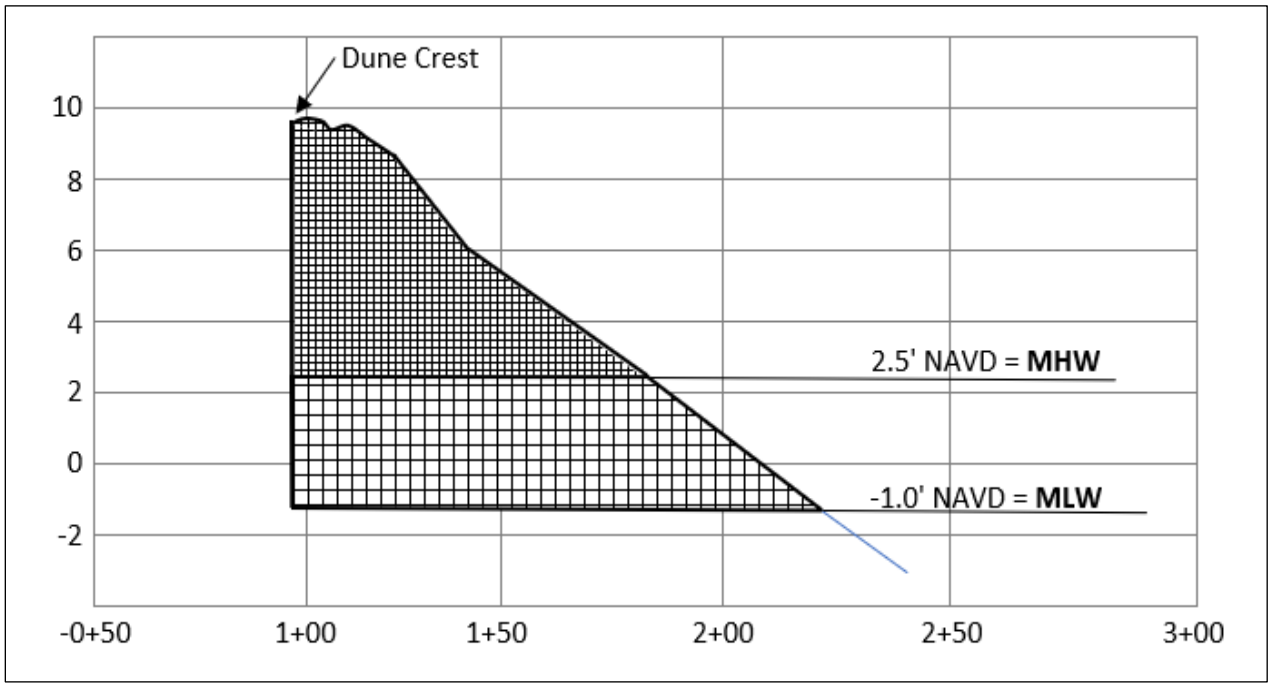


Figure 4: Beach profile sketch showing MHW & MLW contours

The following sections describe the average seasonal and annual beach change volumes determined for each of the Delaware ocean coast communities. Volume data are paired with representative beach profiles and photographs per community. Beach profiles for all LRP lines are available in Appendix 1. Additional photographs are included in Appendix 2.

Cape Henlopen State Park

Cape Henlopen State Park is the northernmost section of beach along Delaware's ocean coast. The Park's northern end includes the point, or spit, of Cape Henlopen (CH) and three LRP survey lines (Figure 5A). The Point and CH-1 are inaccessible during certain times of year to benefit threatened and endangered nesting and migratory birds; therefore, data collection in this region is limited. LRP lines CH-2 and CH-3 are within the Park's main day-use area (Figure 5A).

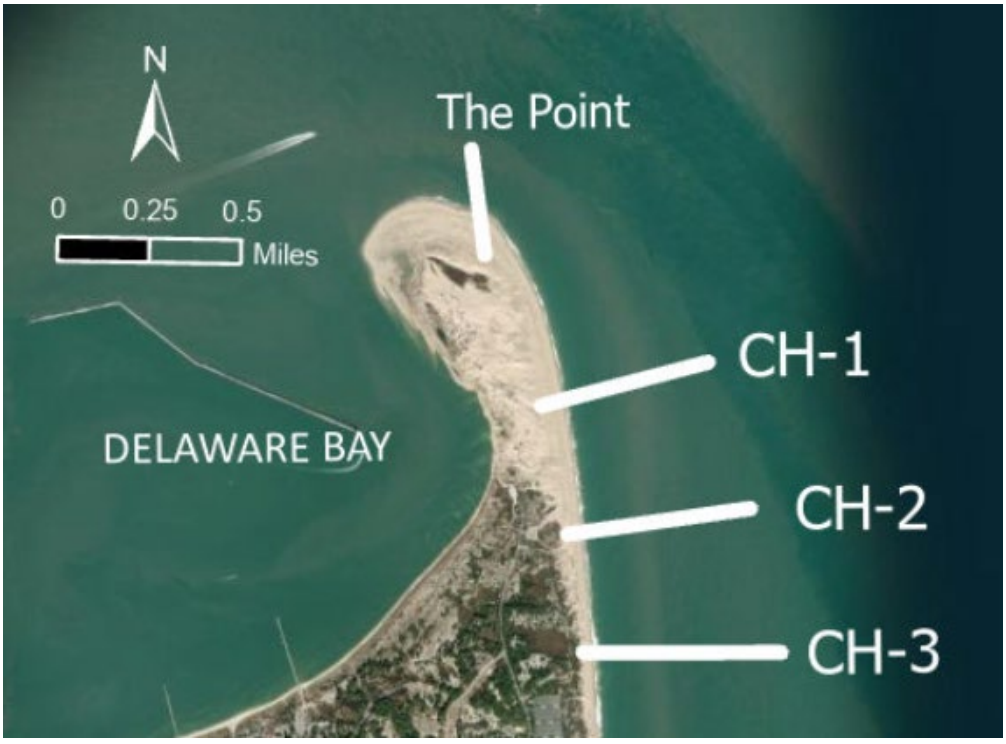


Figure 5A. LRP lines at Cape Henlopen

The average beach volumes determined for Cape Henlopen are shown in Table 5. The Delaware coastline was impacted by TS Ophelia on 9/23/2023, prior to the Summer 2023 survey. Therefore, Figure 5B shows an eroded, post-storm profile at LRP line CH-2 followed by accretion during Winter 2024. Accretion continued through Summer 2024 as volume increases were observed in the intertidal zone and dune. Seasonal erosion at CH-2 was evident from the Winter 2025 profile, which appears similar to the Winter 2024 profile. Conversely, LRP line CH-3 eroded continuously from Summer 2023 through Summer 2024 and then accreted volume during Winter 2025. A photo of the point at Cape Henlopen is shown in Figure 5C.

Table 5: Beach volume calculations for Cape Henlopen							
LRP		**CH-1**		**CH-2**		**CH-3**	
Volume Limit		MHW	MLW	MHW	MLW	MHW	MLW
Season	Date	*cf/lf*	*cf/lf*	*cf/lf*	*cf/lf*	*cf/lf*	*cf/lf*
Summer 2023	10/4/2023	638	1546	841	1857	1184	2135
Winter 2024	3/14/2024	NA	NA	938	2108	1093	2086
Summer 2024	8/13/2024	NA	NA	1106	2306	1106	1977
Winter 2025	2/24/2025	777	1849	971	2075	1171	2045

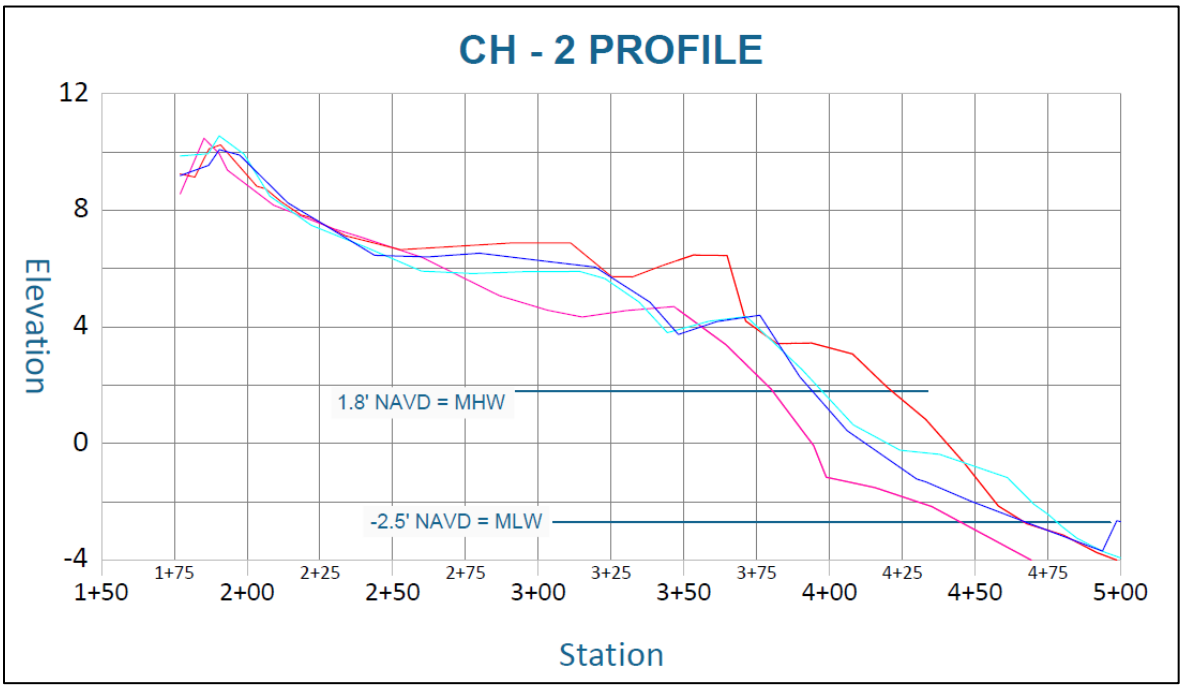


Figure 5B. Beach Profiles at Cape Henlopen, LRP CH-2
Pink: Summer '23, Cyan: Winter '24, Red: Summer '24, Blue: Winter '25

Figure 5C. The Point at Cape Henlopen (Photo: 12/12/2023)

Herring Point

Herring Point (HP) is located south of the main day-use area and within Cape Henlopen State Park. This beach is characterized by two large jetties and five LRP survey lines.

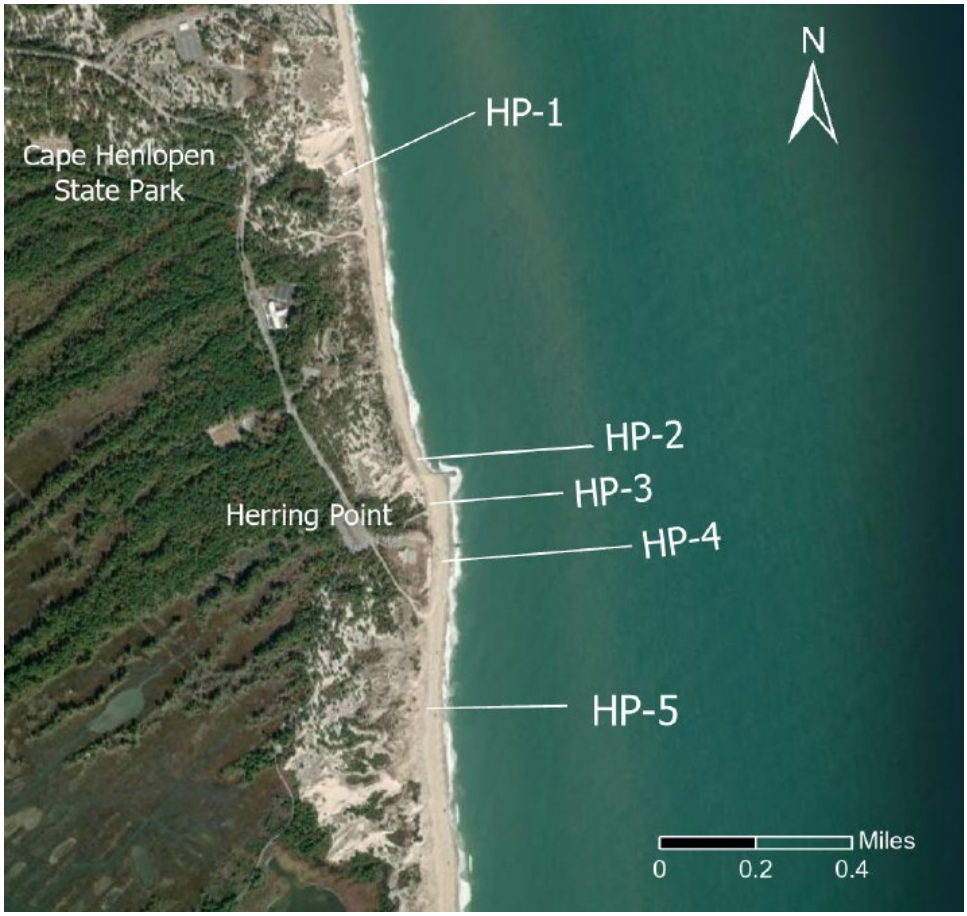


Figure 6A. LRP lines at Herring Point

The average beach volumes determined for Herring Point are shown in Table 6. The northernmost LRP line (HP-1) demonstrates the typical seasonal changes with erosion occurring during winter, followed by summer accretion. Dune accretion is expected during summer as wind-blown sand becomes trapped by vegetation, and erosion due to coastal storms becomes less frequent. In addition, LRP line HP-1 is accreting overtime as annual volume increases are measured between summer and winter seasons.

Conversely, beach profiles at LRP lines HP-2, HP-3, and HP-4 were influenced by the nearby jetties. Post-storm erosion is likely captured in the Summer 2023

data due to the impacts of TS Ophelia as all sites gained volume during the Winter 2024 survey. LRP line HP-2 accreted significantly during Winter 2024 as the jetty helped trap some of the sand that had previously eroded (Figure 6B). However, volume loss was evident in the subsequent Summer 2024 and Winter 2025 profiles as sand likely washed out along the jetty following storms. Survey data at HP-3 and HP-4 demonstrate the expected seasonal trends of accretion during Summer 2024, followed by Winter 2025 erosion. Given LRP line HP-3 is situated between the two jetties, smaller changes in volume were measured compared to HP-4, which is located south of the south jetty.

Table 6: Beach volume calculations for Herring Point

LRP		HP-1		HP-2		HP-3	
Volume Limit		MHW	MLW	MHW	MLW	MHW	MLW
Season	Date	cf/lf	cf/lf	cf/lf	cf/lf	cf/lf	cf/lf
Summer 2023	10/4/2023	654	1357	1014	1855	1238	2245
Winter 2024	3/14/2024	585	1087	1339	2732	1241	2315
Summer 2024	8/13/2024	803	1544	1270	2561	1306	2360
Winter 2025	2/24/2025	754	1391	1121	2229	1224	2173

Table 6 continued: Beach volume calculations

LRP		HP-4		HP-5	
Volume Limit		MHW	MLW	MHW	MLW
Season	Date	cf/lf	cf/lf	cf/lf	cf/lf
Summer 2023	10/4/2023	819	1543	1523	2621
Winter 2024	3/14/2024	860	1657	1320	2253
Summer 2024	8/13/2024	1047	1868	1398	2309
Winter 2025	2/24/2025	866	1606	1404	2377

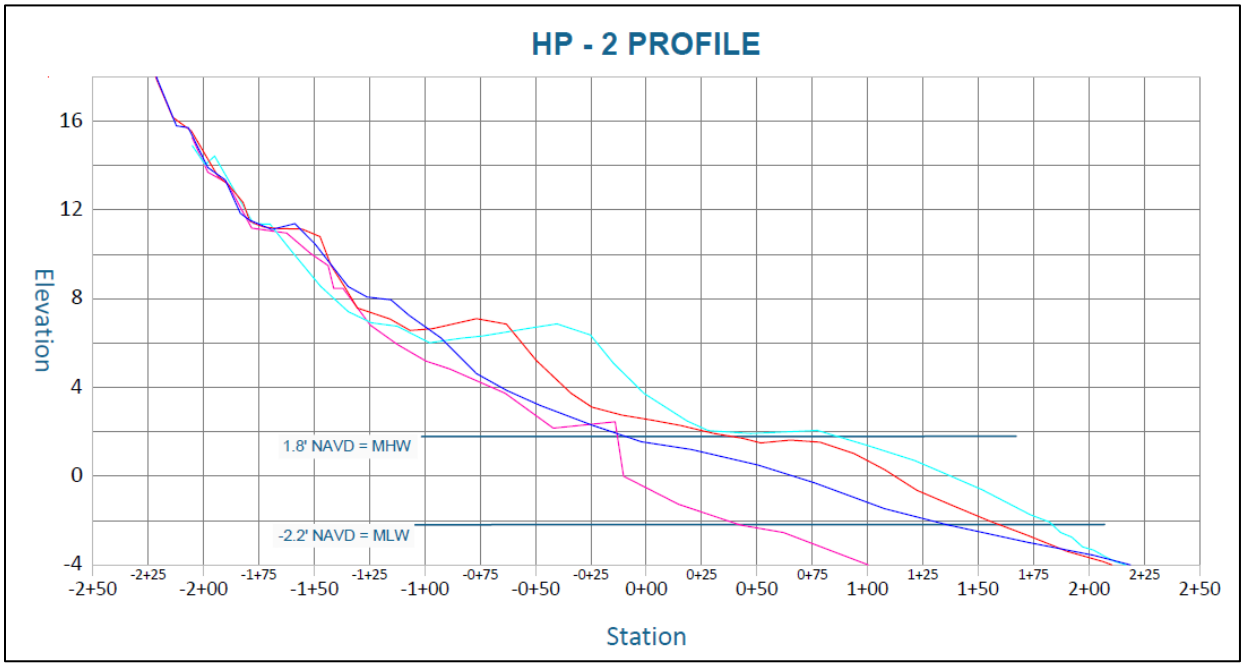


Figure 6B. Beach Profiles at Herring Point, LRP HP-2
Pink: Summer '23, Cyan: Winter '24, Red: Summer '24, Blue: Winter '25

Figure 6C. Herring Point (4/11/2024, 9:40) nearing high tide, looking north.

Gordon's Pond

Gordon's Pond (GP) beach is located at the southern end of Cape Henlopen State Park. This shoreline includes two WWII Artillery Fire Observation Towers, two small jetties, and three LRP survey lines (Figure 7A).

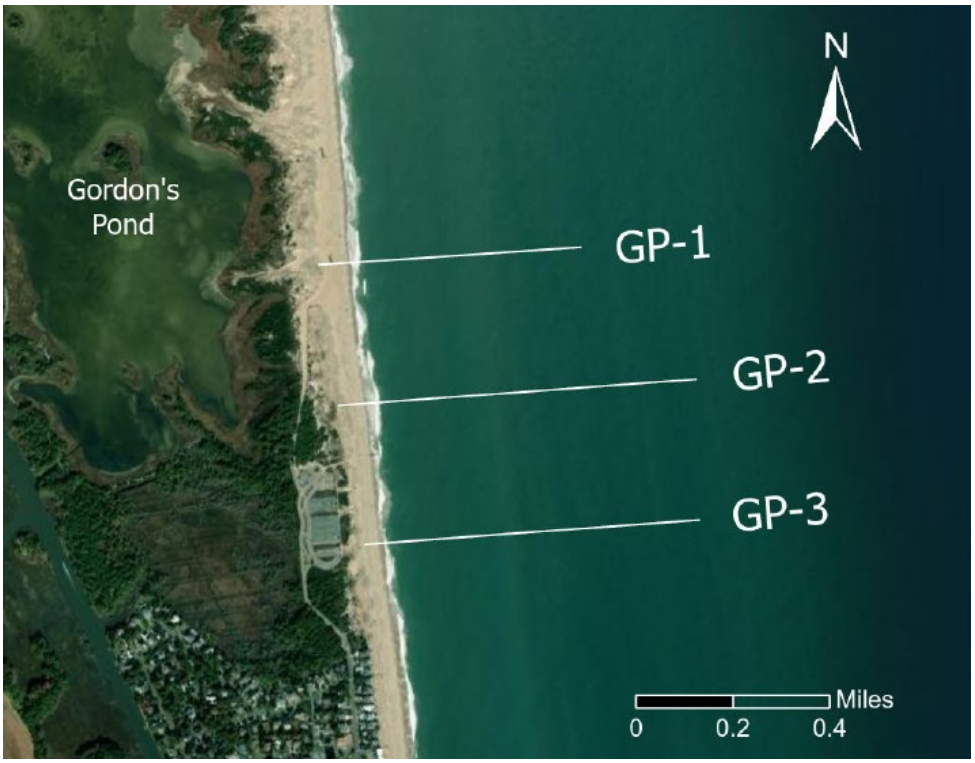


Figure 7A. LRP lines at Gordon's Pond

The average beach volumes determined for Gordon's Pond are shown in Table 7. Despite some volume loss observed during Winter 2024, Gordon's Pond accreted throughout the 2024-2025 season. The greatest gains in volume were measured during the Summer 2024 surveys of LRP lines GP-1 and GP-3. Comparatively, LRP line GP-2 is influenced by a groin to the south and thus accreted smaller volumes from Summer 2023 through Winter 2025. In Figure 7B, accretion above the MHW line is observed at GP-2 in the Summer 2024 and Winter 2025 profiles.

Table 7: Beach volume calculations for Gordon's Pond							
LRP		**GP-1**		**GP-2**		**GP-3**	
Volume Limit		MHW	MLW	MHW	MLW	MHW	MLW
Season	Date	cf/lf	cf/lf	cf/lf	cf/lf	cf/lf	cf/lf
Summer 2023	10/4/2023	1421	2658	1192	2488	767	1664
Winter 2024	3/14/2024	1498	2631	1284	2542	907	1835
Summer 2024	8/13/2024	1596	3002	1303	2600	1115	2222
Winter 2025	2/24/2025	1678	3070	1386	2750	1112	2273

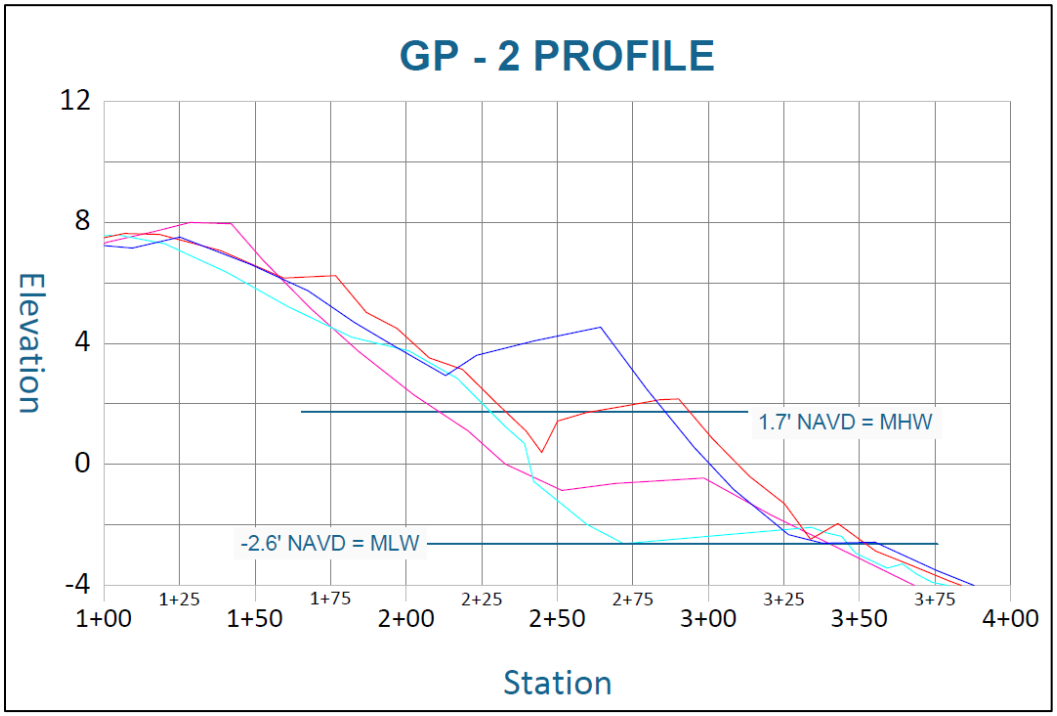


Figure 7B. Beach Profiles at Gordon's Pond, LRP GP-2
Pink: Summer '23, Cyan: Winter '24, Red: Summer '24, Blue: Winter '25

An aerial view of Gordon's Pond beach is shown in Figure 7C. The northern jetty is visible in the center of the photo, and the WWII Observation Towers are shown in the background.

Figure 7C. Aerial view of Gordon's Pond beach (4/11/2024, 9:51) approaching high tide looking north

South of Gordon's Pond is the unincorporated community of North Shores, which includes approximately 2,200 feet of private beach. Survey data is not collected along this section of coastline.

Rehoboth Beach

Henlopen Acres is a small, incorporated town that lies between North Shores to the north and Rehoboth Beach (RB) to the south. The shoreline is about 1,000 feet in length and contains LRP line RB-1 (Figure 8A). The densely developed incorporated town of Rehoboth Beach accounts for over 9,200 feet of coastline and includes the state-owned northern end (RB-2), known as Deauville and the unincorporated southern region (RB-5), known as Silver Lake. There are nine constructed groins and four additional LRP lines within this stretch of shoreline (Figure 8A).

Figure 8A. LRP lines at Rehoboth Beach

The average volumes determined for Rehoboth Beach are shown in Table 8. Overall, Rehoboth Beach accreted material throughout the 2024-2025 season. As one of the federally authorized Delaware Coastal Storm Damage Reduction Projects described above, Rehoboth Beach was last nourished in May 2023. Beach nourishment impacted LRP lines RB-2, RB-3, and RB-4 and, in addition to TS Ophelia, influenced the Summer 2023 volume measurements. Comparing the Summer 2023 profiles at RB-2 (Figure 8B) and RB-5 (Figure 8C) demonstrate the importance of periodic nourishment for reducing the effects of coastal storm erosion.

In Winter 2024, Rehoboth Beach recovered some of the volume lost and then continued accreting above the MHW line during Summer 2024. The expected seasonal erosion followed in Winter 2025 at LRP lines RB-1 and RB-3; however, both areas regained a significant volume since the erosive effects of TS Ophelia. Otherwise, net accretion was measured in the Winter 2025 surveys of RB-2, RB-4, and RB-5. Figures 8B and 8C display a gain in material each season and re-establishment of the berm and dune during Winter 2025. Figure 8D displays an aerial view of Rehoboth Beach from the central, developed shoreline.

Table 8: Beach volume calculations for Rehoboth Beach

LRP		RB-1		RB-2		RB-3	
Volume Limit		MHW	MLW	MHW	MLW	MHW	MLW
Season	Date	cf/lf	cf/lf	cf/lf	cf/lf	cf/lf	cf/lf
Summer 2023	10/4/2023	1022	2017	1279	2412	656	1651
Winter 2024	3/14/2024	1177	2273	1522	2844	921	2015
Summer 2024	8/13/2024	1406	2591	1583	2779	1086	2293
Winter 2025	2/24/2025	1341	2465	1602	2813	972	2016

Table 8 continued: Beach volume calculations					
LRP		**RB-4**		**RB-5**	
Volume Limit		MHW	MLW	MHW	MLW
Season	Date	cf/lf	cf/lf	cf/lf	cf/lf
Summer 2023	10/4/2023	1254	2448	1335	2327
Winter 2024	3/14/2024	1445	2633	1558	2635
Summer 2024	8/13/2024	1637	2832	1754	2882
Winter 2025	2/24/2025	1653	2846	1865	3020

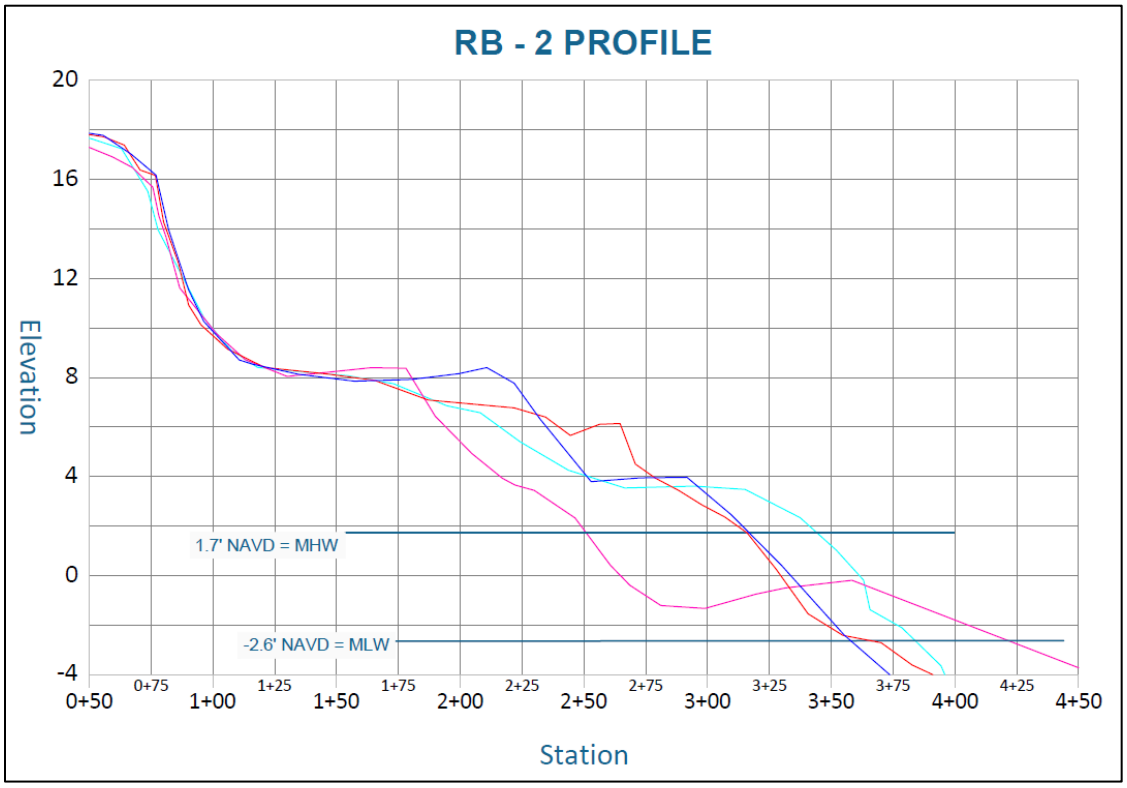


Figure 8B. Beach Profiles at Rehoboth Beach, LRP RB-2
Pink: Summer '23, Cyan: Winter '24, Red: Summer '24, Blue: Winter '25

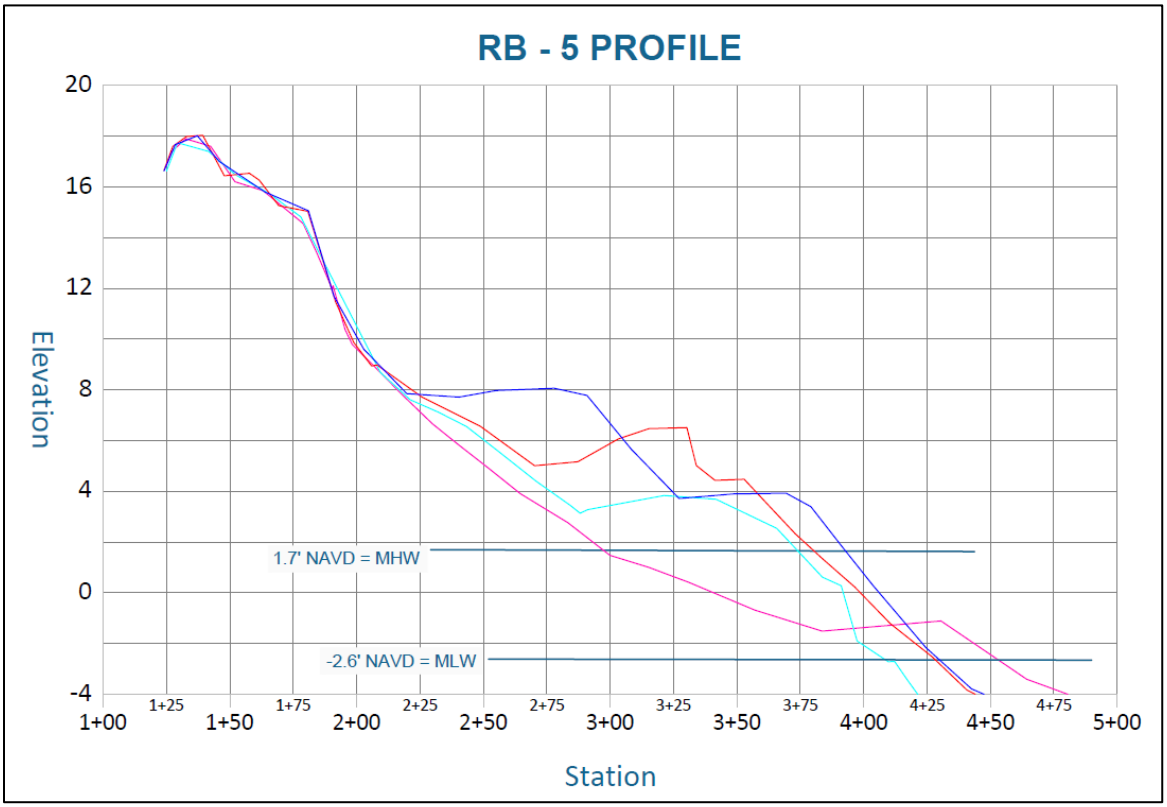


Figure 8C. Beach Profiles at Rehoboth Beach, LRP RB-5
Pink: Summer '23, Cyan: Winter '24, Red: Summer '24, Blue: Winter '25

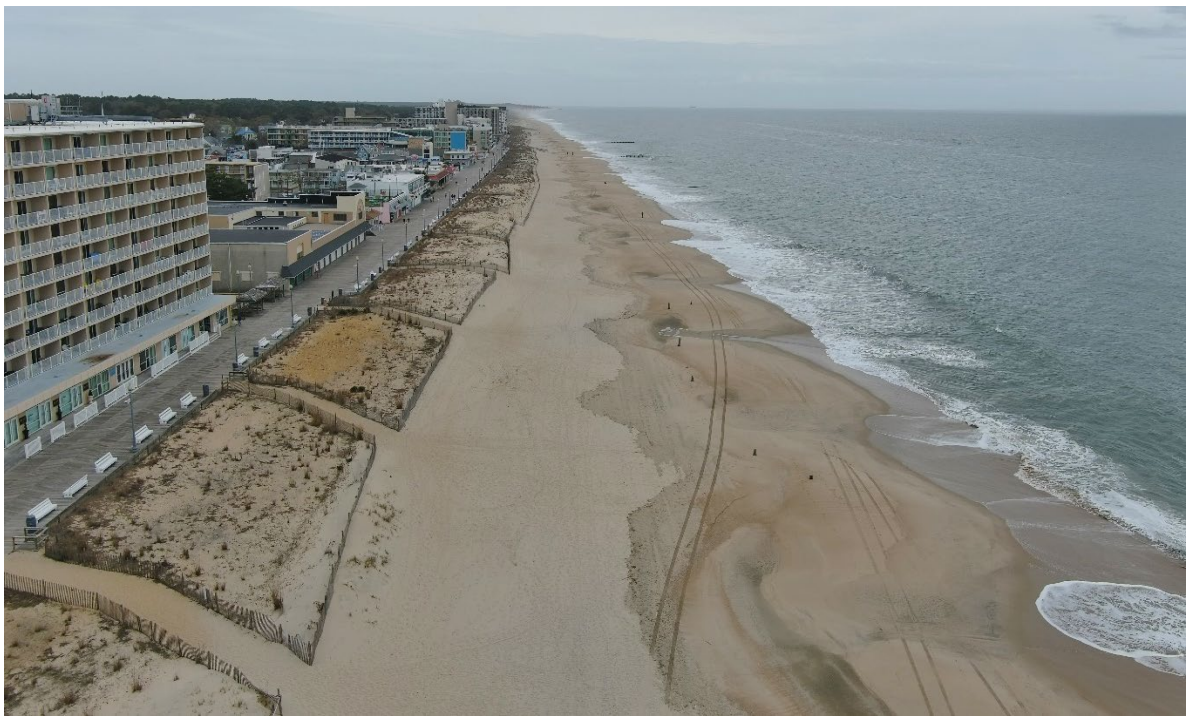


Figure 8D. Rehoboth Beach (4/11/2024, 10:03) nearing high tide, looking north

Dewey Beach

Dewey Beach (DB) is located south of the Silver Lake region, which separates Rehoboth and Dewey Beaches. This stretch of coastline is about 7,500 feet in length and contains one LRP line (Figure 9A).

Figure 9A. LRP line at Dewey Beach

The average beach volumes determined for Dewey Beach are shown in Table 9. Similar to Rehoboth, Dewey Beach is one of the federally authorized Delaware Coastal Storm Damage Reduction Projects described above and was last nourished in May 2023. The impacts due to TS Ophelia are represented in the Summer 2023 profile. Net accretion was measured in subsequent seasonal surveys, and Figure 9B suggests material from the intertidal zone accreted above the MHW line during Summer 2024. Accretion continued, including formation of a berm, in Winter 2025 (Figure 9B). An aerial view of Dewey Beach is shown in Figure 9C.

Table 9: Beach volume calculations for Dewey Beach			
LRP		**DB**	
Volume Limit		MHW	MLW
Season	Date	cf/lf	cf/lf
Summer 2023	10/4/2023	1105	2078
Winter 2024	3/14/2024	1279	2303
Summer 2024	8/13/2024	1390	2424
Winter 2025	2/24/2025	1426	2394

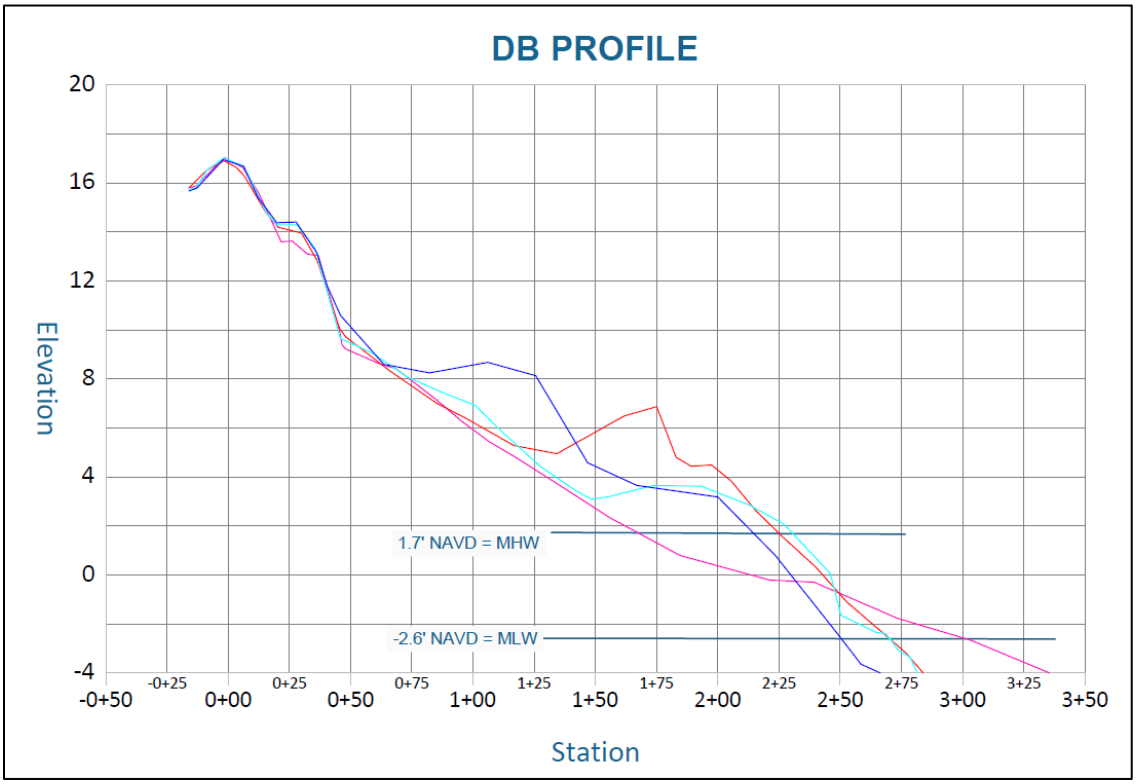


Figure 9B. Beach Profiles at Dewey Beach

Pink: Summer '23, Cyan: Winter '24, Red: Summer '24, Blue: Winter '25

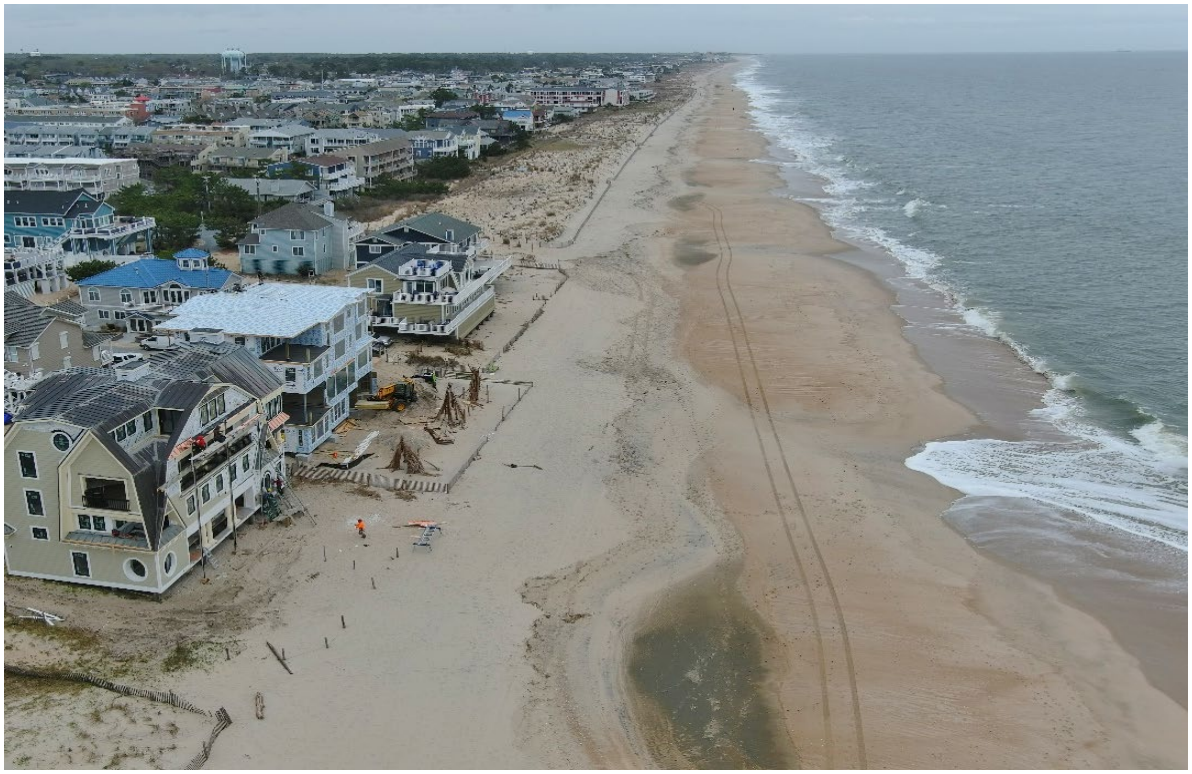


Figure 9C. Dewey Beach (4/11/2024, 10:17) nearing high tide, looking north

Delaware Seashore State Park - North

Delaware Seashore State Park - North of Indian River Inlet (DSSP-N) spans five miles and contains seven LRP lines that are evenly spaced, except for the two closest to the north jetty (Figures 10A, 10B). This area is located south of Dewey Beach and extends from Tower Road to Indian River Inlet.

Figure 10A. LRP lines at Delaware Seashore State Park - North

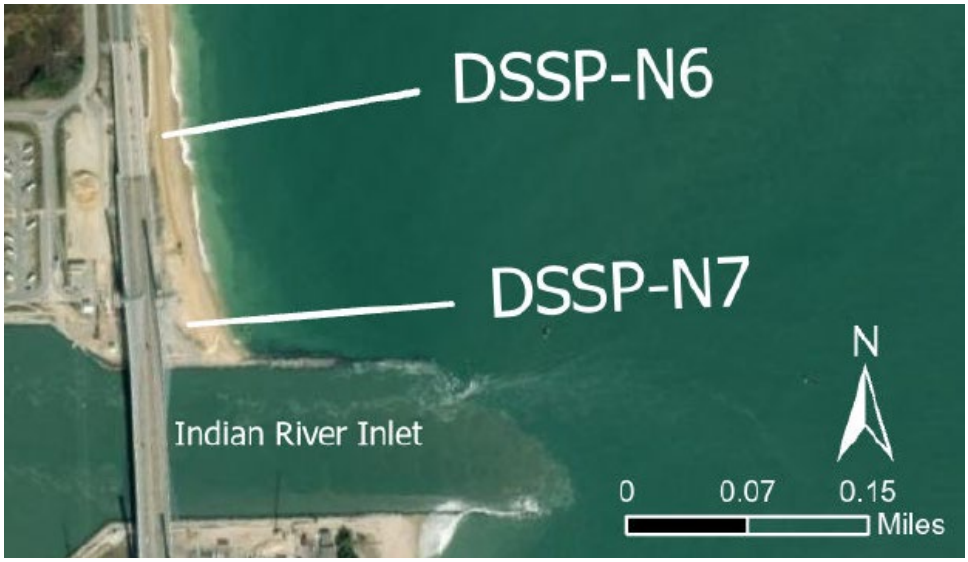


Figure 10B. LRP lines north of Indian River Inlet

The average beach volumes determined for Delaware Seashore State Park - North are shown in Table 10. The Summer 2023 profiles were impacted by TS Ophelia; however, most of the shoreline, except nearest to the jetty, recovered some of the volume lost during Winter 2024. The northernmost LRP lines, DSSP-N1 and DSSP-N2, maintained accretion through Summer 2024 and then experienced seasonal erosion in Winter 2025. The central part of the shoreline that includes LRP lines DSSP-N3 and DSSP-N4, continuously gained volume through Winter 2025. Figure 10C shows substantial dune scarping at DSSP-N4 in the post-storm Summer 2023 profile, followed by accretion with each consecutive season and re-establishment of a dune by Winter 2025. Surveys of LRP line DSSP-N5 suggest this area started to recover volume in Winter 2024 before scarping of the nearshore profile was observed during Summer 2024.

Considerable erosion during Summer 2024 was also measured at LRP lines DSSP-N6 and DSSP-N7, which are situated closest to the north jetty. Due to the lack of sediment supply, as described above, this area is known to be erosive and continued to deteriorate following TS Ophelia. The dune breached twice in 2024 resulting in flooding and closure of Delaware State Route 1, an evacuation route, for several hours. Figure 10D was taken during the first dune breach on 3/26/2024 and shows no visible beach above the high tide line (foreground) as ocean water floods the northbound lane. Figure 10E provides a closer view of the second dune breach on 8/17/2024 that also resulted in flooding and closure of the roadway.

Given the Sand Bypass Facility was inoperable, DNREC was relying on truck-hauled sand from inland sources for beach repairs, but this method could no longer keep up with the rapid rate of erosion. Therefore, an emergency dredging and beach repair project was initiated in Fall 2024 that was completed just prior to the Winter 2025 survey. Nearly 480,000 cubic yards of dredged sand from the inlet flood shoal was used to repair up to 5,000 linear feet of shoreline. Figure 10F demonstrates the drastic difference between the seasonal profiles at DSSP-N7, especially before and after the large-scale nourishment project. Volunteers helped to plant American beach grass (*Ammophila breviligulata*) on the newly constructed beach during Spring 2025 (Figure 10G).

Table 10: Beach volume calculations for Delaware Seashore State Park – North

LRP		**DSSP-N1**		**DSSP-N2**		**DSSP-N3**		**DSSP-N4**	
Volume Limit		MHW	MLW	MHW	MLW	MHW	MLW	MHW	MLW
Season	Date	*cf/lf*	*cf/lf*	*cf/lf*	*cf/lf*	*cf/lf*	*cf/lf*	*cf/lf*	*cf/lf*
Summer 2023	10/4/2023	2530	3848	931	1857	2325	3636	2426	3832
Winter 2024	3/14/2024	2879	4297	1278	2329	2389	3717	2716	4170
Summer 2024	8/13/2024	3056	4514	1456	2571	2490	3815	2744	4196
Winter 2025	2/24/2025	2992	4405	1383	2466	2532	3913	2797	4257

Table 10 Continued: Beach volume calculations

LRP		**DSSP-N5**		**DSSP-N6**		**DSSP-N7**	
Volume Limit		MHW	MLW	MHW	MLW	MHW	MLW
Season	Date	*cf/lf*	*cf/lf*	*cf/lf*	*cf/lf*	*cf/lf*	*cf/lf*
Summer 2023	10/4/2023	636	1419	680	1245	829	1432
Winter 2024	3/14/2024	833	1592	426	847	638	1088
Summer 2024	8/13/2024	855	1426	140	360	145	323
Winter 2025	2/24/2025	1095	1950	2251	3445	2600	4069

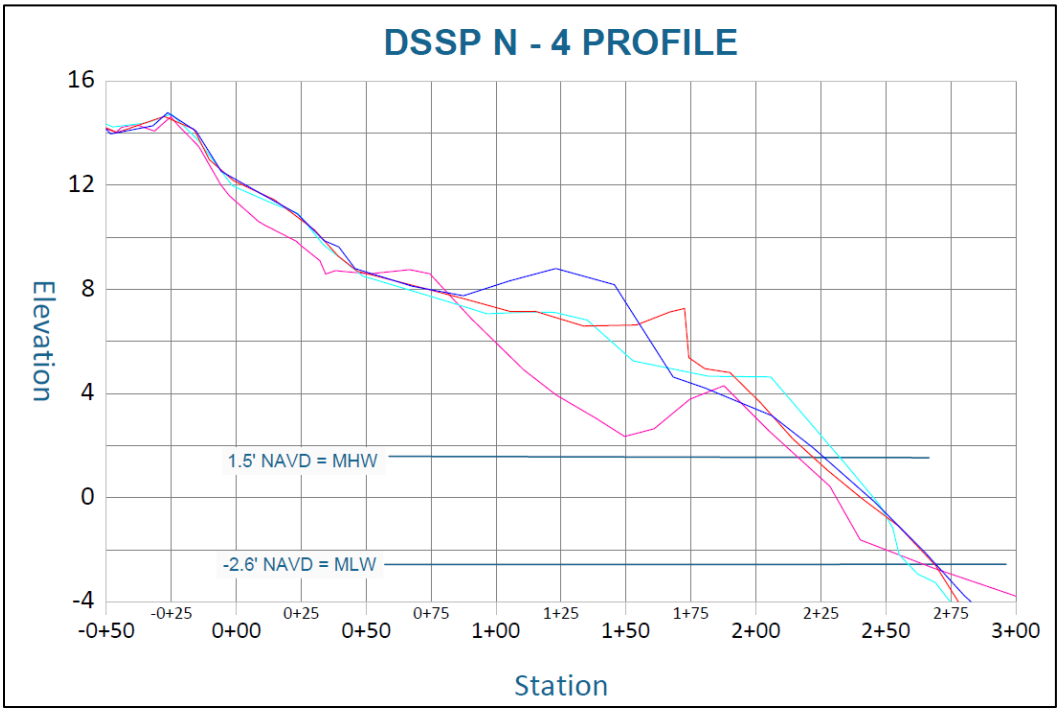


Figure 10C. Beach Profiles at Delaware Seashore State Park, LRP DSSP-N4
Pink: Summer '23, Cyan: Winter '24, Red: Summer '24, Blue: Winter '25

Figure 10D. North Inlet Beach (3/26/2024) at high tide looking north. Ocean water covers the NB Rt 1 lane just beyond the Inlet Bridge, visible on the left.

Figure 10E. DE Seashore State Park - North Inlet Beach (8/17/2024) at high tide looking south. The Rt 1 northbound lane is closed as ocean water breaches the dune and floods the roadway.

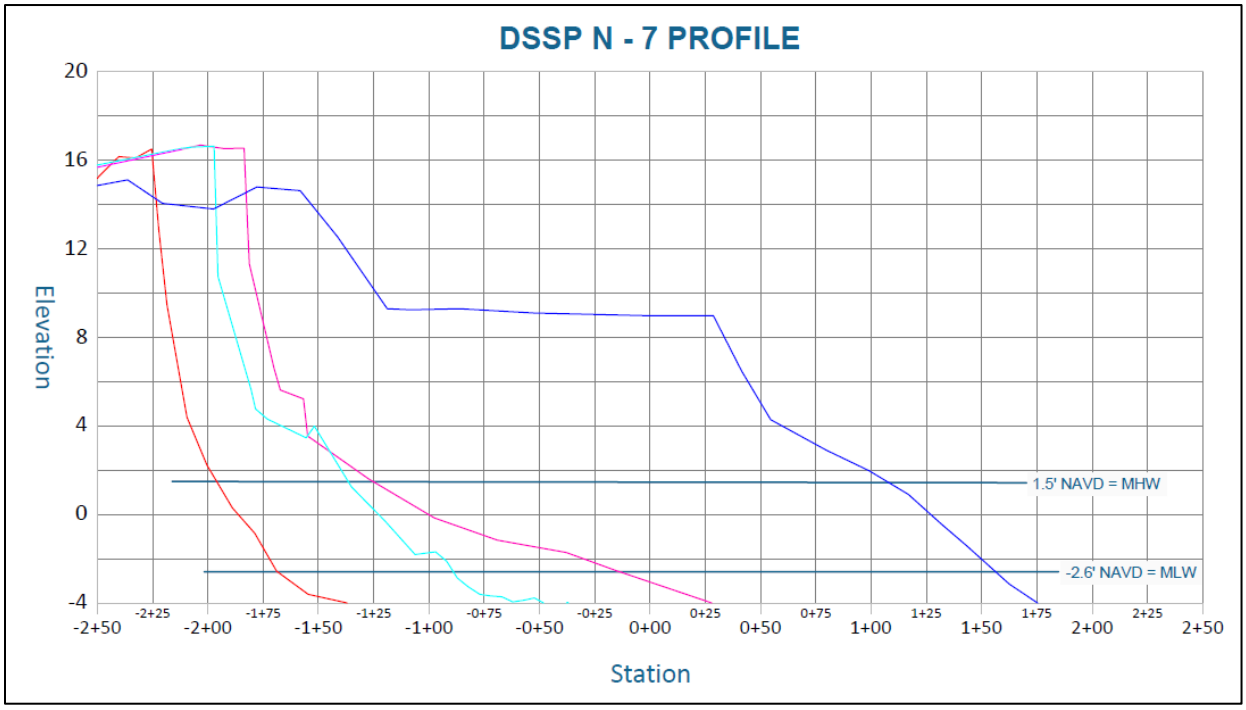


Figure 10F. Beach Profiles at Delaware Seashore State Park, LRP DSSP-N7
Pink: Summer '23, Cyan: Winter '24, Red: Summer '24, Blue: Winter '25

Figure 10G. DE Seashore State Park - North Inlet Beach (3/26/2025) looking south at the repaired dune with newly planted *American Beach Grass*.

Delaware Seashore State Park - South

Delaware Seashore State Park – South of Indian River Inlet (DSSP-S) is approximately one-mile long with two LRP lines located at the south inlet day-use area and 3'Rs Beach (Figure 11A).

Figure 11A. LRP lines at Delaware Seashore State Park - South

The average beach volumes determined for Delaware Seashore State Park - South are shown in Table 11. It should be noted that surveys were collected south of Indian River Inlet on 9/20/2023, prior to TS Ophelia; therefore, impacts from the storm are not captured in the Summer 2023 profiles. Surveys of LRP lines DSSP-S1 and DSSP-S2 show similar patterns of accretion from Summer 2023 through Summer 2024, followed by erosion in Winter 2025. Directly adjacent to the south inlet jetty is DSSP-S1, which accreted considerably in Summer 2024 as sand that moved onshore was trapped by the jetty. However, all this volume was lost in the subsequent Winter 2025 profile as sand likely washed out along the jetty following the winter storms. Figure 11B demonstrates the significant shift in beach volumes observed between seasons at DSSP-S1.

Table 11: Beach volume calculations for Delaware Seashore State Park – South					
LRP		**DSSP-S1**		**DSSP-S2**	
Volume Limit		MHW	MLW	MHW	MLW
Season	Date	*cf/lf*	*cf/lf*	*cf/lf*	*cf/lf*
Summer 2023	9/20/2023	707	1476	2174	3435
Winter 2024	3/14/2024	714	1775	2244	3535
Summer 2024	8/13/2024	1283	2770	2328	3692
Winter 2025	2/24/2025	725	1692	2227	3640

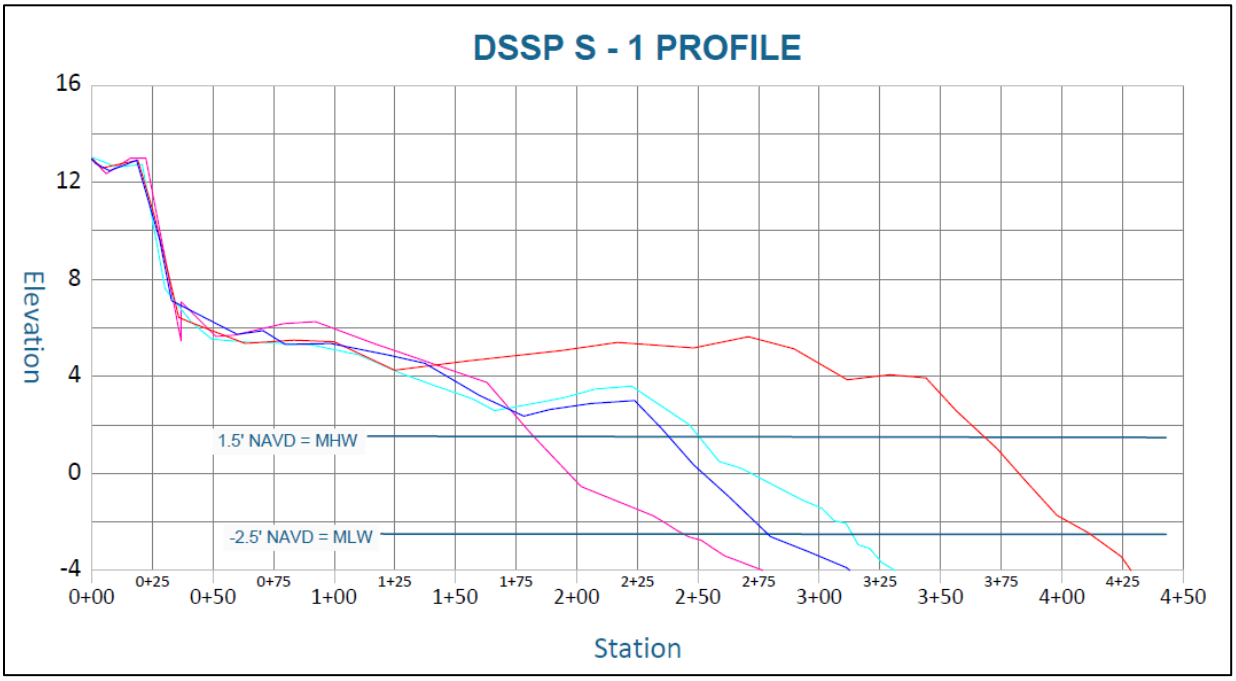


Figure 11B. Beach Profiles at Delaware Seashore State Park, LRP DSSP-S1
Pink: Summer '23, Cyan: Winter '24, Red: Summer '24, Blue: Winter '25

Figure 11C shows an aerial view of Delaware Seashore State Park – South approaching high tide looking north from the day-use beach. Indian River Inlet and the north jetty are visible in the photo.

Figure 11C. Aerial view of Delaware Seashore State Park - South (4/16/2024, 14:38) looking north at Indian River Inlet and the north jetty.

Oceanview

Oceanview (OV) is a densely populated private beach that marks the northernmost developed shoreline south of Indian River Inlet and Delaware Seashore State Park. This area contains two LRP lines and a series of private communities including Tower Shores and The Preserve (Figure 12A).

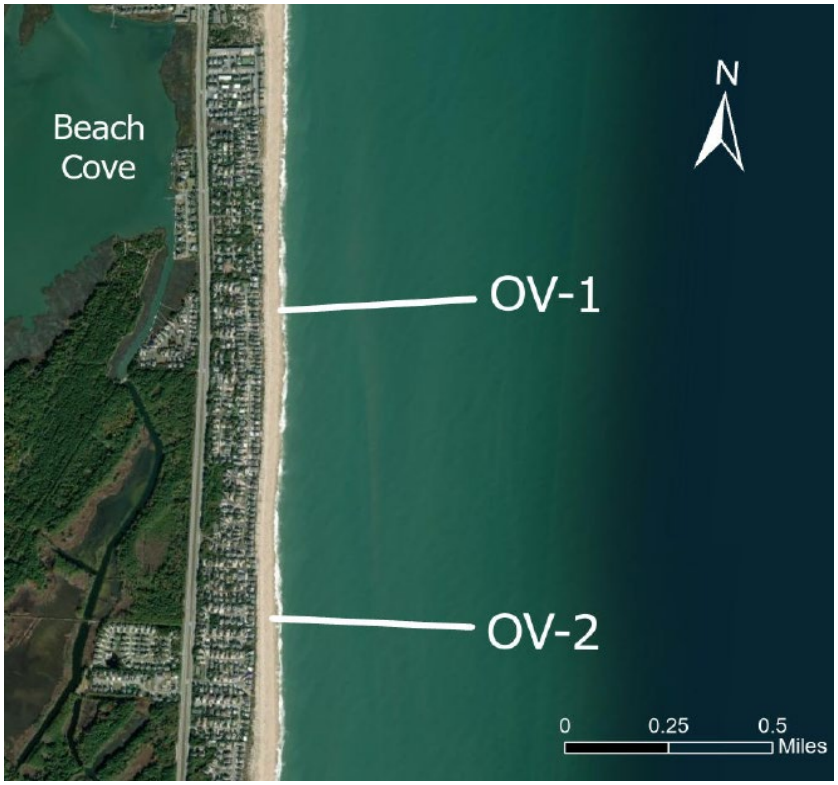


Figure 12A. LRP line at Oceanview Beach

Table 12: Beach volume calculations for Oceanview

LRP		OV-1		OV-2	
Volume Limit		MHW	MLW	MHW	MLW
Season	Date	*cf/lf*	*cf/lf*	*cf/lf*	*cf/lf*
Summer 2023	9/20/2023	1388	2329	1352	2375
Winter 2024	3/14/2024	1212	2226	1245	2244
Summer 2024	8/13/2024	1376	2379	1312	2270
Winter 2025	2/24/2025	1367	2421	1351	2399

Average beach volumes determined for Oceanview are shown in Table 12. Overall, Oceanview beach experienced the expected seasonal patterns of erosion and accretion in the Winter 2024 and Summer 2024 profiles, respectively. Given the Winter 2024 profile reflects the impacts of TS Ophelia, Figure 12B demonstrates dune erosion and nearshore accretion at LRP line OV-1 as sand washed down into the intertidal zone. The dune re-gained volume during Summer 2024 and then shifted landward the subsequent winter season, creating a berm (Figure 12B). Nearshore accretion also continued through Winter 2025. Figure 12C shows an aerial view of Oceanview looking northward at high tide.

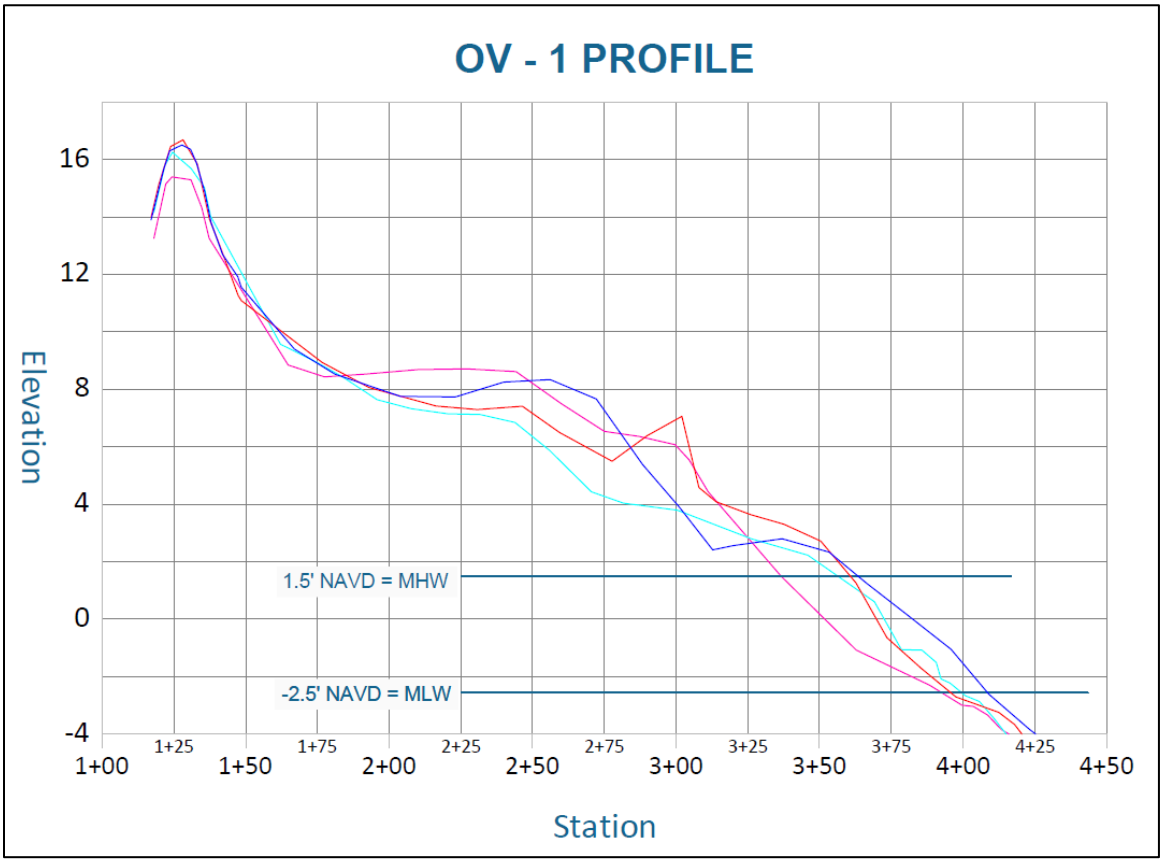


Figure 12B. Beach Profiles at Oceanview, LRP OV-1
Pink: Summer '23, Cyan: Winter '24, Red: Summer '24, Blue: Winter '25

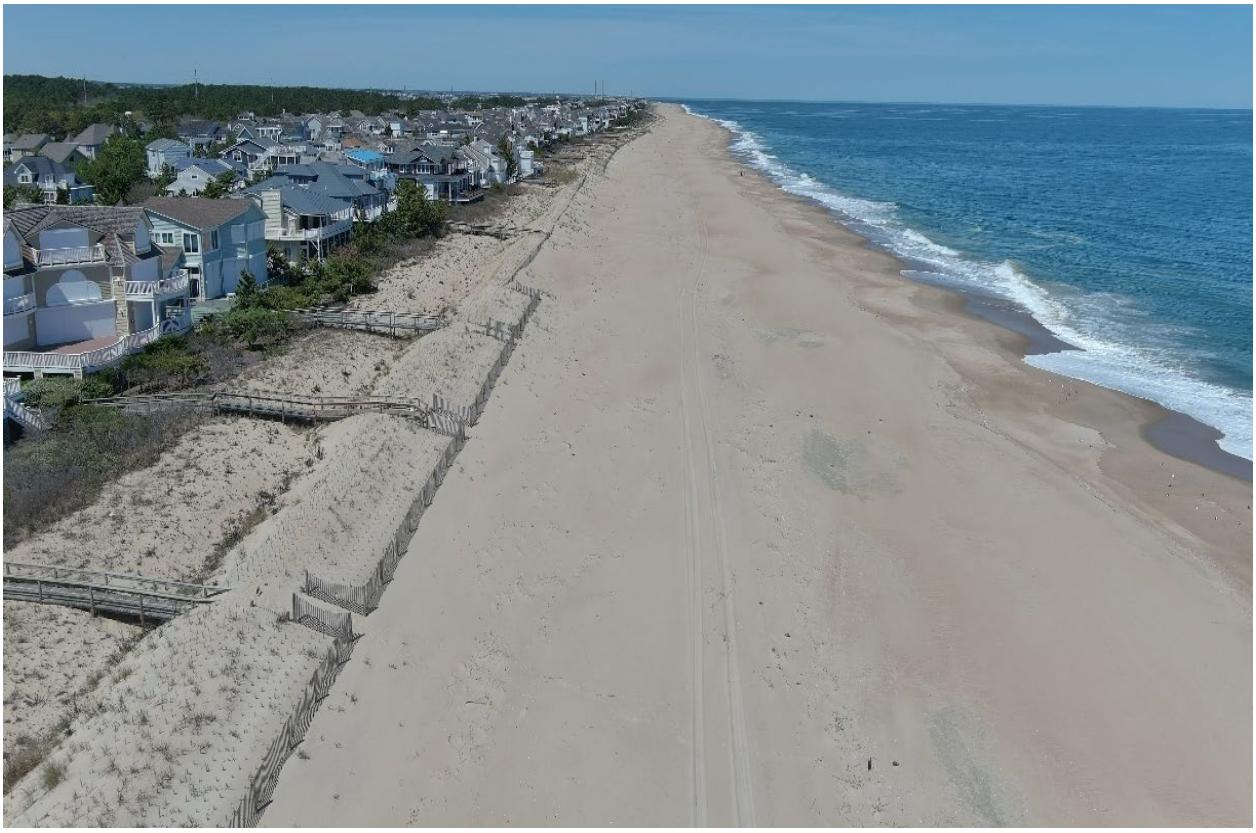


Figure 12C. View of Oceanview (4/16/2024, 13:56) at high tide, looking north

Bethany Beach

South of Oceanview continues a series of private beach communities, including Sussex Shores, that form the northern border to the incorporated town of Bethany Beach (BB). Since there are 3 miles of private beach between Delaware Seashore State Park and Bethany Beach, two additional LRP lines (BB-1 and BB-2) are located within this area (Figure 13A). The Town of Bethany Beach, to the south, is a densely populated one-mile section of coastline that contains three LRP lines (BB-3, BB-4, BB-5).

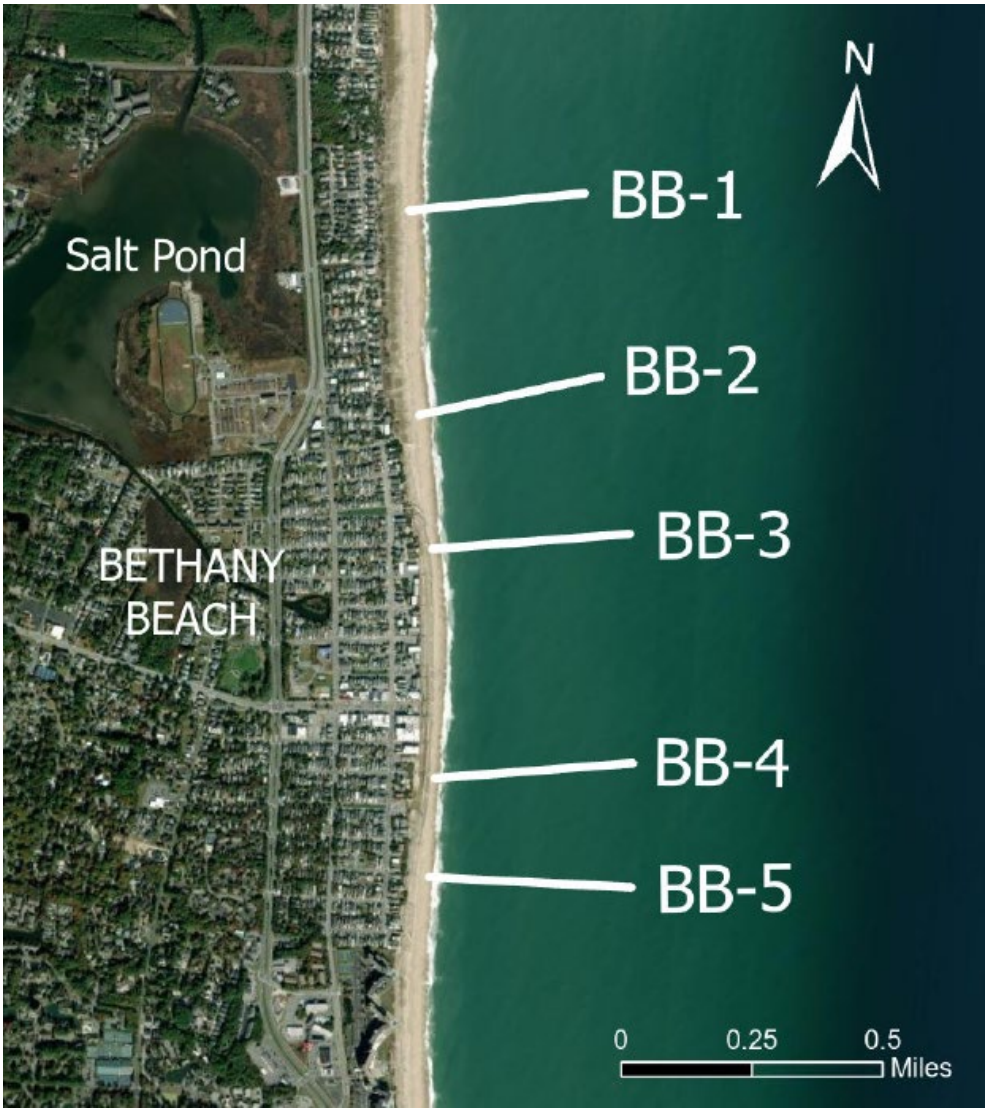


Figure 13A. LRP lines at Bethany Beach

The average beach volumes determined for Bethany Beach are shown in Table 13. As one of the federally authorized Delaware Coastal Storm Damage Reduction Projects described above, Bethany Beach was last nourished in July 2023. Renourishment is reflected in the Summer 2023 profiles for LRP lines BB-2 through BB-5. Significant erosion was measured in the subsequent Winter 2024 survey due to the erosive effects of TS Ophelia; however, Bethany Beach began to recover some of the volume lost by Summer 2024. While LRP lines in the northern, private section of Bethany Beach (BB-1 and BB-2) continued to accrete during Winter 2025, erosion was measured along the stretch of developed shoreline (BB-3, BB-4, and BB-5). Volume loss at LRP line BB-4 was the most drastic as Figure 13B demonstrates erosion of the dune and landward shift in the scarped nearshore area. Survey data suggest BB-4 is generally eroding overtime as volume loss was measured between the annual summer and winter surveys.

Figure 13C shows an aerial view of the town of Bethany Beach looking north while approaching high tide.

Table 13: Beach volume calculations for Bethany Beach

LRP		BB-1		BB-2		BB-3	
Volume Limit		MHW	MLW	MHW	MLW	MHW	MLW
Season	Date	cf/lf	cf/lf	cf/lf	cf/lf	cf/lf	cf/lf
Summer 2023	9/20/2023	2806	4243	2252	3726	1473	2521
Winter 2024	3/14/2024	2570	3987	1964	3347	959	1851
Summer 2024	8/13/2024	2673	4055	2060	3401	1037	1894
Winter 2025	2/24/2025	2743	4187	2080	3417	1034	1854

Table 13 continued: Beach volume calculations					
LRP		**BB-4**		**BB-5**	
Volume Limit		MHW	MLW	MHW	MLW
Season	Date	cf/lf	cf/lf	cf/lf	cf/lf
Summer 2023	9/20/2023	1518	2552	2011	3279
Winter 2024	3/14/2024	908	1747	1705	2968
Summer 2024	8/13/2024	1074	1921	1931	3175
Winter 2025	2/24/2025	906	1675	1802	3006

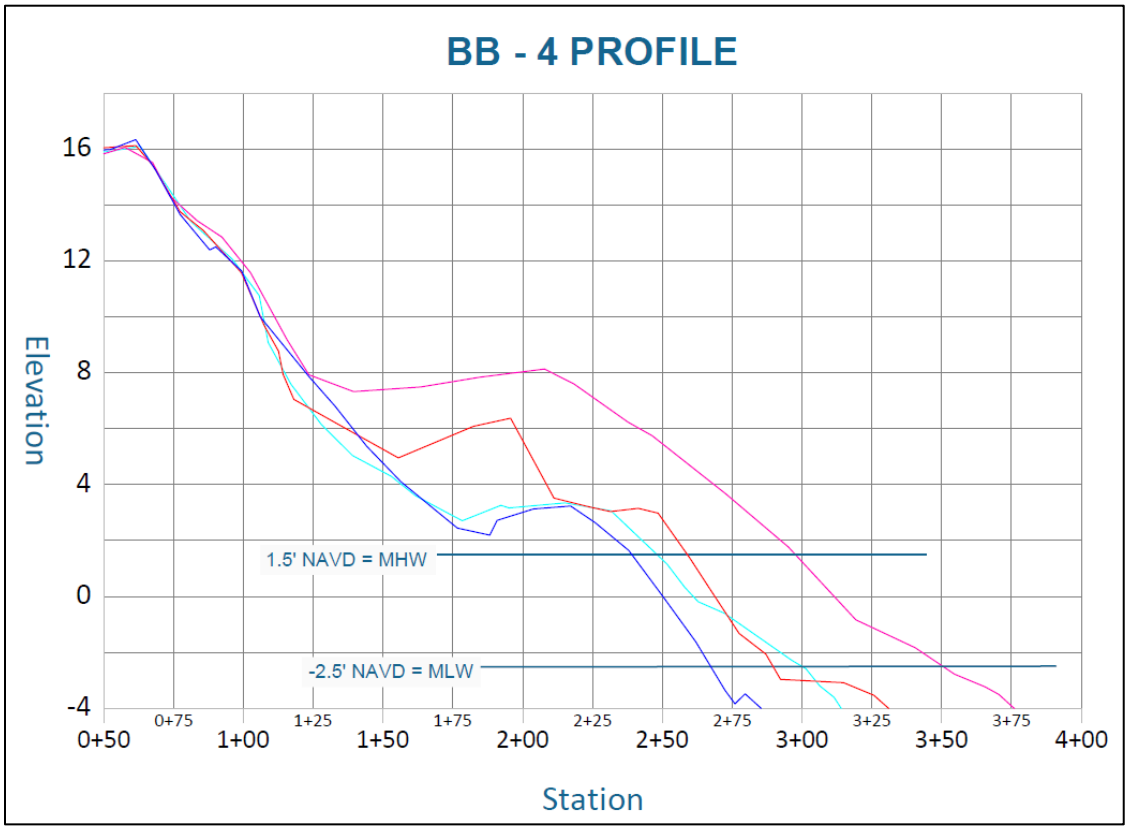


Figure 13B. Beach Profiles at Bethany Beach, LRP BB-4
Pink: Summer '23, Cyan: Winter '24, Red: Summer '24, Blue: Winter '25

Figure 13C. Bethany Beach (4/16/2024, 13:38) nearing high tide, looking north

South Bethany Beach

South Bethany Beach (SBB) is an incorporated, residential town located south of the Sea Colony and Middlesex private beach communities that separate this area from Bethany Beach. There are two LRP lines (SBB-1 and SBB-2) located along this coastline that extends approximately 4,000 feet.

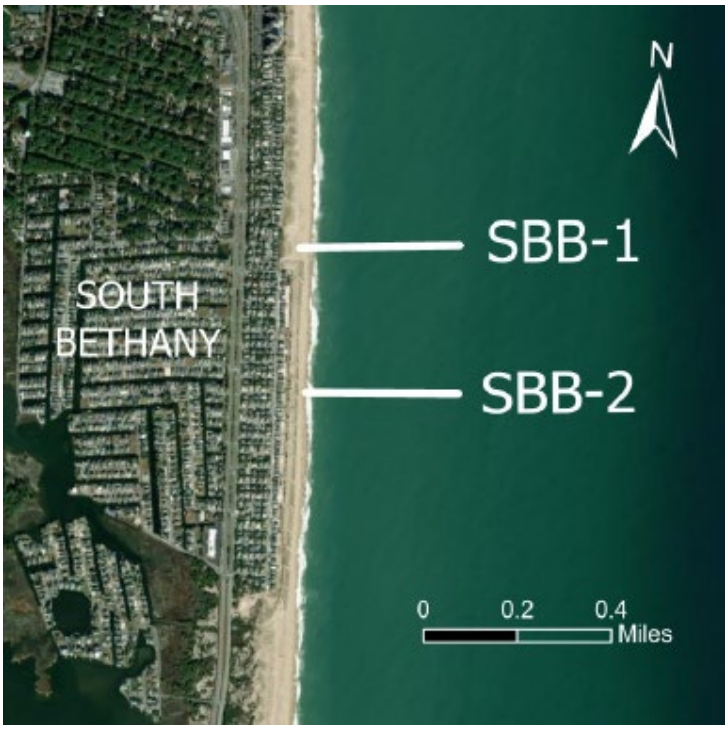


Figure 14A. LRP lines at South Bethany Beach

The average beach volumes determined for South Bethany Beach are shown in Table 14. As part of the federally authorized Delaware Coastal Storm Damage Reduction Projects described above, South Bethany was last nourished in July 2023. Renourishment was captured in the Summer 2023 survey followed by volume loss during Winter 2024. Figure 14B shows the significant difference between the Summer 2023 and Winter 2024 profiles at LRP line SSB-2 mainly due to the erosive effects of TS Ophelia. The berm recovered some of the lost volume during Summer 2024, and while most of this material eroded during Winter 2025, Figure 14B shows some volume accretion in the upper dune.

Figure 14C demonstrates an aerial view of South Bethany Beach looking north. The beach crossover at South 3rd Street is visible in the foreground.

Table 14: Beach volume calculations for South Bethany Beach					
LRP		SBB-1		SBB-2	
Volume Limit		MHW	MLW	MHW	MLW
Season	Date	*cf/lf*	*cf/lf*	*cf/lf*	*cf/lf*
Summer 2023	9/20/2023	2175	3642	1558	2560
Winter 2024	3/14/2024	1944	3311	814	1580
Summer 2024	8/13/2024	2046	3401	970	1750
Winter 2025	2/24/2025	2018	3386	908	1691

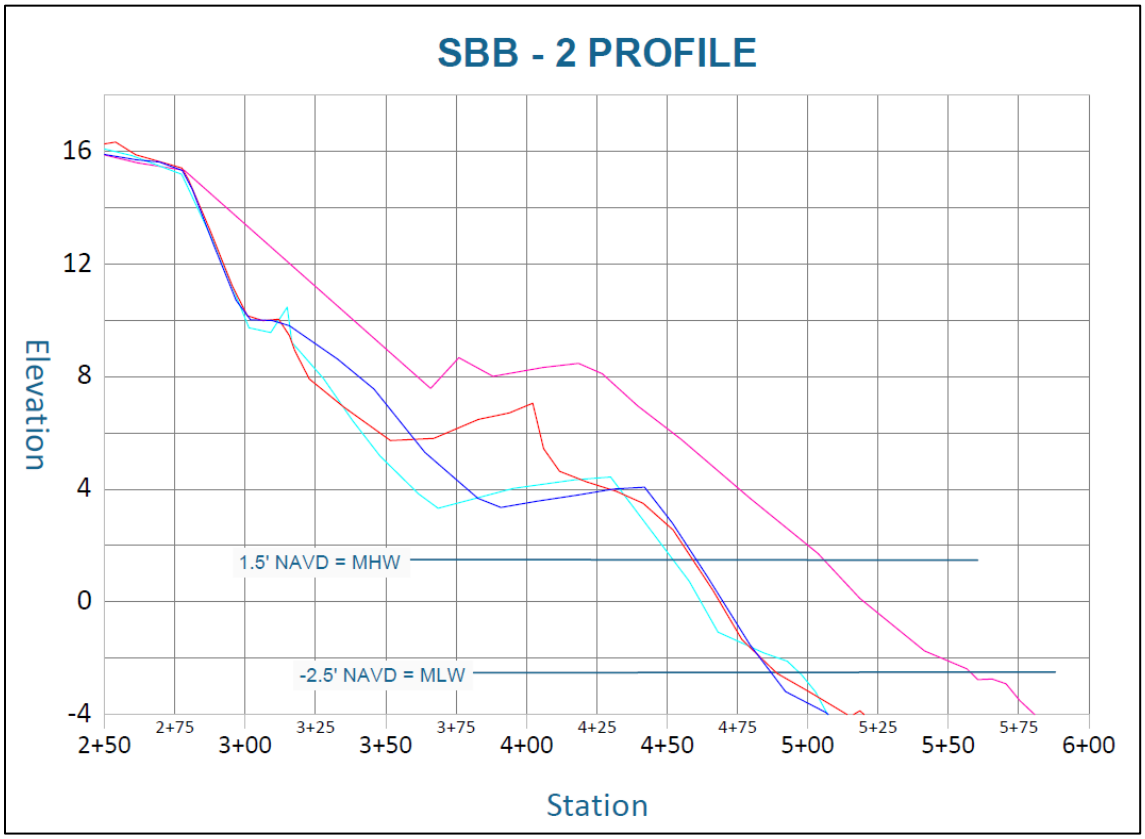


Figure 14B. Beach Profiles at South Bethan Beach, LRP SBB-2
Pink: Summer '23, Cyan: Winter '24, Red: Summer '24, Blue: Winter '25

Figure 14C. South Bethany Beach (4/16/2024, 13:27) nearing high tide, looking north

Fenwick Island

Fenwick Island (FW) is located south of South Bethany Beach and extends approximately four miles to the Delaware-Maryland state line. Fenwick Island State Park makes up the sparsely populated northern section that includes LRP lines FW-1, FW-2 and FW-3 (Figure 15A). The Town of Fenwick Island public beach, to the south, is a more developed area that contains about one mile of coastline and two additional LRP lines (FW-4 and FW-5).

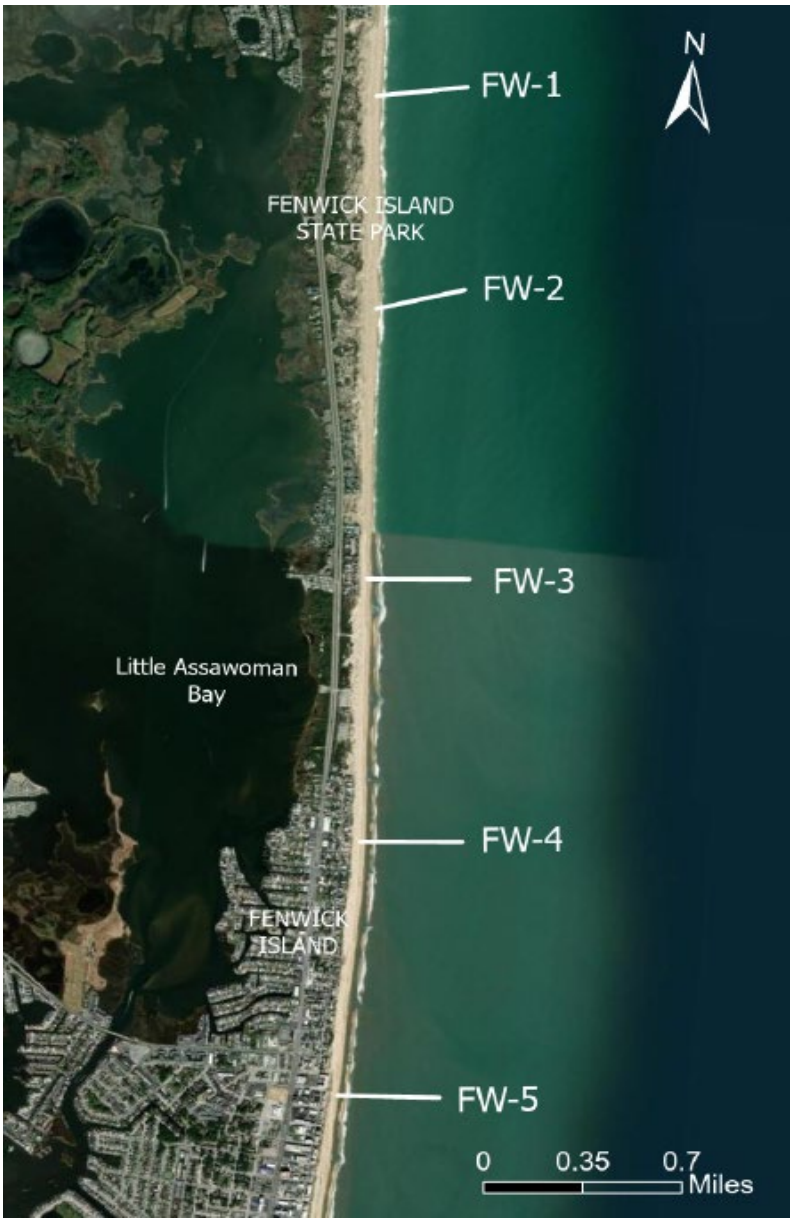


Figure 15A. LRP lines at Fenwick Island

The average beach volumes determined for Fenwick Island are shown in Table 15. Survey data for Summer 2023, particularly along the public beaches, reflect the re-nourishment that occurred in June 2023 as part of the federally authorized Delaware Coastal Storm Damage Reduction Projects described above. Erosion measured during Winter 2024 was likely due to the impacts of TS Ophelia; however, the central Fenwick Island coast (FW-3) was the only area to accrete volume during this time. In Summer 2024, Fenwick Island recovered some of the volume previously lost. Accretion continued through Winter 2025, expect at LRP line FW-3. In Figure 15B, the Winter 2025 profile of FW-3 shows erosion of the Summer 2024 dune, re-establishment of a berm, and accretion of the upper profile that appears similar to the pre-storm (Summer 2023) survey.

Figure 15C shows an aerial view of Fenwick Island State Park from the main day-use beach area. This site is located between LRP lines FW-3 and FW-4.

Table 15: Beach volume calculations for Fenwick Island

LRP		FW-1		FW-2		FW-3	
Volume Limit		MHW	MLW	MHW	MLW	MHW	MLW
Season	Date	cf/lf	cf/lf	cf/lf	cf/lf	cf/lf	cf/lf
Summer 2023	9/20/2023	2569	4156	2442	3930	2075	3209
Winter 2024	3/14/2024	2461	4036	2296	3852	2012	3216
Summer 2024	8/13/2024	2657	4271	2504	4068	2146	3340
Winter 2025	2/24/2025	2636	4272	2513	4145	2064	3271

Table 15 continued: Beach volume calculations					
LRP		**FW-4**		**FW-5**	
Volume Limit		MHW	MLW	MHW	MLW
Season	Date	cf/lf	cf/lf	cf/lf	cf/lf
Summer 2023	9/20/2023	2695	4036	1139	1974
Winter 2024	3/14/2024	2247	3583	861	1592
Summer 2024	8/13/2024	2381	3645	994	1804
Winter 2025	2/24/2025	2386	3678	1017	1822

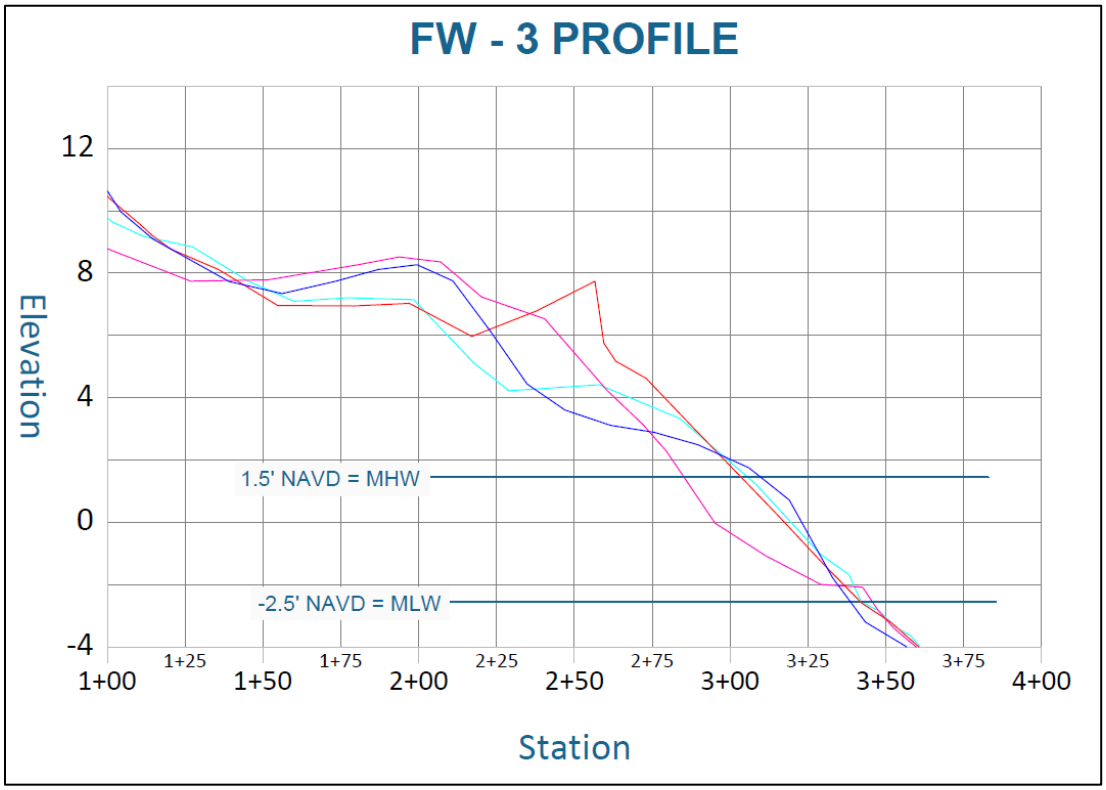


Figure 15B. Beach Profiles at Fenwick Island, LRP FW-3
Pink: Summer '23, Cyan: Winter '24, Red: Summer '24, Blue: Winter '25

Figure 15C. Fenwick Island State Park (4/16/24, 13:14) approaching high tide, looking north.

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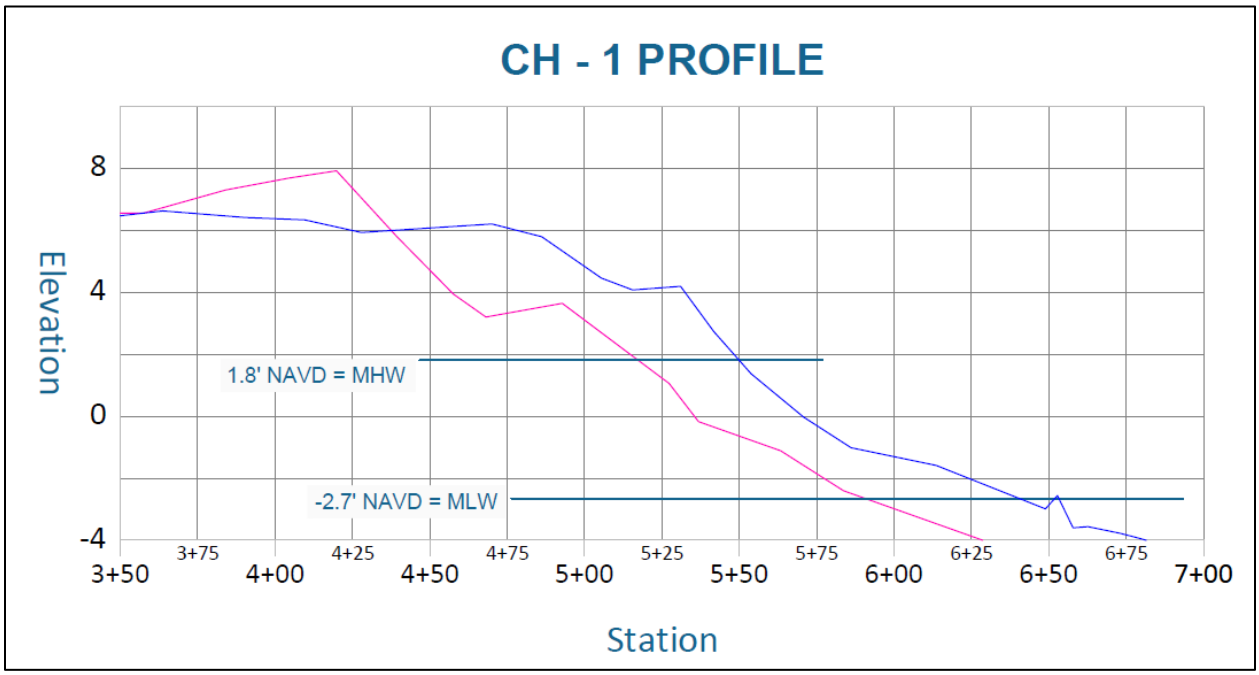
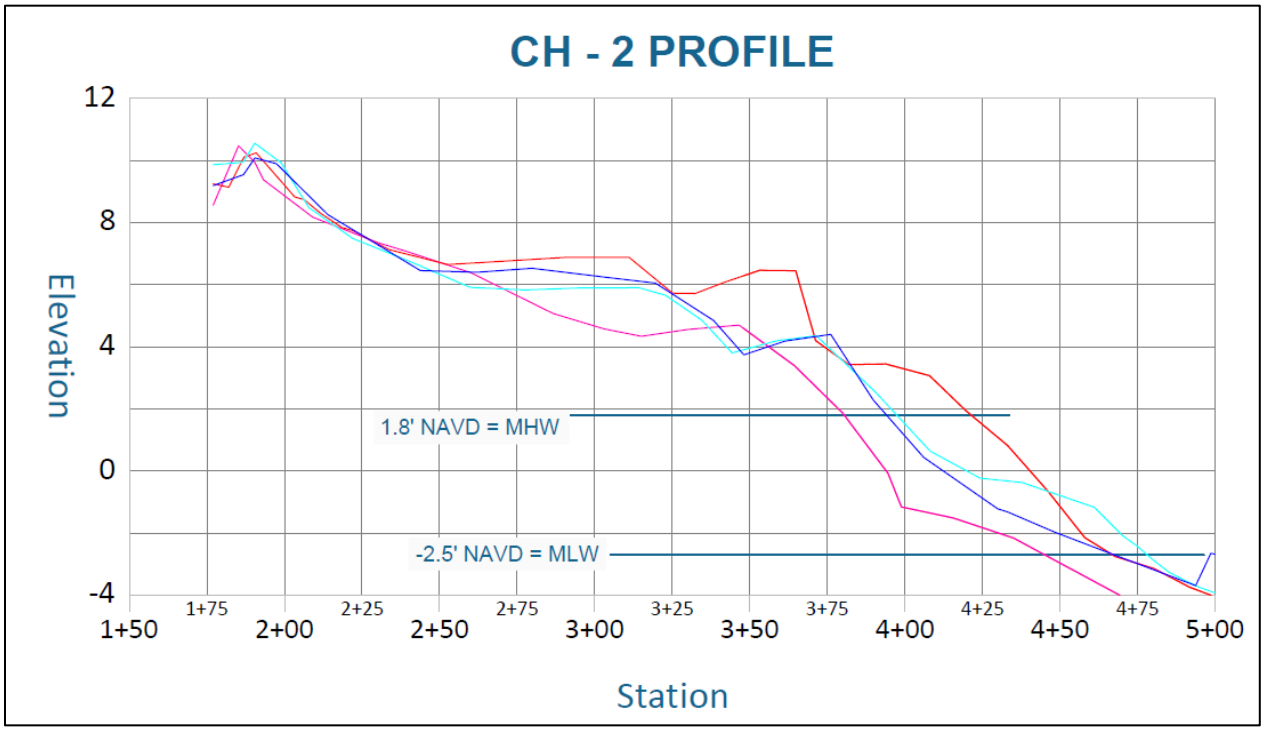
Appendix 1: Ocean Coast Profile Views

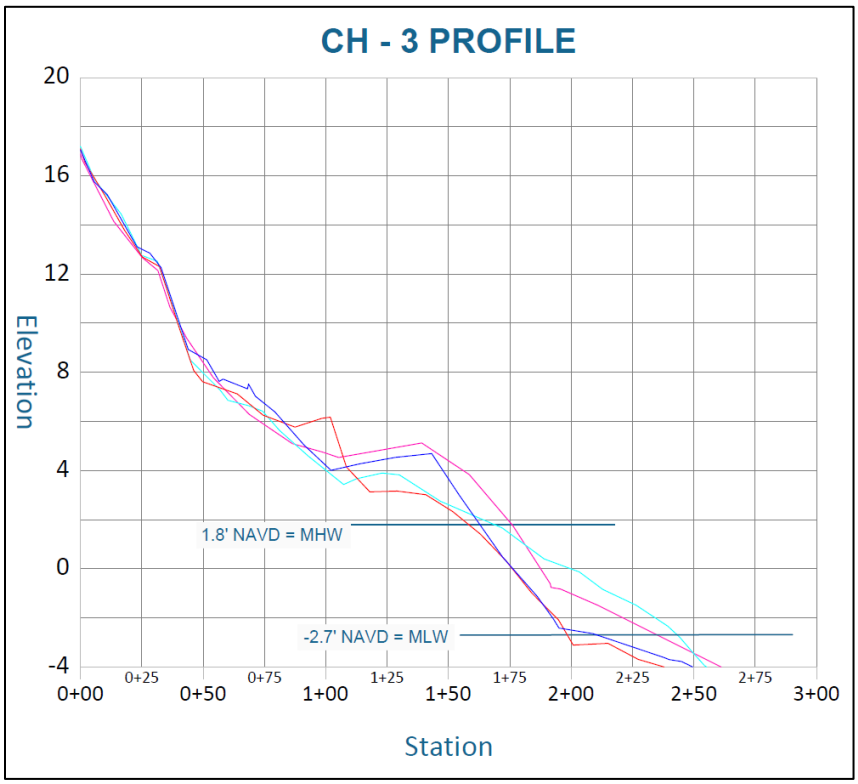
Cape Henlopen State Park



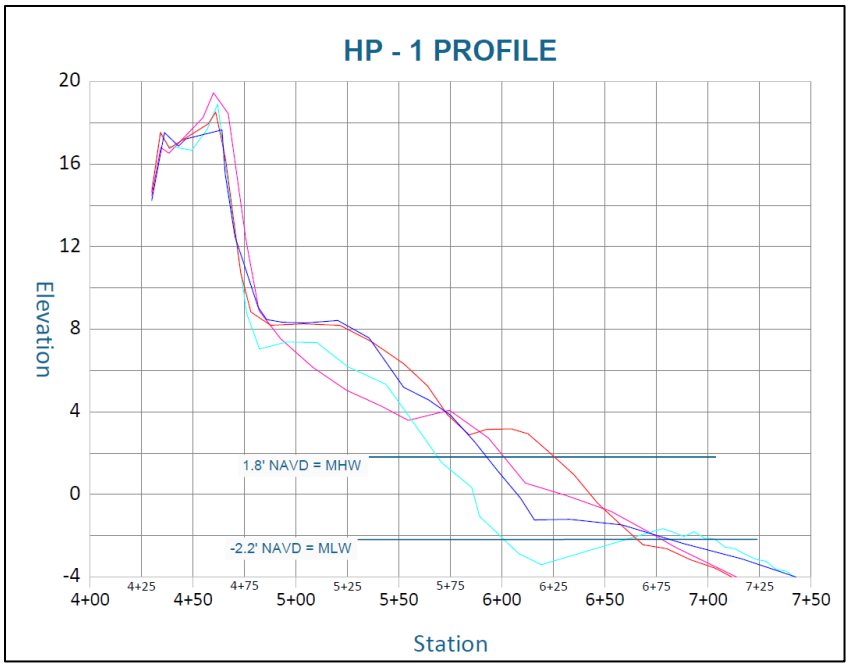


Pink: Summer '23, Cyan: Winter '24, Red: Summer '24, Blue: Winter '25

Cape Henlopen State Park (continued).



Herring Point



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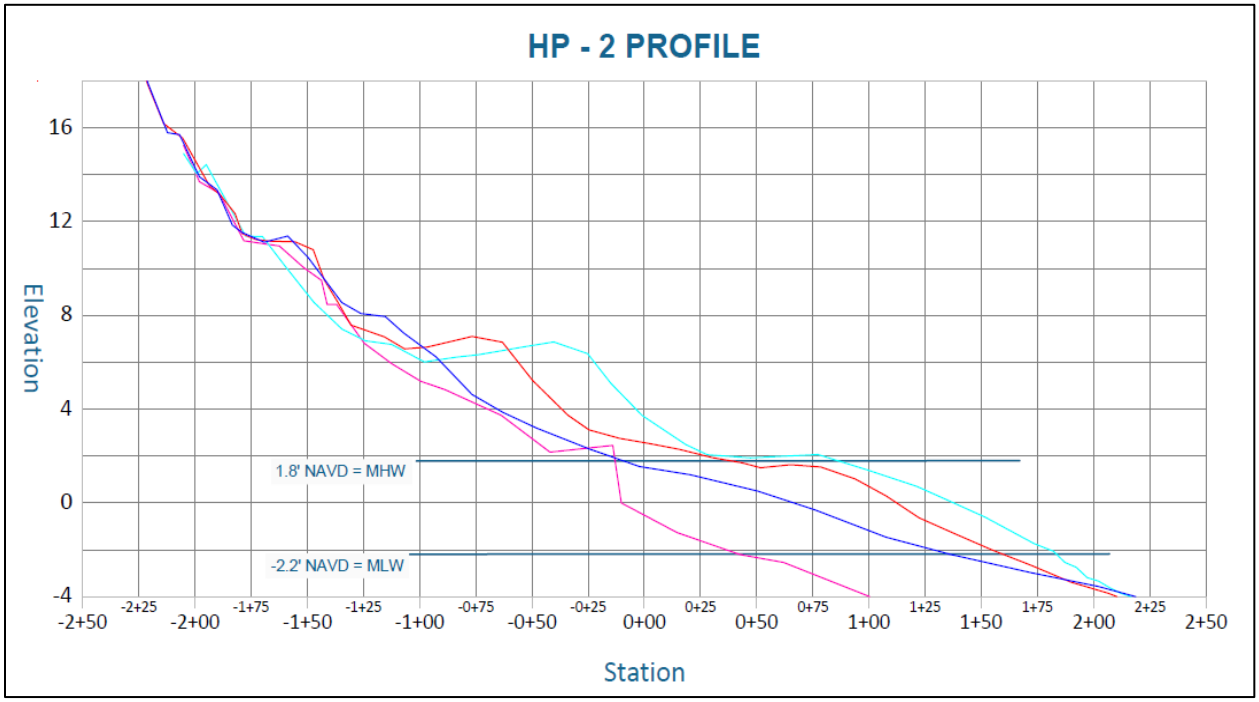
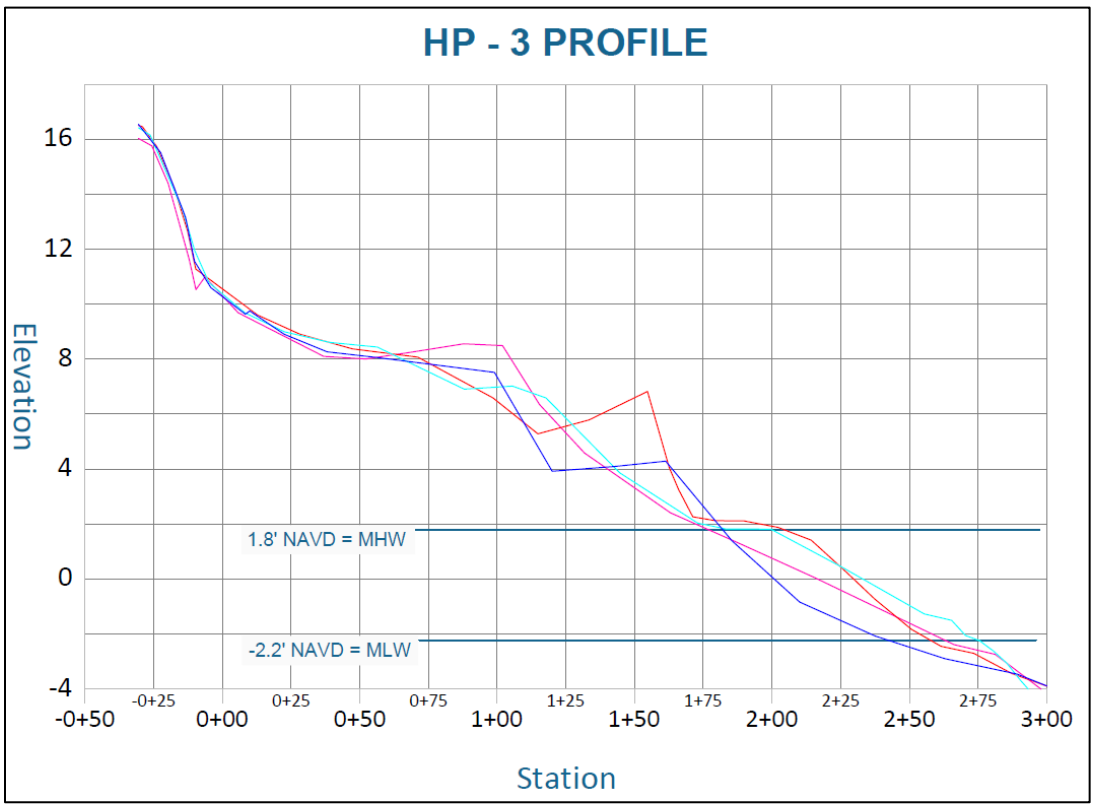
Herring Point (continued).





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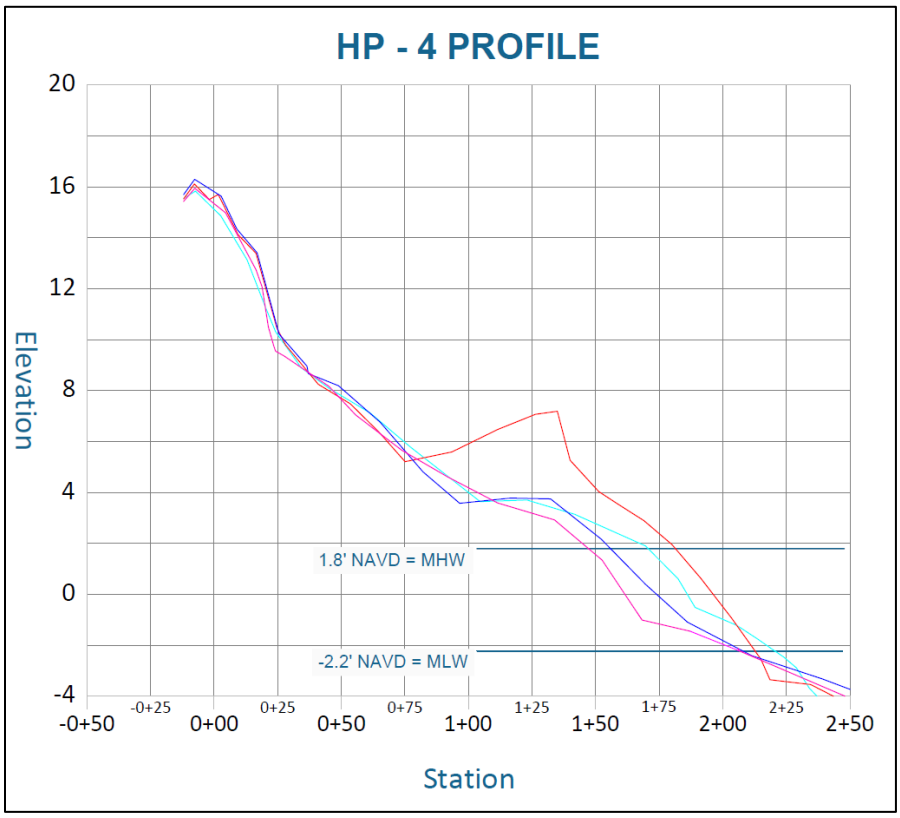
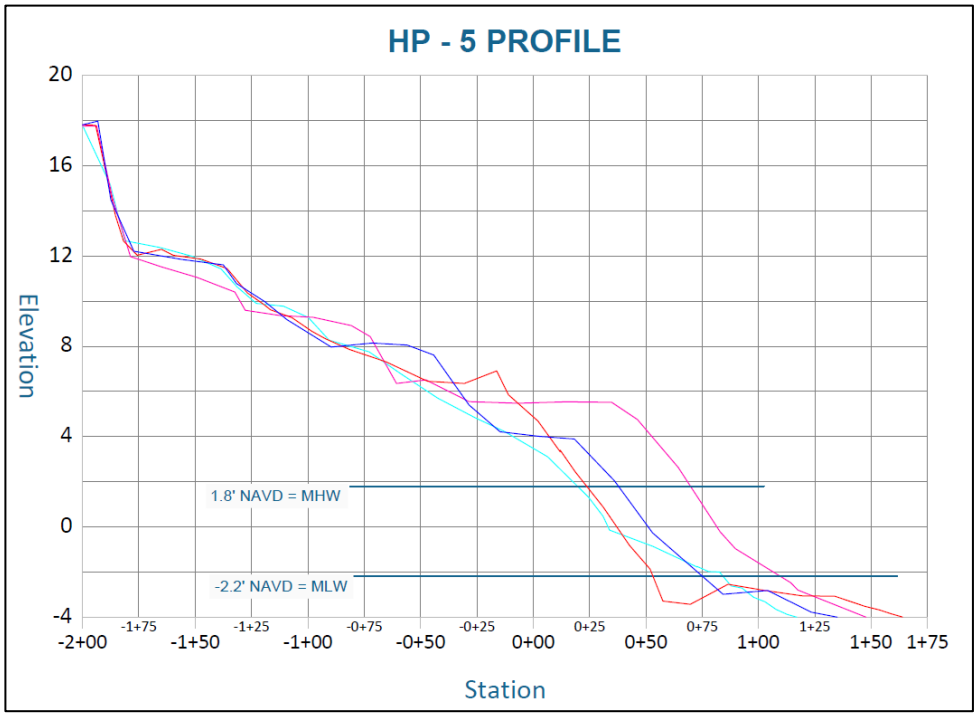
Herring Point (continued).





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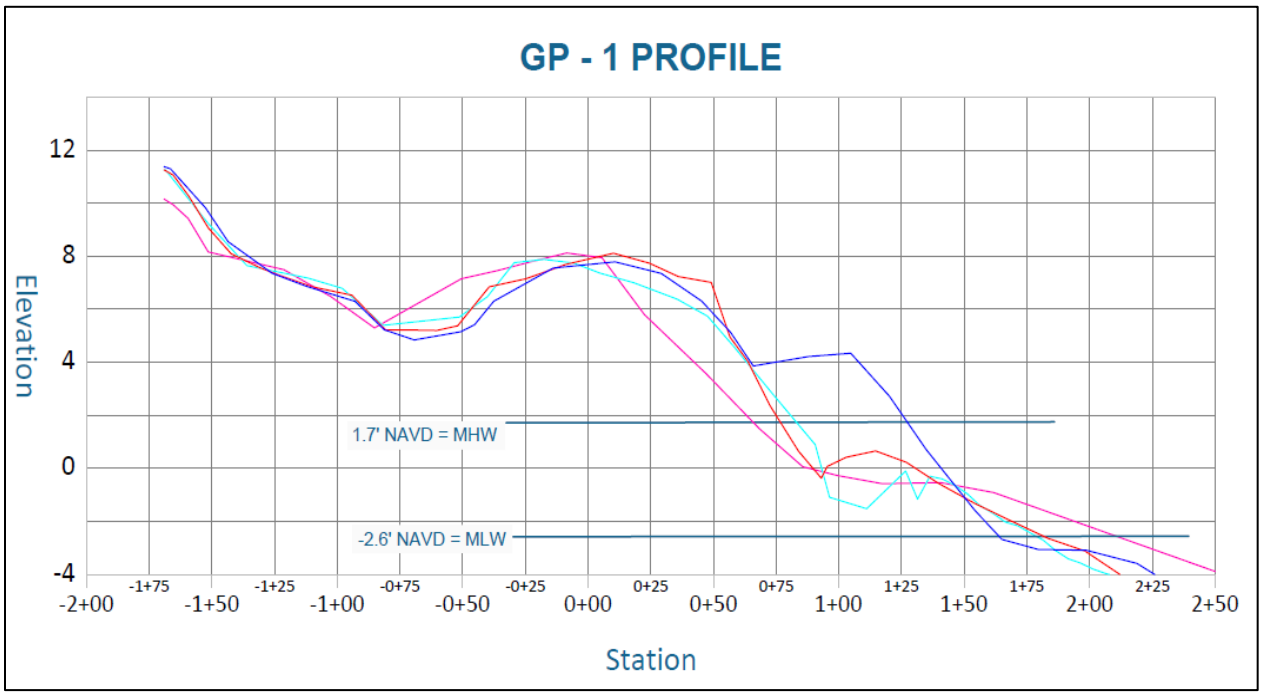
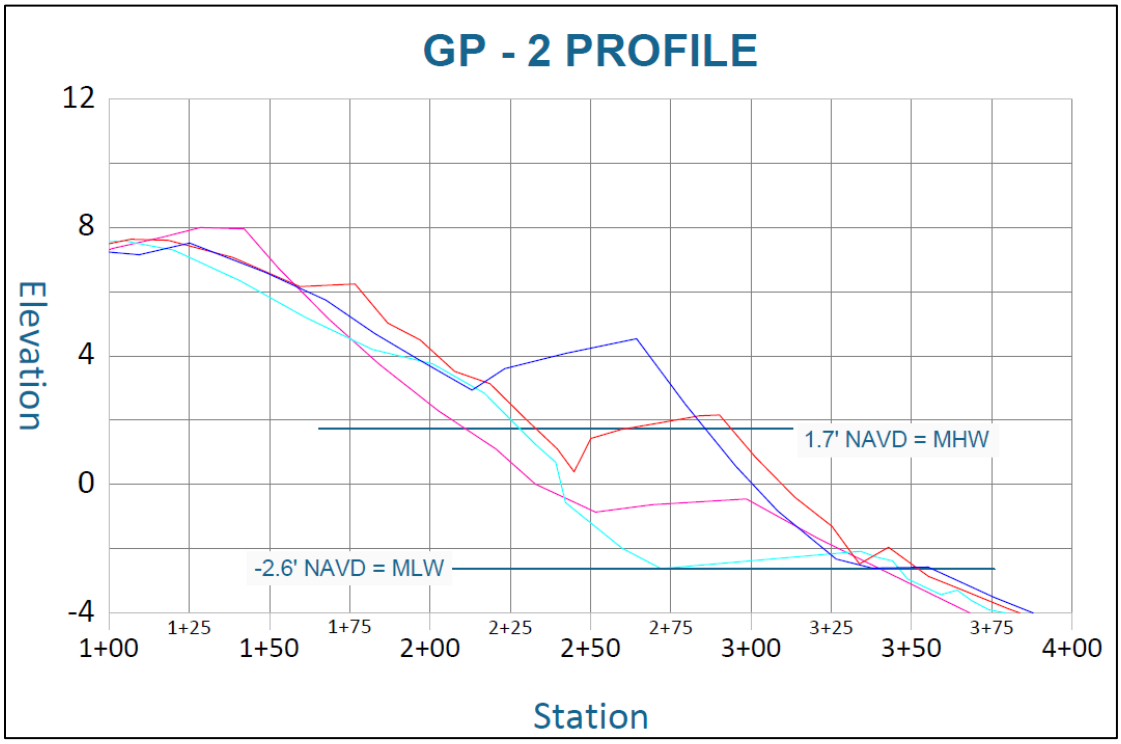
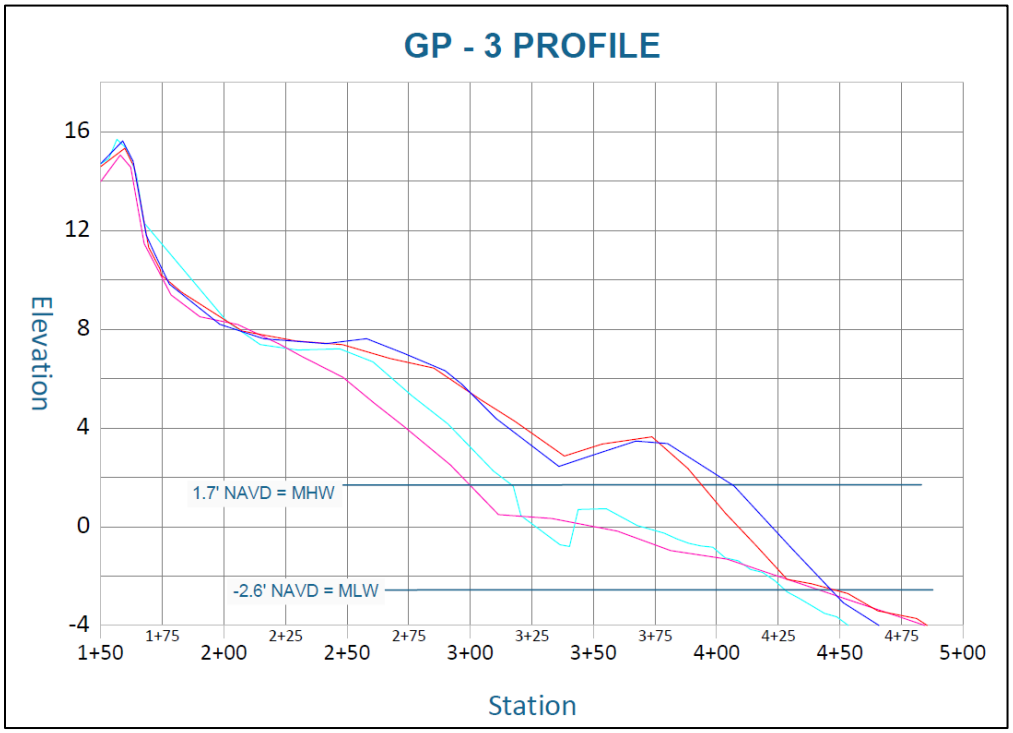
Gordon's Pond



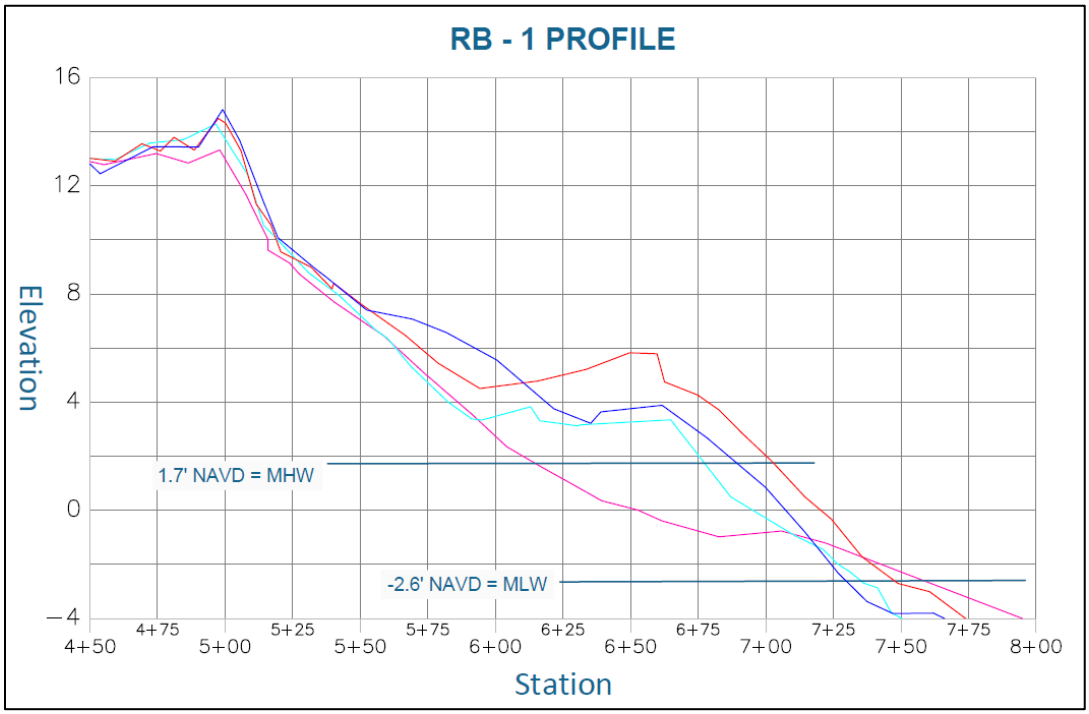


Pink: Summer '23, Cyan: Winter '24, Red: Summer '24, Blue: Winter '25

Gordon's Pond (continued).



Rehoboth Beach



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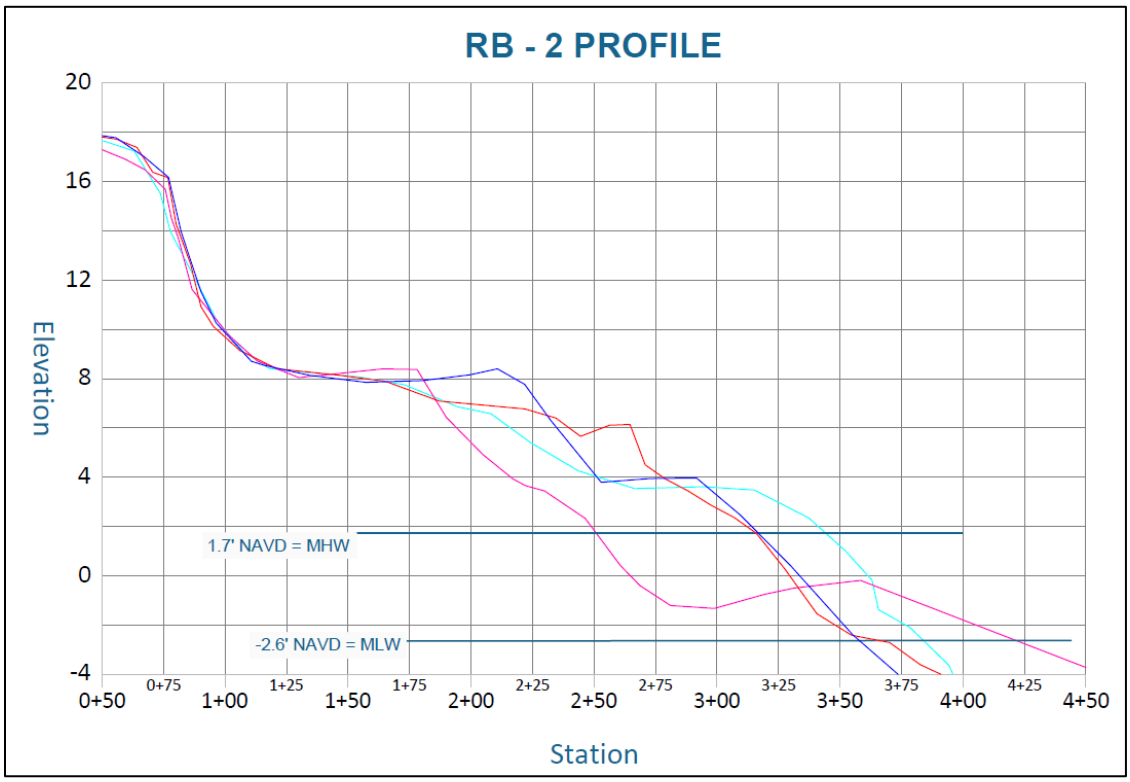
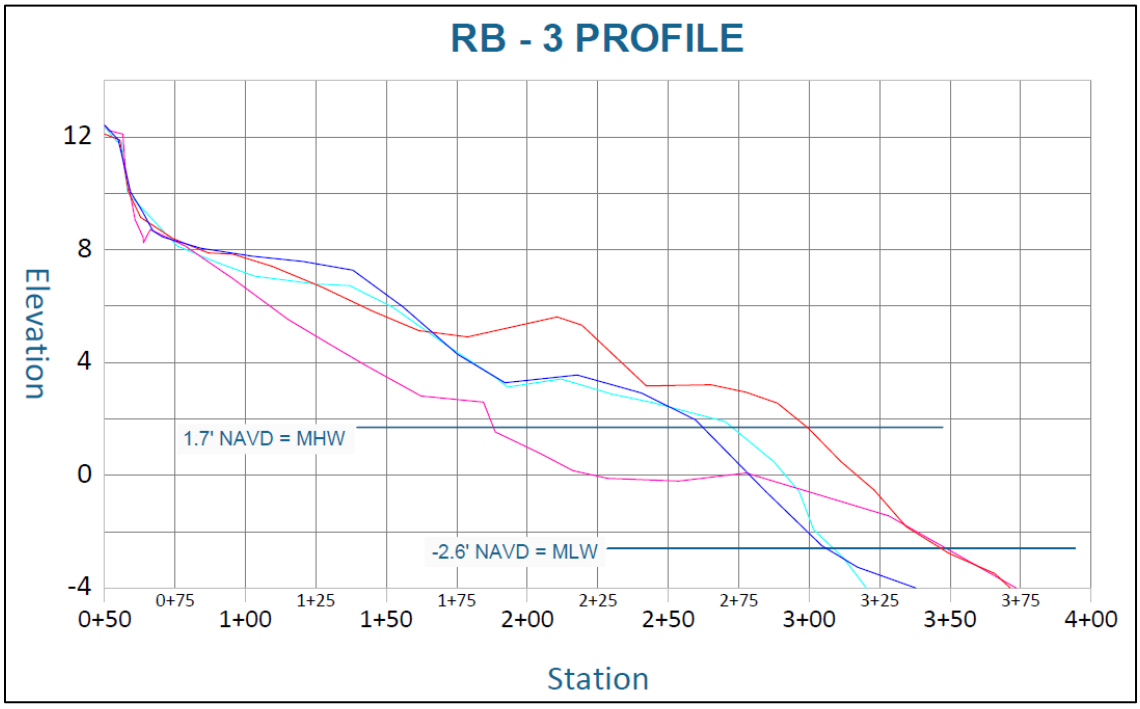
Rehoboth Beach (continued).





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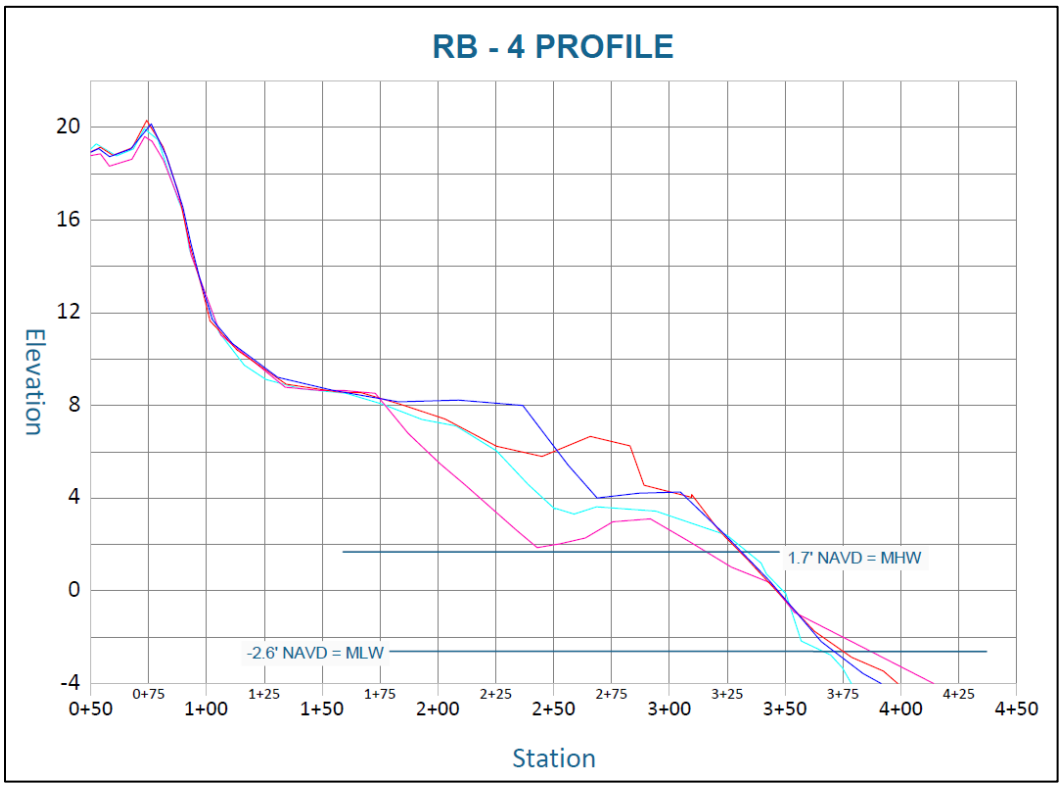
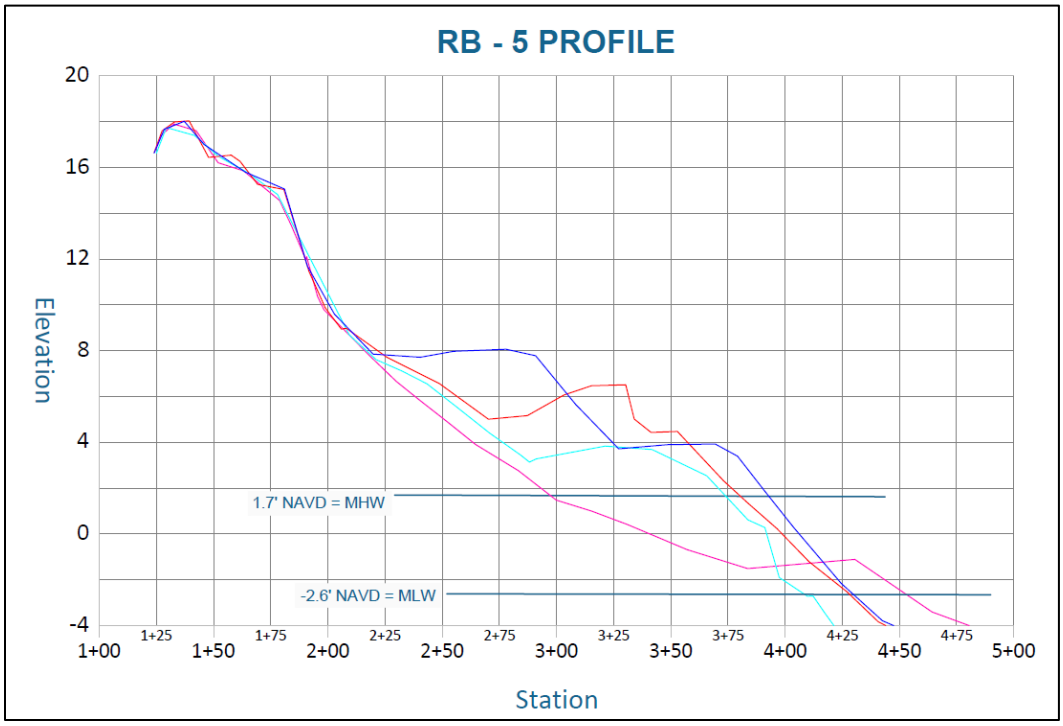
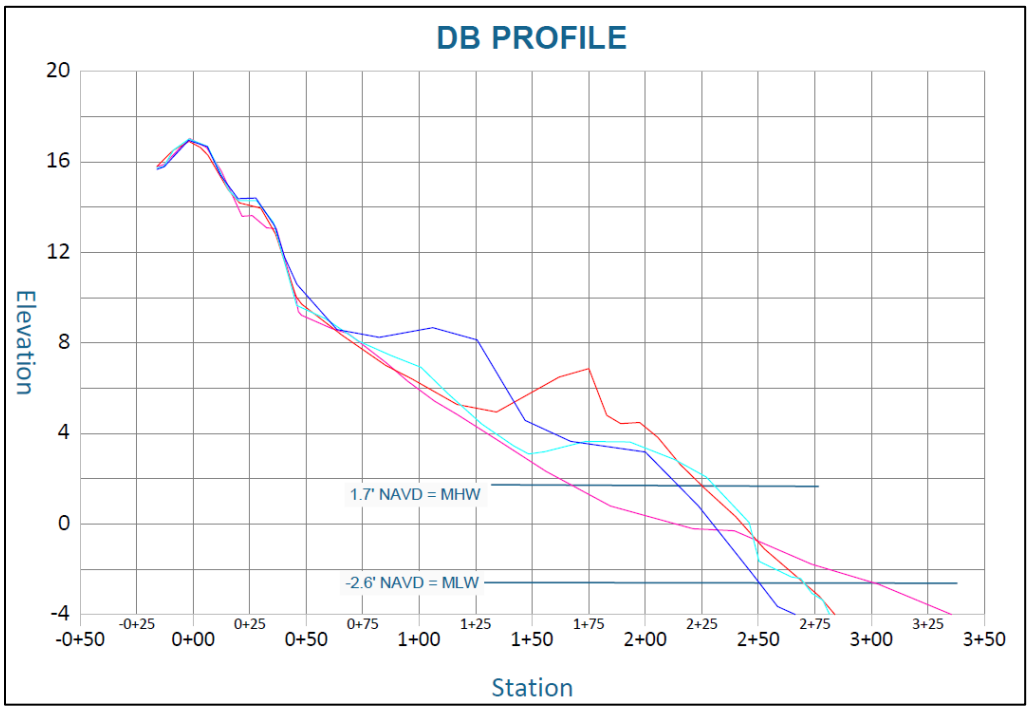


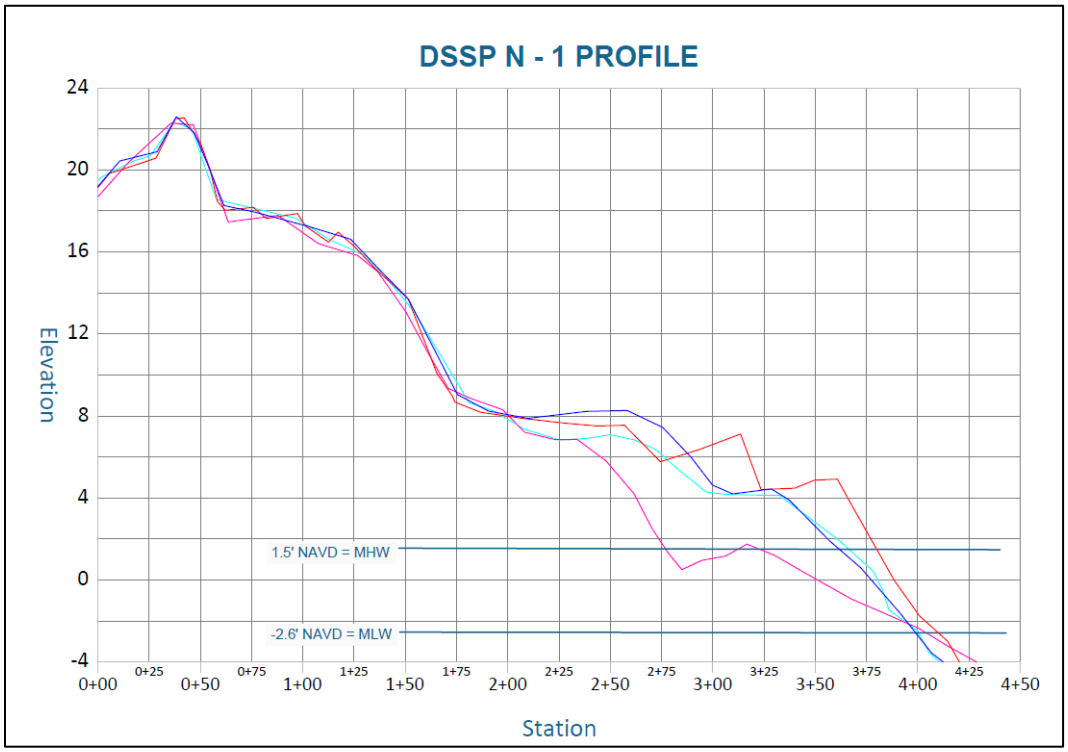


Pink: Summer '23, Cyan: Winter '24, Red: Summer '24, Blue: Winter '25

Dewey Beach



Delaware Seashore State Park – North



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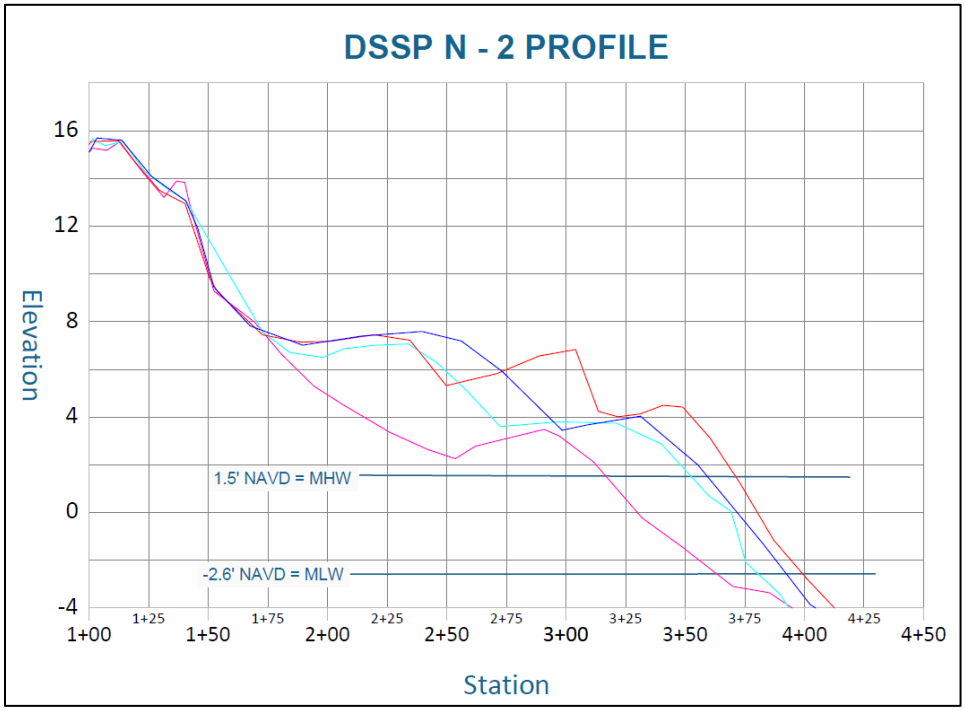
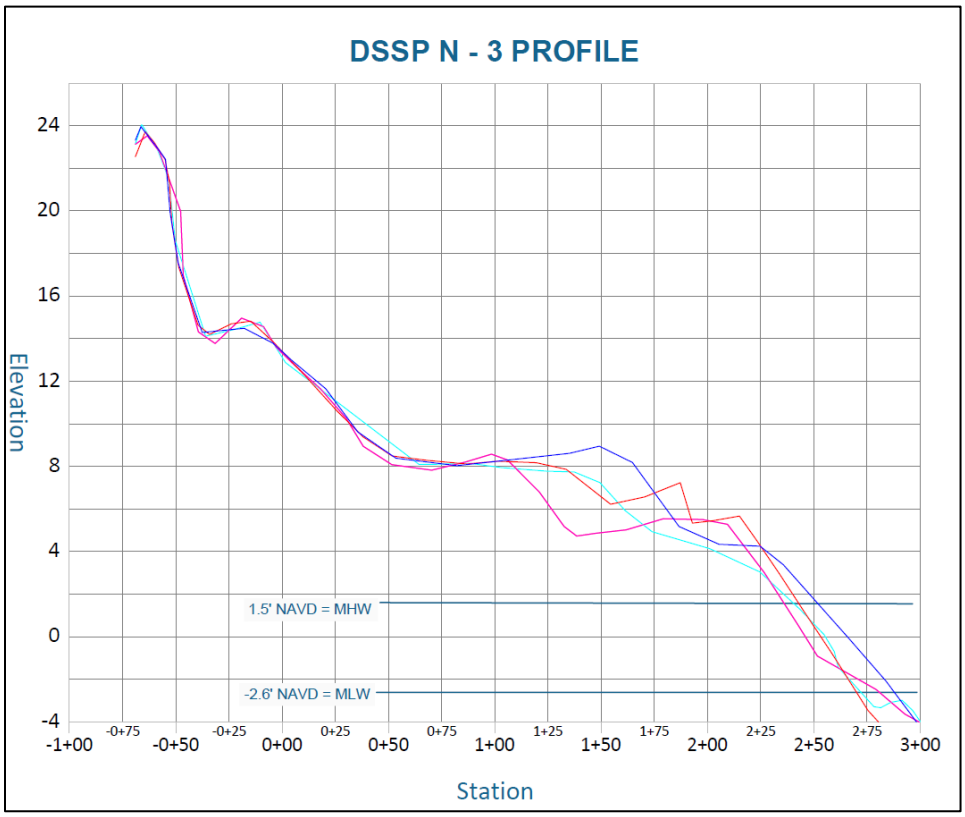
Delaware Seashore State Park – North (continued).





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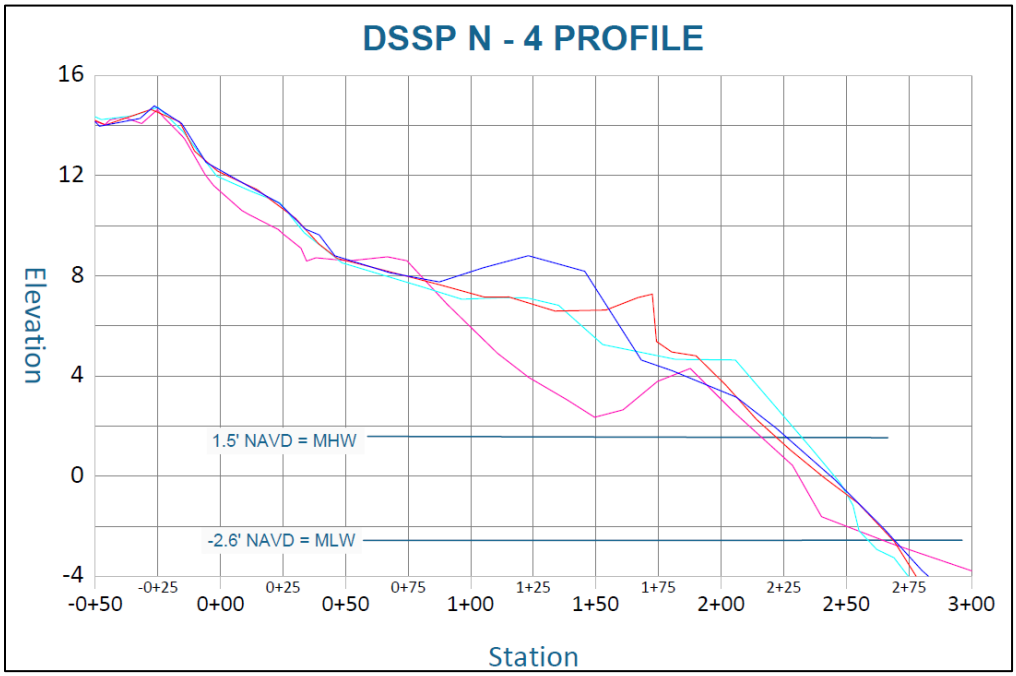
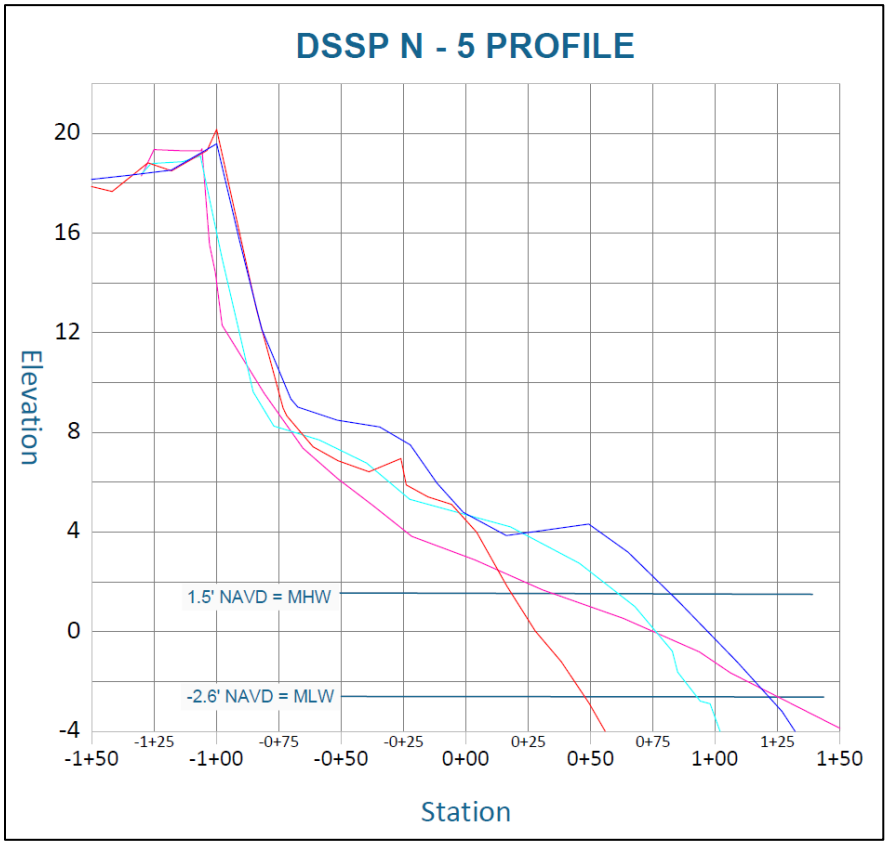
Delaware Seashore State Park – North (continued).





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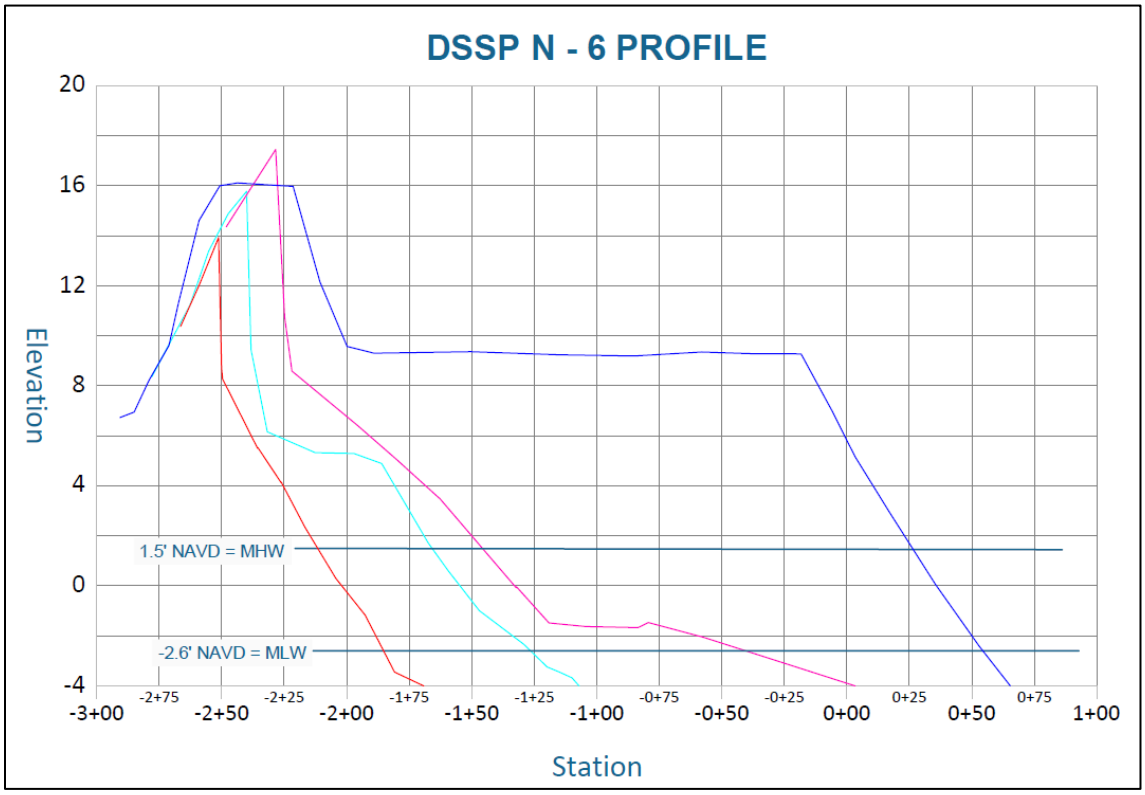
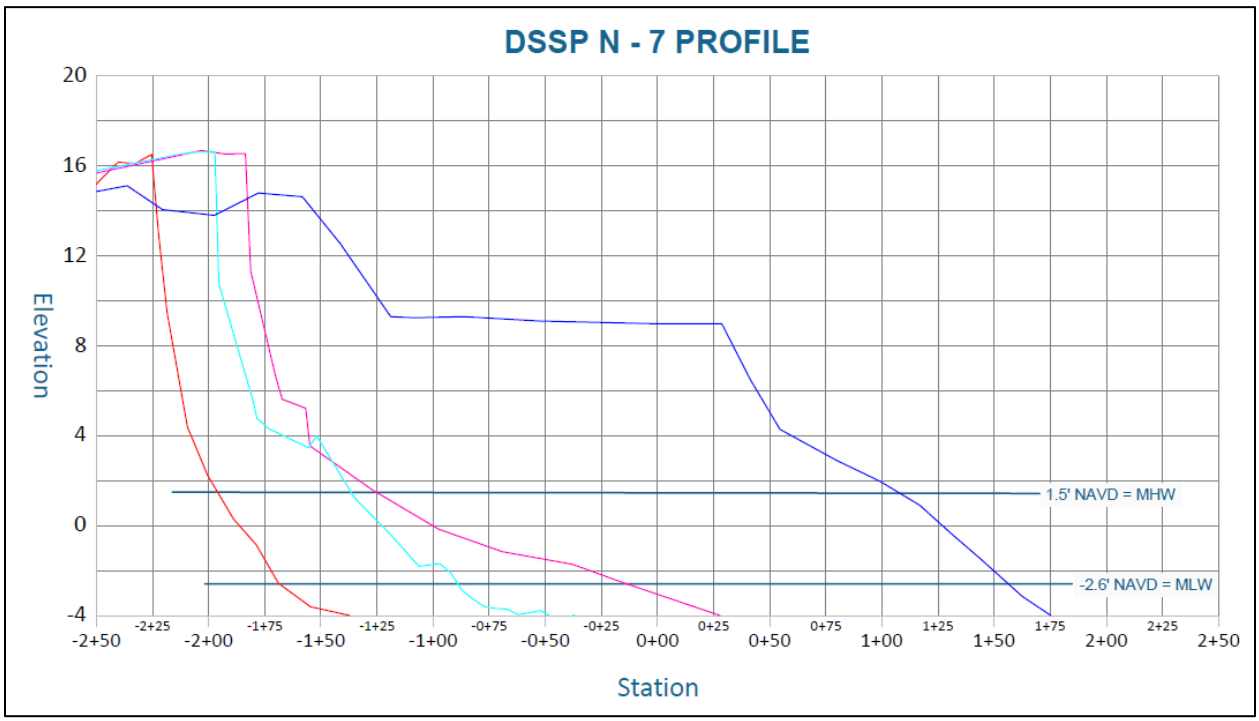
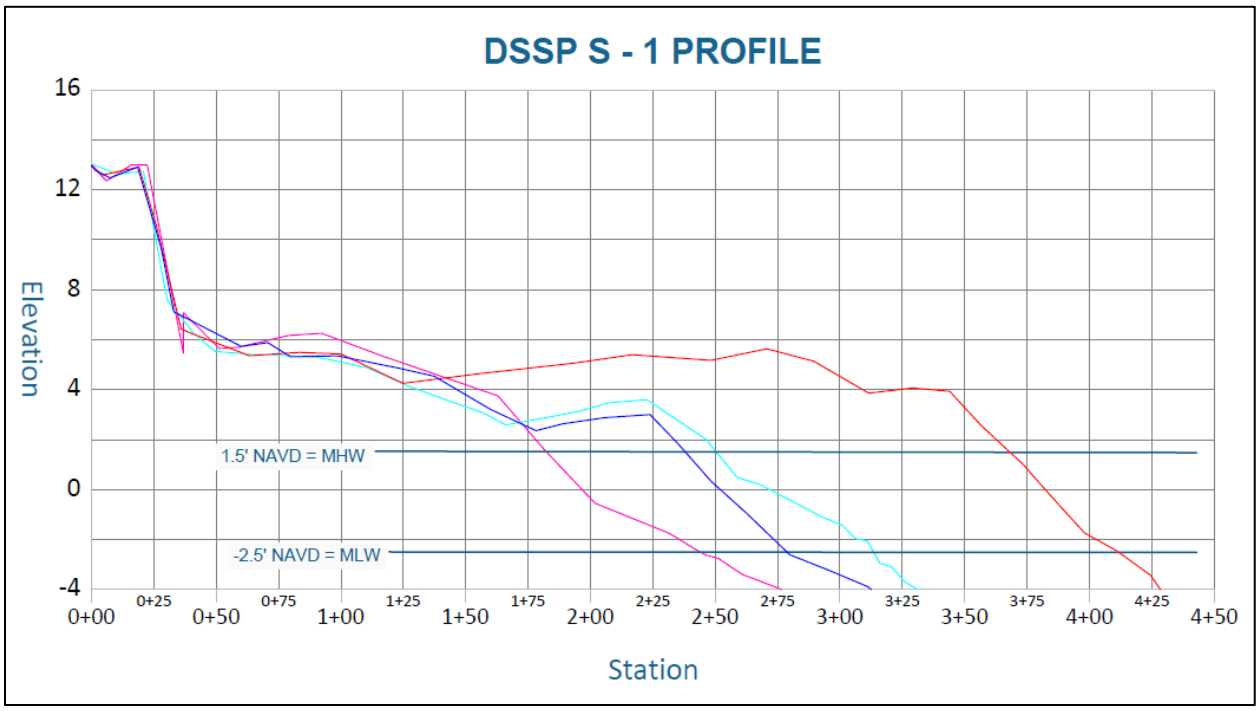
Delaware Seashore State Park – North (continued).

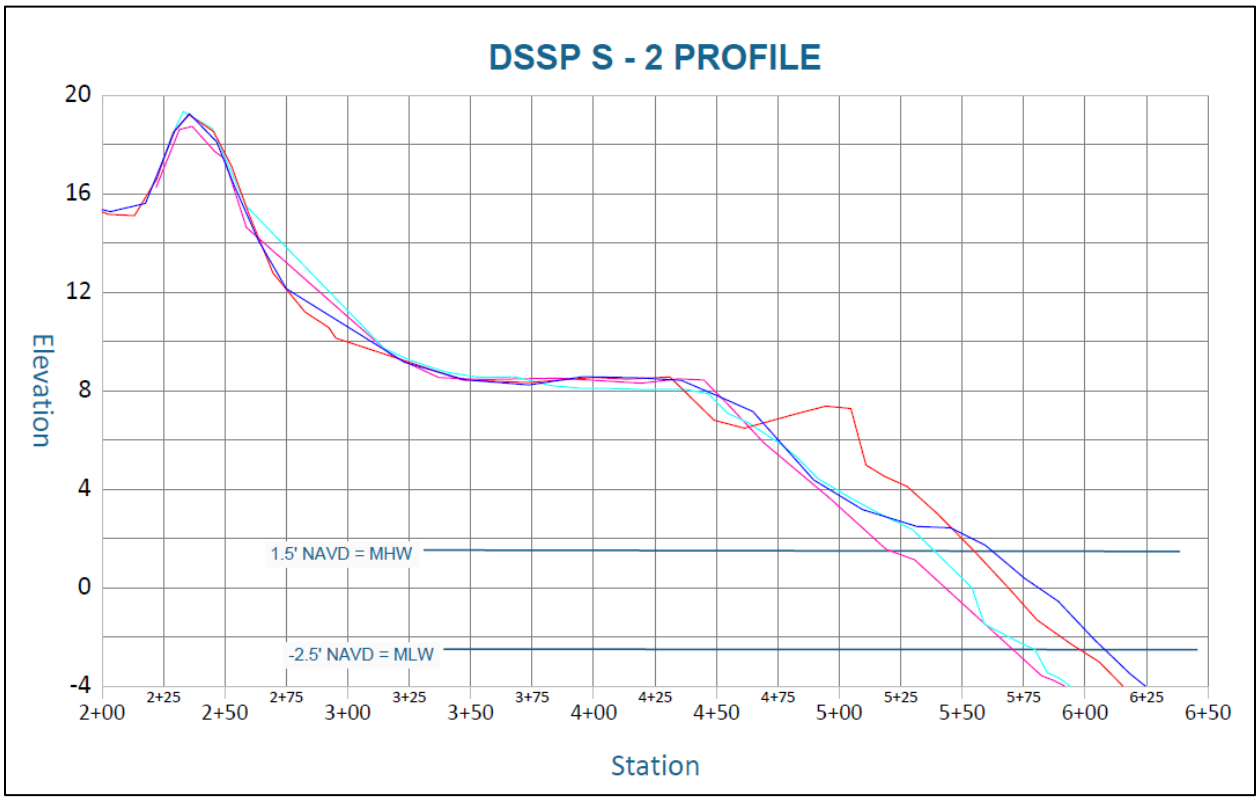




Pink: Summer '23, Cyan: Winter '24, Red: Summer '24, Blue: Winter '25

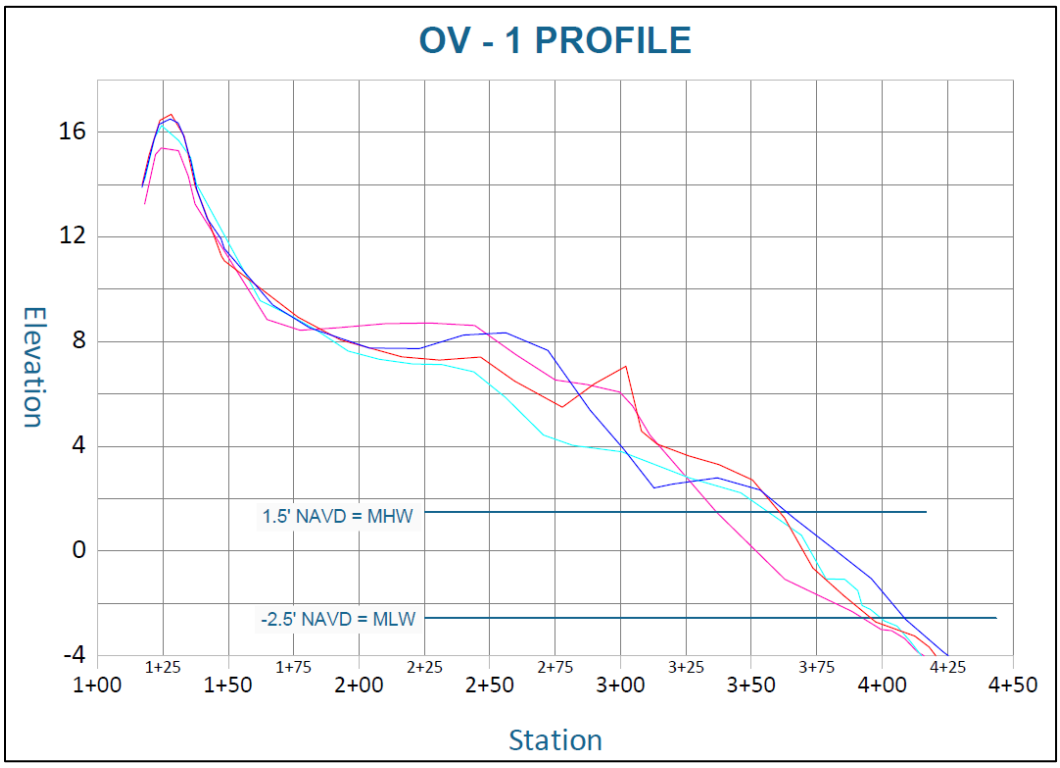
Delaware Seashore State Park – South

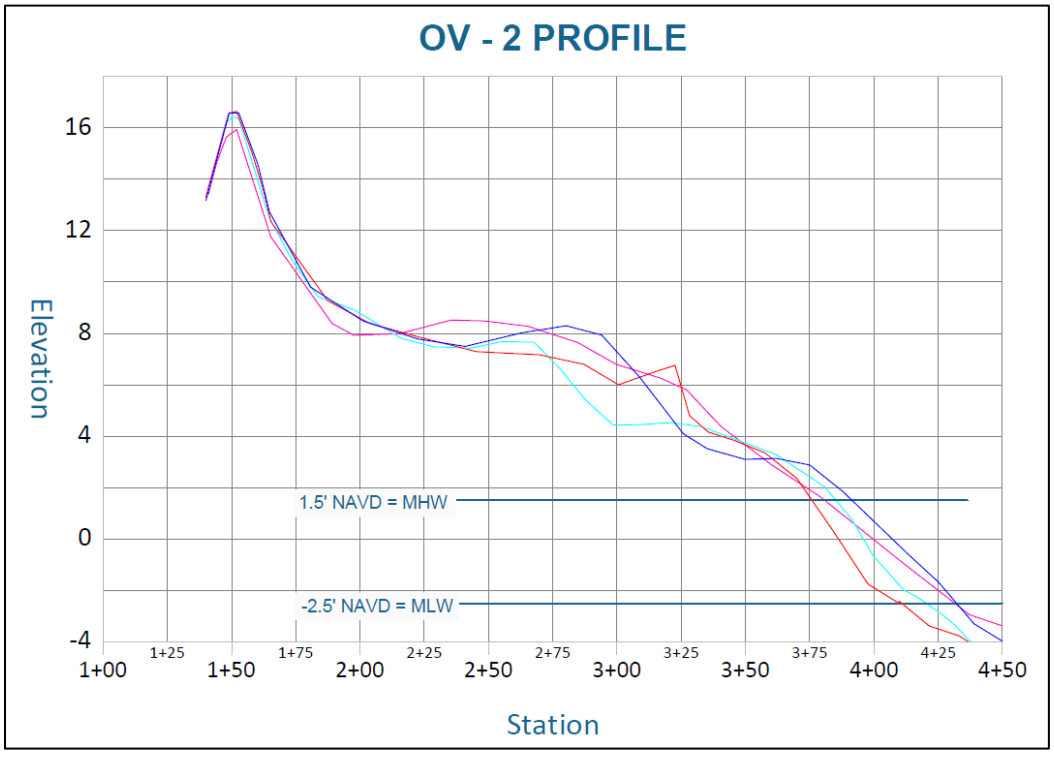




Pink: Summer '23, Cyan: Winter '24, Red: Summer '24, Blue: Winter '25

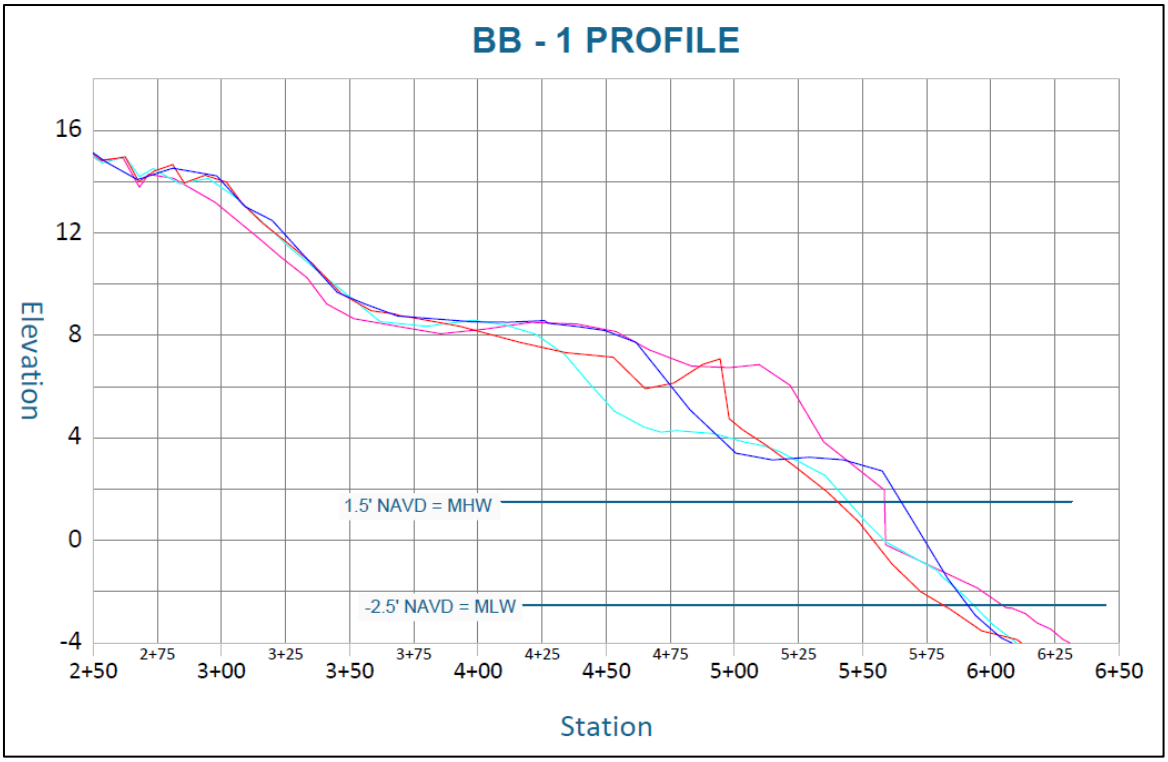
Oceanview

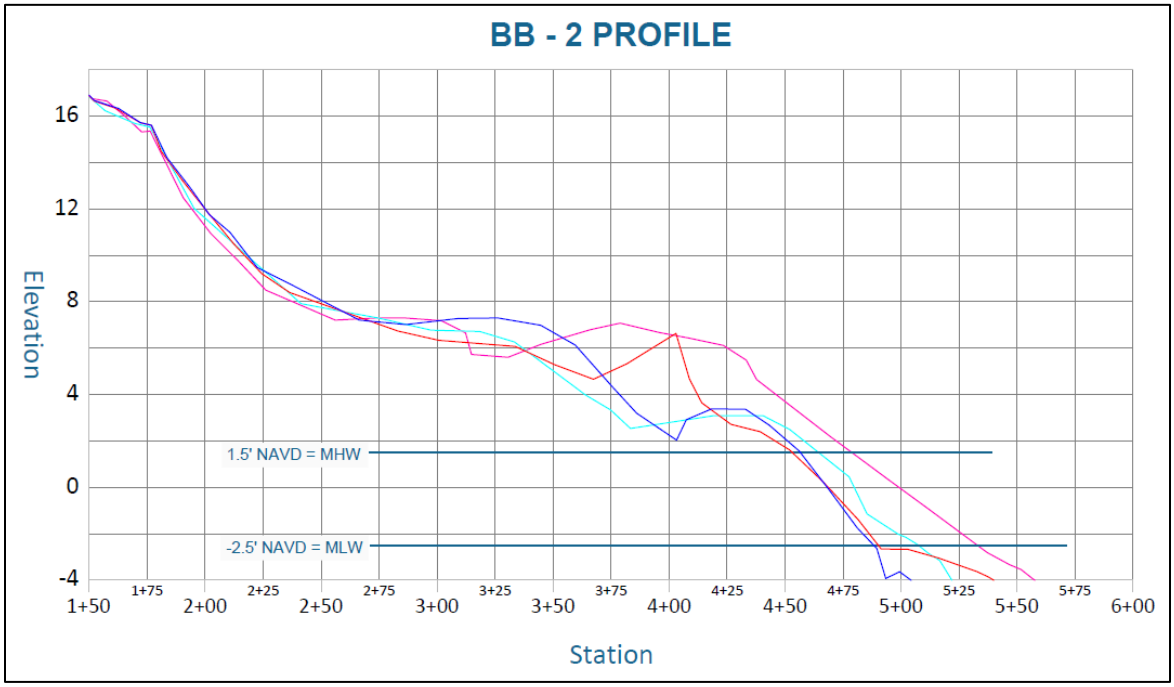




Pink: Summer '23, Cyan: Winter '24, Red: Summer '24, Blue: Winter '25

Bethany Beach





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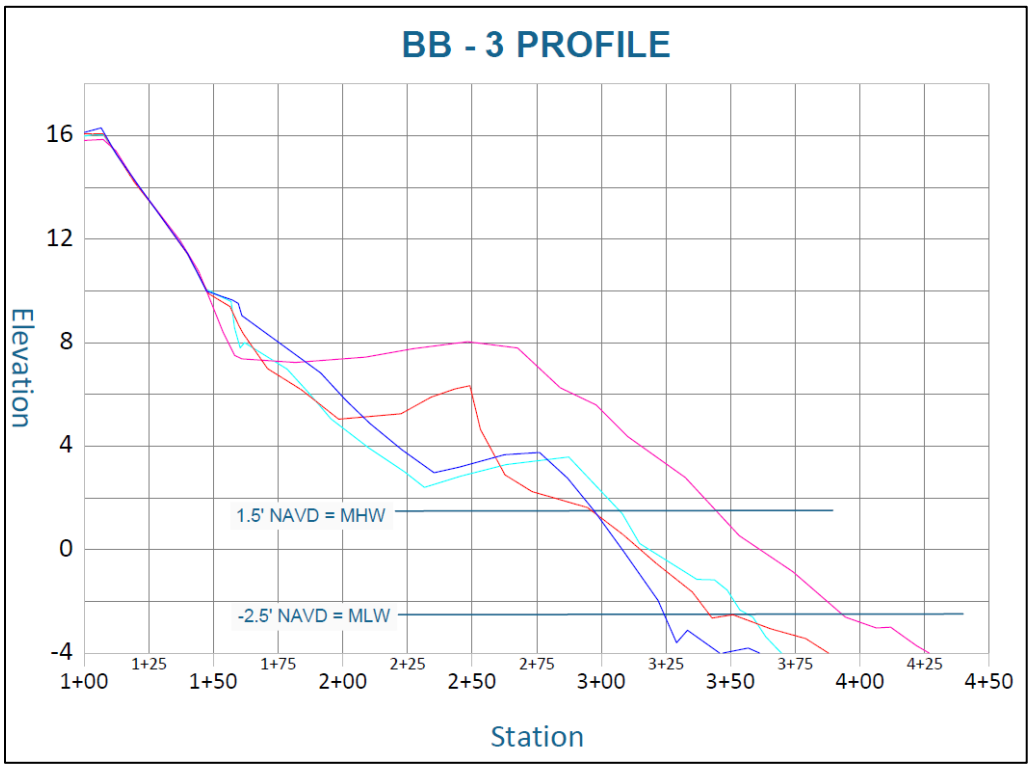

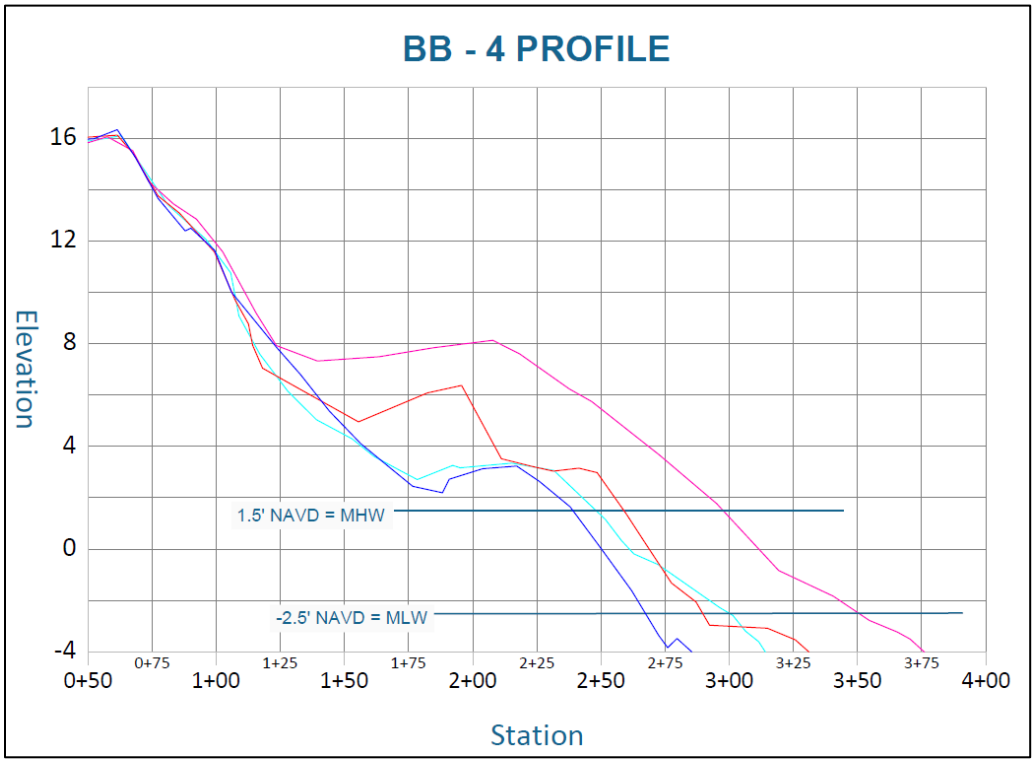

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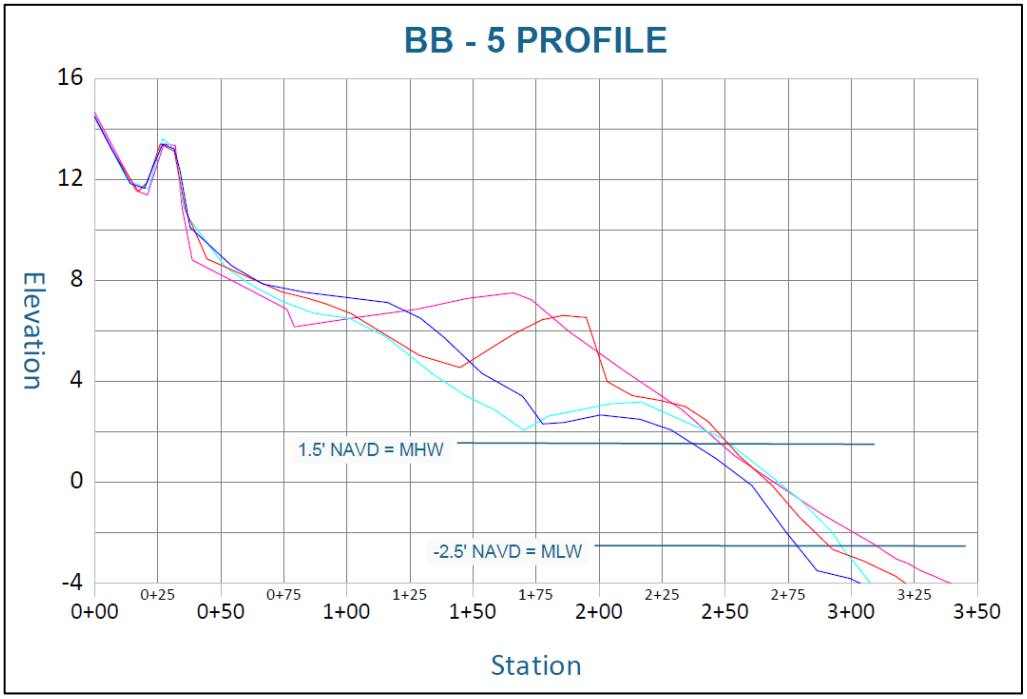
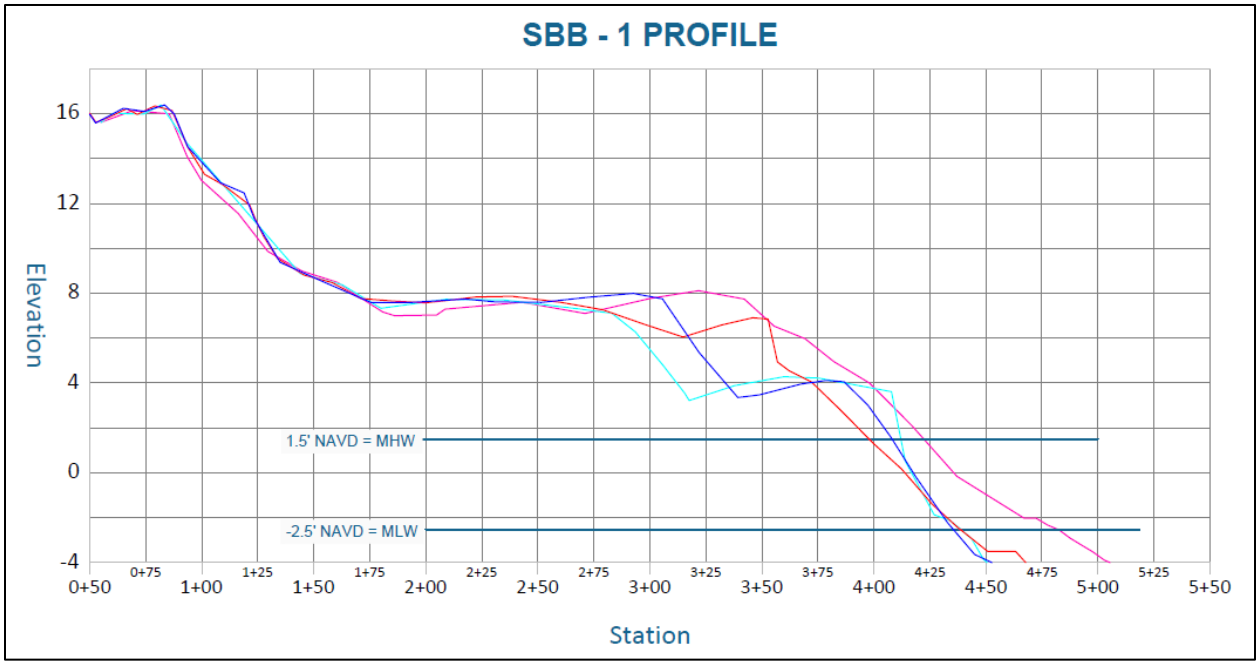
Bethany Beach (continued).

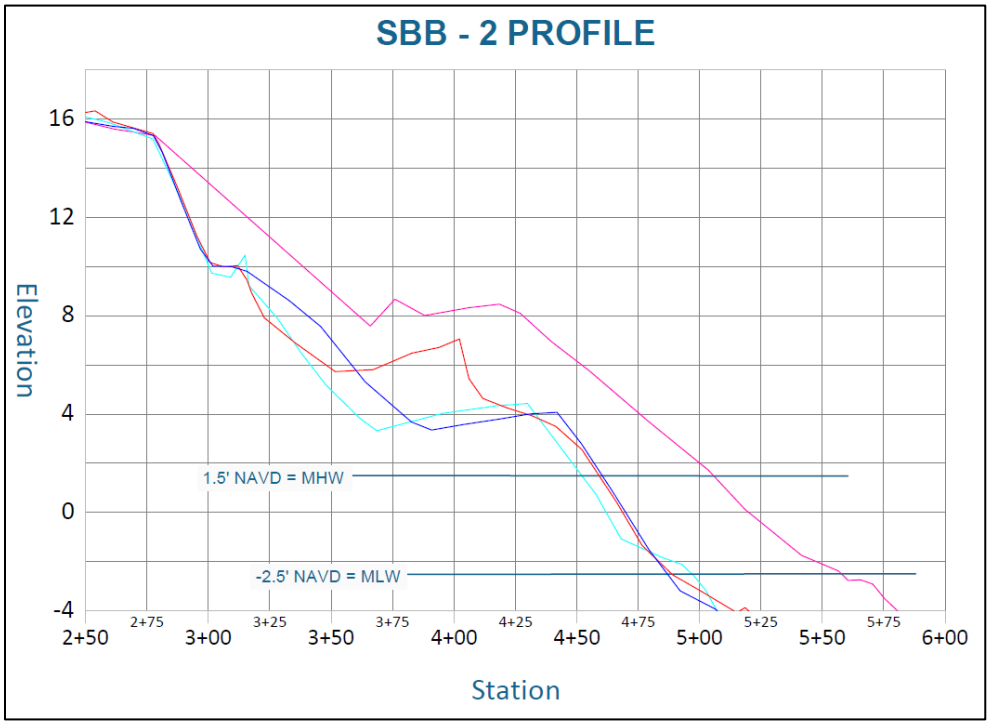


South Bethany Beach

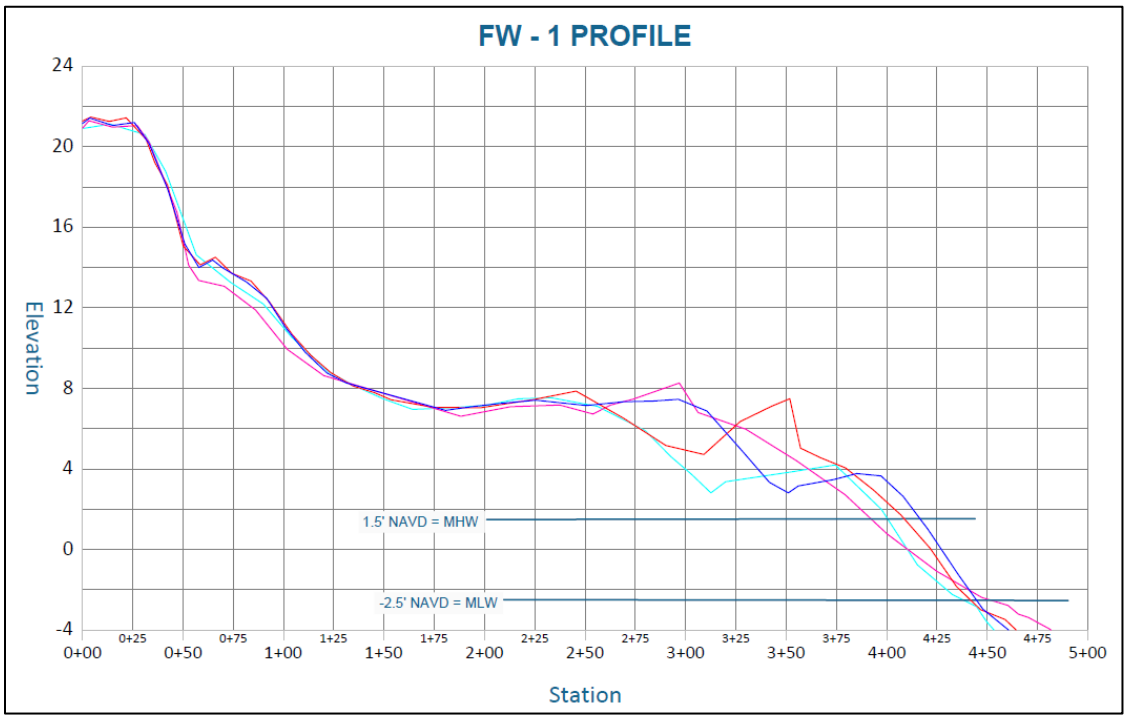


Pink: Summer '23, Cyan: Winter '24, Red: Summer '24, Blue: Winter '25

South Bethany Beach (continued).



Fenwick Island



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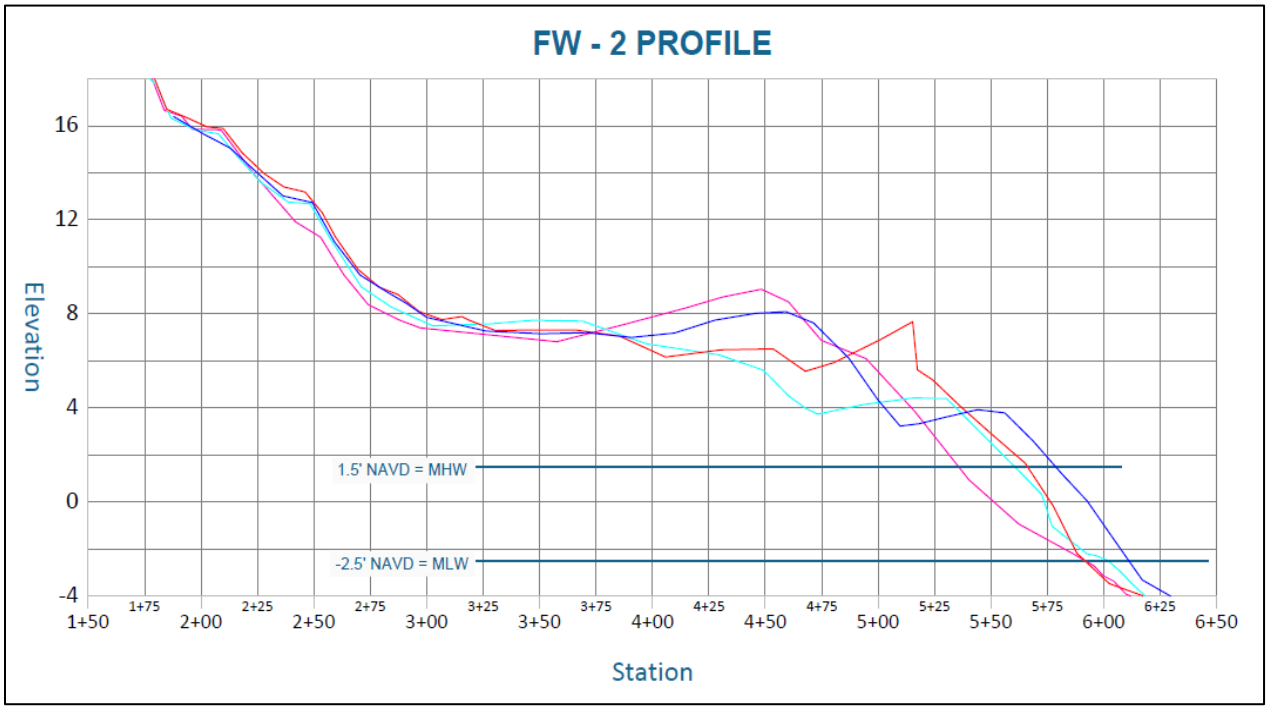

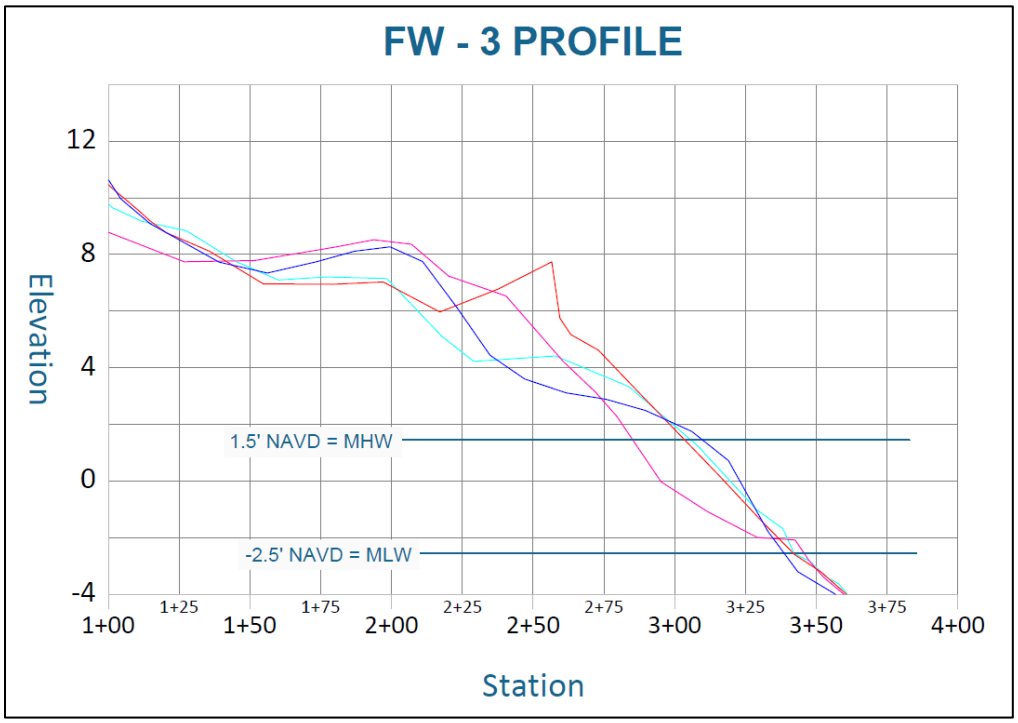

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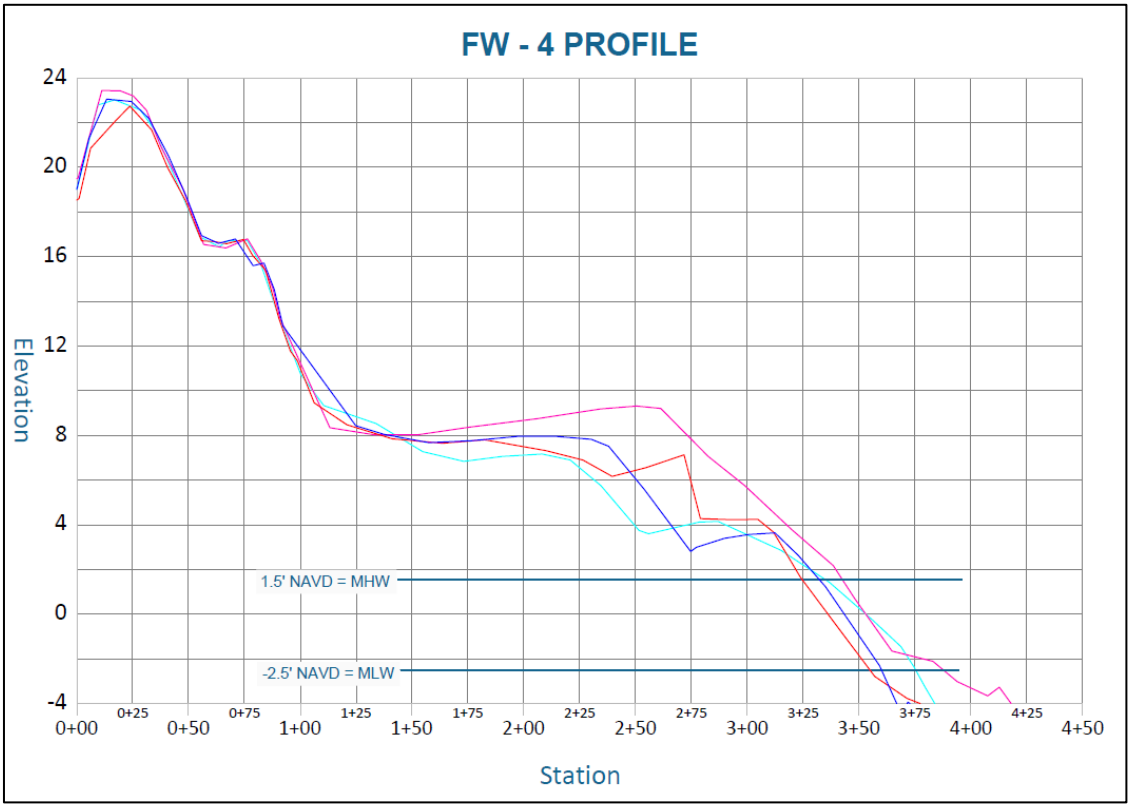
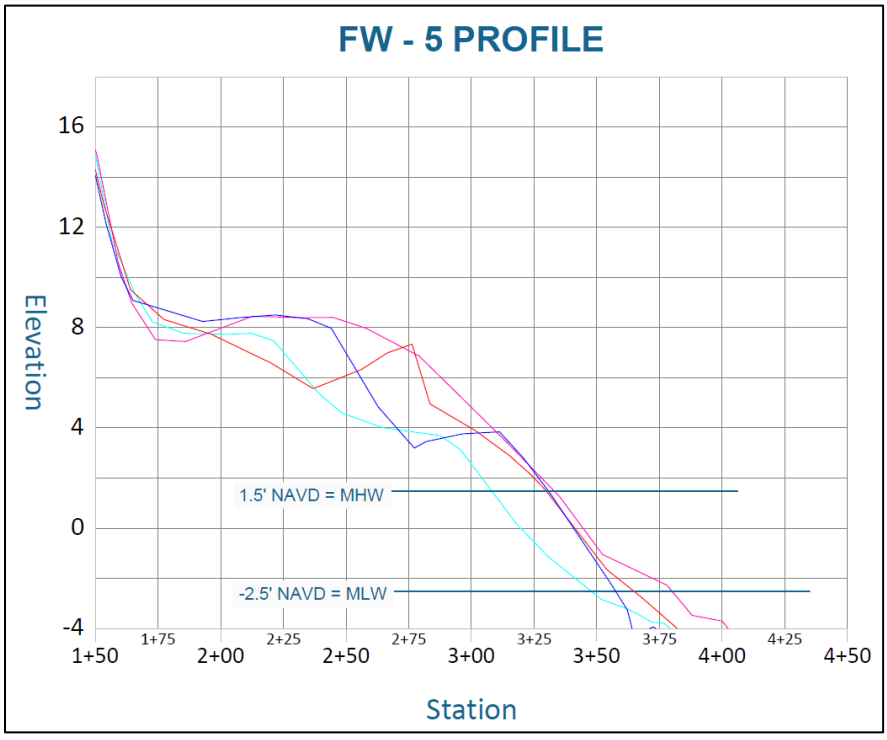
Fenwick Island (continued).





Pink: Summer '23, Cyan: Winter '24, Red: Summer '24, Blue: Winter '25

Appendix 2: Ocean Coast Photographs

Herring Point (4/11/2024 at 9:40)

Photo taken approaching high tide looking north at the jetties.

Photo taken approaching high tide looking south.

Gordon's Pond (04/11/2024 at 9:46)

Photo taken approaching high tide looking north. Observation Tower #6 appears in the foreground.

Photo taken approaching high tide looking south. Observation Tower #5 is visible.

Gordon's Pond (04/11/2024 at 9:51)

Photo taken approaching high tide looking north. Observation Towers #5 and #6 are seen in the background.

Photo taken approaching high tide looking south.

Rehoboth Beach (04/11/2024 at 9:59)

Photo taken approaching high tide looking north at Deauville Beach.

Photo taken approaching high tide looking south. Two groins are visible as well as the northern end of the Rehoboth Boardwalk.

Rehoboth Beach (04/11/2024 at 10:03)

Photo taken approaching high tide looking north. The two groins are seen in the background.

Photo taken approaching high tide looking south at the southern end of the Rehoboth Boardwalk.

Dewey Beach (4/11/2024 at 10:11)

Northern Section (near Clayton St): Photo taken at high tide looking north.

Northern Section (near Clayton St): Photo taken at high tide looking south.

Dewey Beach (4/11/2024 at 10:17) continued.

Southern Section (near Collins Ave): Photo taken at high tide looking north.

Southern Section (near Collins Ave): Photo taken at high tide looking south.

Delaware Seashore State Park - North (4/11/2024 at 10:23)

Photo taken from Tower Road Beach at high tide looking north.

Photo taken from Tower Road Beach at high tide looking south.

Delaware Seashore State Park - North (4/11/2024 at 10:33) continued.

Photo taken from Keybox Road Beach at high tide looking north.

Photo taken from Keybox Road Beach at high tide looking south.

Delaware Seashore State Park - North (4/11/2024 at 10:54) continued.

Photo taken from the Indian River Life Saving Station at high tide looking north.

Photo taken from the Indian River Life Saving Station at high tide looking south.

Delaware Seashore State Park - North (4/11/2024 at 11:07) continued.

Photo taken from the northside Inlet beach at high tide looking north.

Photo taken from the northside Inlet beach at high tide looking south. The Indian River Inlet Bridge is visible.

Delaware Seashore State Park - South (4/16/2024 at 14:38)

Photo taken from the southside Inlet beach approaching high tide looking north. The Indian River Inlet and north jetty are visible.

Photo taken from the southside Inlet beach approaching high tide looking south.

Delaware Seashore State Park - South (4/16/2024 at 14:28) continued.

Photo taken from 3R's Beach approaching high tide looking north.

Photo taken from 3R's Beach approaching high tide looking south.

Oceanview (4/16/2024 at 14:11)

Photo taken approaching high tide looking north at Delaware Seashore State Park.

Photo taken near the Tower Shores Beach Community approaching high tide looking south.

Oceanview (4/16/2024 at 13:56) continued.

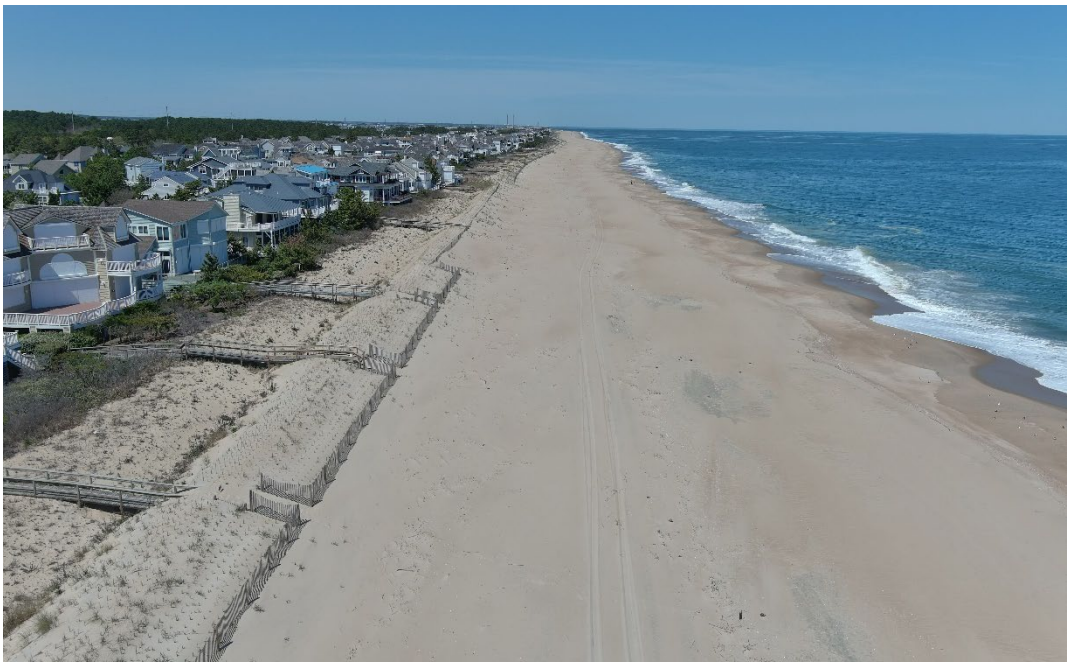


Photo taken near The Preserve Beach Community approaching high tide looking north.

Photo taken near The Preserve Beach Community approaching high tide looking south.

Bethany Beach (4/16/2024 at 13:47).

Photo taken near the Sussex Shores Beach Community approaching high tide looking north.

Photo taken near the Sussex Shores Beach Community approaching high tide looking south.

Bethany Beach (4/16/2024 at 13:38) continued.

Photo taken from the Town of Bethany Beach approaching high tide looking north.

Photo taken from the Town of Bethany Beach approaching high tide looking south. The tall, Sea Colony Condominiums are visible.

South Bethany Beach (4/16/2024 at 13:27)

Photo taken from South Bethany Beach approaching high tide looking north. The Sea Colony Condominiums are visible in the background.

Photo taken from South Bethany Beach approaching high tide looking south.

Fenwick Island (4/16/2024 at 13:14)

Photo taken from Fenwick Island State Park approaching high tide looking north.

Photo taken from Fenwick Island State Park approaching high tide looking south.

Fenwick Island (4/16/2024 at 13:08) continued.

Photo taken from the Town of Fenwick Island approaching high tide looking north.

Photo taken from the Town of Fenwick Island approaching high tide looking south at the Delaware-Maryland state border.