



Delaware Annual Beach Change Report: **Ocean Coast**



Prepared by:

**Delaware Department of Natural
Resources and Environmental Control**

Division of Watershed Stewardship
Shoreline and Waterway Management
285 Beiser Blvd., Suite 102
Dover, DE 19904
302-739-9921

2023-2024 Seasons



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Abbreviations

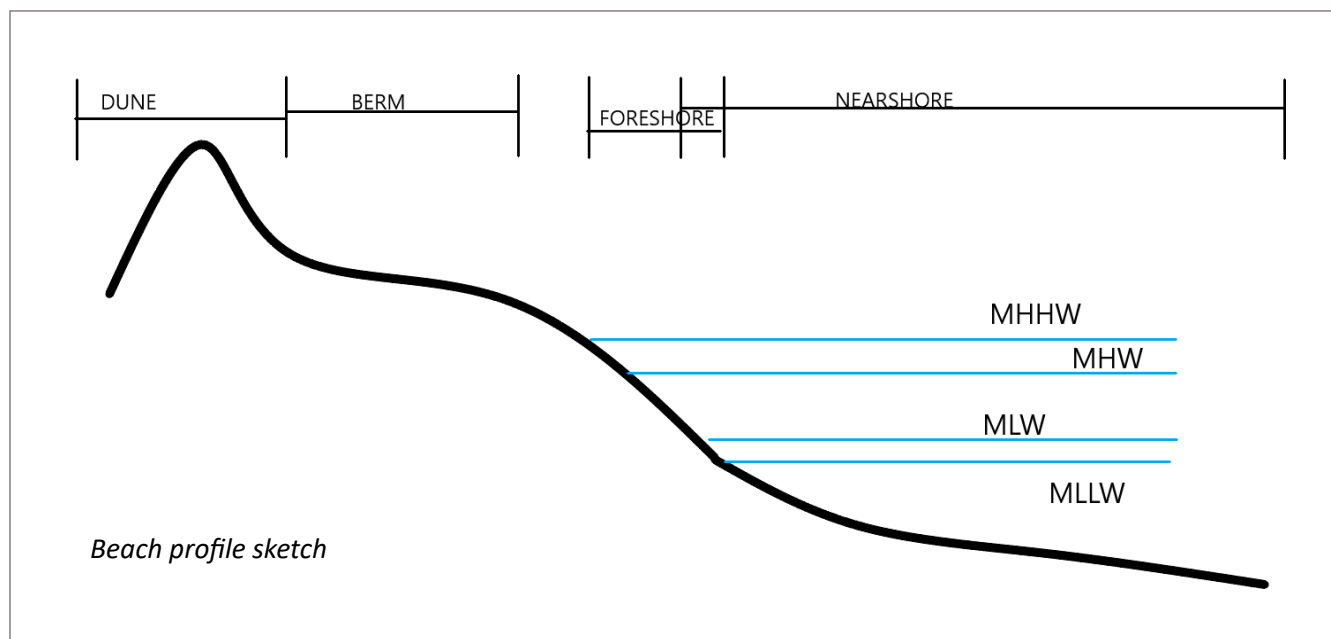
CF/LF	Cubic Feet per Linear Foot (volume per unit length)
DNREC	Department of Natural Resources and Environmental Control
GPS	Global Positioning System
LRP	Location Reference Point
MHHW	Mean Higher High Water
MHW	Mean High Water
MLLW	Mean Lower Low Water
MLW	Mean Low Water
NAVD	North American Vertical 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 foreshore slope is 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 towards the surf zone where waves break but onshore of most boating traffic.



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. Since survey dates vary around the changing summer-fall and winter-spring seasons, for simplicity the September-October dates are designated as 'summer' and the March dates as 'winter' throughout this report. In addition, SWMS divided beach communities relative to their location north or south of Indian River Inlet. This allowed SWMS survey crew to complete data collection in one day along each continuous section of coastline. Surveys north of the inlet were conducted on 9/19/2022, 3/7/2023, 10/4/2023, and 3/14/2024. Surveys south of the inlet were conducted on 9/15/2022, 3/16/2023, 9/20/2023, and 3/13/2024. Beach communities are organized from north to south, and all survey lines have been renamed since the last published report, dated October 2023.

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 bathymetry 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.

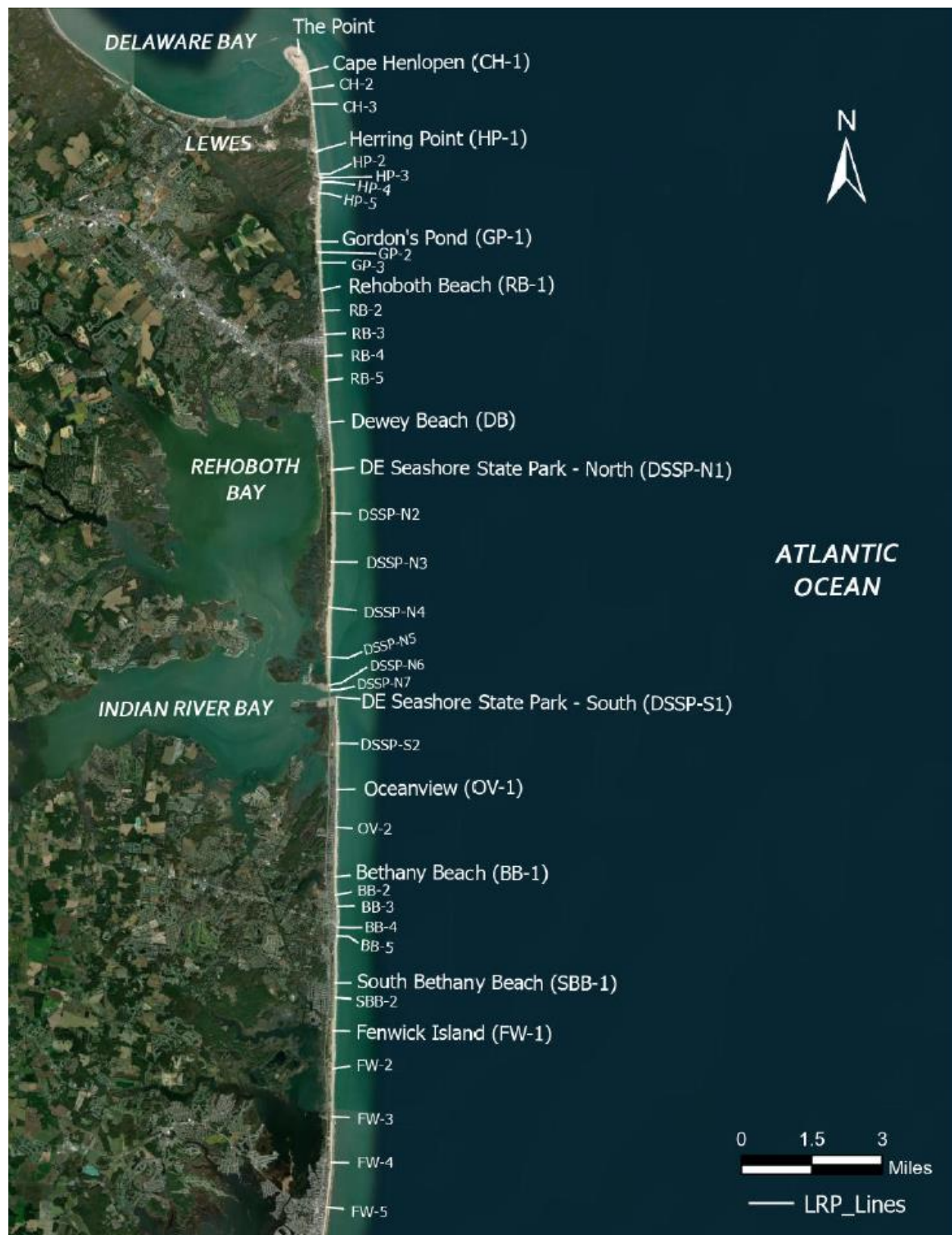


Figure 1: Ocean Coast Survey Location Map

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 the 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 are 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, which is characterized by an exposed bedrock complex consisting of metamorphic and igneous rocks. The eroded surface of this province slopes south and east toward the ocean, forming a depositional wedge-shaped mass of unconsolidated sediments known as the Atlantic Coastal Plain Province [1]. Delaware's ocean coast is located entirely in the Atlantic Coastal Plain and nearly 85 miles from the Fall Zone. Since the Coastal Plain extends eastward and offshore, the province is divided into two sections: the submerged section, also known as the continental shelf, and the emerged section. Delaware's shoreline forms the boundary between the two sections.

The oldest recorded sediments were deposited in the Coastal Plain 120 million years ago during the Early Cretaceous time, when streams transported clays and sands southeast from the Appalachian Mountains and deposited them in coastal rivers and marshes. This process continued into the Late Cretaceous, between 100 million and 65 million years ago, resulting in a 'wedge' of sediment that was approximately 4,000 feet thick. Sea level rise also contributed to the deposition of marine sediments across southern Delaware during this time. Similarly, between 65 million years ago and present day, sea level has risen and fallen multiple times, depositing coastal and 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 'wedge' is currently estimated to be 7,800 feet thick at 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, the longshore transport is interrupted by physical structures such as jetties and groins, and geological features such as ebb shoals along the coast. 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; while sand transported northward along the north ocean coast is interrupted by constructed jetties and groins or ultimately deposited on Cape Henlopen [1].

History of Indian River Inlet & Erosion Control

Indian River Inlet has a complex history of opening, closing migrating, shoaling, and re-opening due to natural forces. The 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 northside 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 northside beach. The sand bypass utilizes a semi-mobile system to pump sand from the southside beach, across the inlet to the northside beach. For many years, the sand bypass system reduced the need for dredging and nourishment until it went offline in 2019. Operations are expected to resume by December 2025 after conversion of the original diesel pumps to an electric system.

Coastal Storm Risk Management Projects

The U.S. Army Corps of Engineers in partnership with DNREC have managed coastal storm risk 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 damages to infrastructure like roads and buildings through dredging sand from offshore borrow sites and then pumping it onto the beach. The initial storm risk management projects were constructed between 2005 and 2008 with periodic nourishment planned on a three-to-four-year interval depending on the availability of funding. All projects were last re-nourished in 2023. The details are described in Table 1.



Table 1: USACE Delaware Coastal Storm Risk Management 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 2023-2024 Storm Season

NOAA Coastal Flood Events

Coastal storm events and flooding have significant impacts to Delaware's Atlantic coastline. Since construction of the USACE Coastal Storm Risk Management Projects, most coastal storms pose low flood risks along the Atlantic shoreline. The constructed beach templates are designed for storm-induced damage in the form of erosion rather than damage to buildings and other infrastructure.

The NOAA National Centers for Environmental Information (NCEI) Storm Event Database describes several events that occurred 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 Coastal Flood Events recorded for the Delaware Beaches during the 2023-2024 seasons.



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

Date	Description Of Event
October 2-3, 2022	Low pressure stayed off the Mid-Atlantic coast from Oct 2-5, before moving out to sea. The low maintained an onshore flow along the Delaware coast.
June 3, 2023	Low pressure centered well off the coast and strong high pressure resulted in a steady onshore wind. The pattern brought widespread moderate tidal flooding to the coast around the evening high tide.
September 23, 2023	Tropical Storm Ophelia drifted northward from North Carolina. Resulted in a steady onshore flow along the coast of Delaware, causing widespread tidal flooding.
September 26, 2023	Low pressure off the Mid-Atlantic & strong high pressure resulted in a steady onshore flow along the Delaware coast causing widespread tidal flooding.
December 18, 2023	An area of low pressure passing over the region resulted in <u>strong onshore flow and a push of water onshore</u> and up the Delaware Bay and River, where moderate coastal flooding was observed.
January 10, 2024	A strong system with steady southerly flow pushing water into coastal communities along the ocean and within the Delaware River/Bay. Water levels in tidal areas were higher due to 2 to 4+ inches of rainfall.
January 13, 2024	Strong south to SE winds. Widespread tidal flooding and a push of water up the Delaware Bay/River and through the back bays. The outcome was the tidal inundation of roads and structures.
February 13, 2024	A strong coastal system pushing offshore resulted in increasing surge values of 2-3 feet above the astronomical tides, resulting in widespread and impactful coastal flooding issues during high tides along much of the Atlantic coast of Delaware.

USGS Hydrologic Gauge Stations

Hydrologic gauges can be used to determine the maximum water elevations resulting from storm events affecting Delaware's 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 is 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.

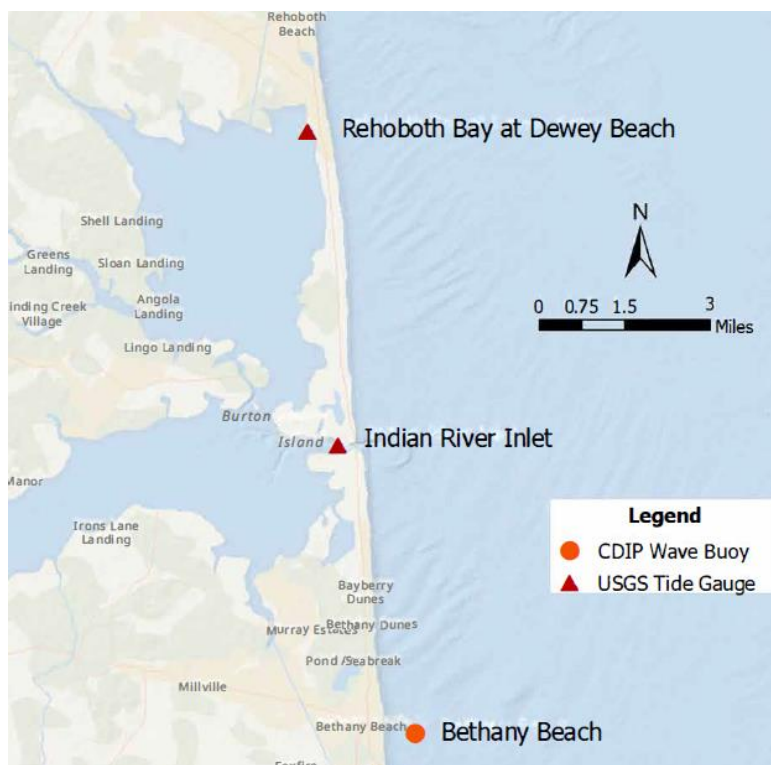


Figure 2: Water level and wave monitoring stations

To evaluate hydrologic data during the Coastal Flood Events described above, Table 3 lists the peak water level elevations (in feet above MHHW) measured at each gauge station. Based on NOAA's flood impact forecasting, these values suggest a 'moderate level' of flooding occurred at both stations during all events. At this level, widespread flooding of roadways begins with many roads becoming impassable; lives may be at risk when people put themselves in harm's way; and some damage to vulnerable structures may begin to occur [9].

Indian River Inlet experienced the most flooding during the 2023-2024 storm season followed by Rehoboth Bay at Dewey Beach (Table 3). The effects of Tropical Storm Ophelia on 9/23/2023 generated the highest water levels measured at both gauge stations. Moderate flooding was predicted for all events at Indian River Inlet, except the January 2024 storm, despite heavy rainfall.



Table 3: Maximum water level elevations recorded by USGS hydrologic gauges		
NOAA Coastal Flood Event	Dewey Beach	Indian R Inlet
	MHHW, feet	MHHW, feet
3-Oct-22	2.97	3.03
3-Jun-23	----	2.39
23-Sep-23	2.98	2.81
26-Sep-23	2.45	2.56
18-Dec-23	2.33	2.51
10-Jan-24	2.42	----
13-Jan-24	----	2.27
13-Feb-24	----	2.48
NOAA Flood Impact Prediction	Moderate Flooding (2.3 to 3.2-feet)	Moderate Flooding (2.3 to 3.2-feet)

USACE/CDIP - Wave Monitoring Buoy Station

Coastal erosion along the Delaware shoreline is most damaging during storms when high waves and strong currents combine to suspend and move sand off beaches. Storm surge, especially during high tide, has a greater potential to cause flooding and damage to nearshore structures. Therefore, real-time wave measurements can be used to understand storm intensity and Coastal Flood Events. The U.S. Army Corps of Engineers sponsors the Coastal Data Information Program (CDIP), operated by the Scripps Institution of Oceanography, which developed and maintains a network of buoys, or data collection systems, to monitor waves and beaches along the coastlines of the United States [10]. There is one CDIP buoy (Station-263) along the Delaware coastline that is located 0.5 miles east of Bethany Beach (Figure 2).

The largest recorded wave heights measured at the Bethany Beach CDIP Station during the 2023-2024 season are listed in Table 4 and correspond with the Coastal Flood Events described above. On 9/23/2023, TS Ophelia produced waves with the largest height, shortest period, and longest duration of all the events. Similarly, the January 2024 storm delivered heavy rainfall, and elevated wave height was measured for 24 hours. However, wave data suggest the December 2023 flood event was different. The buoy station measured smaller waves with a much longer period, which reflect the ‘strong onshore push of water’ described by NOAA (Table 2).



Table 4: Maximum wave heights recorded at CDIP Bethany Beach, DE			
DATE	WAVE HEIGHT	PEAK WAVE PERIOD	*DURATION
	feet	seconds	hours
9/23/2023	11.06	9.1	30
1/10/2024	10.70	9.9	24
12/18/2023	10.14	14.3	24
<i>*Duration: all records with a wave height $\geq 60\%$ of the peak value</i>			

Typical Seasonal to Annual Beach Change

Storm-driven erosion and overwash [11] control seasonal-to-annual-scale beach change along Delaware's ocean coast. 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 would 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 the 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].

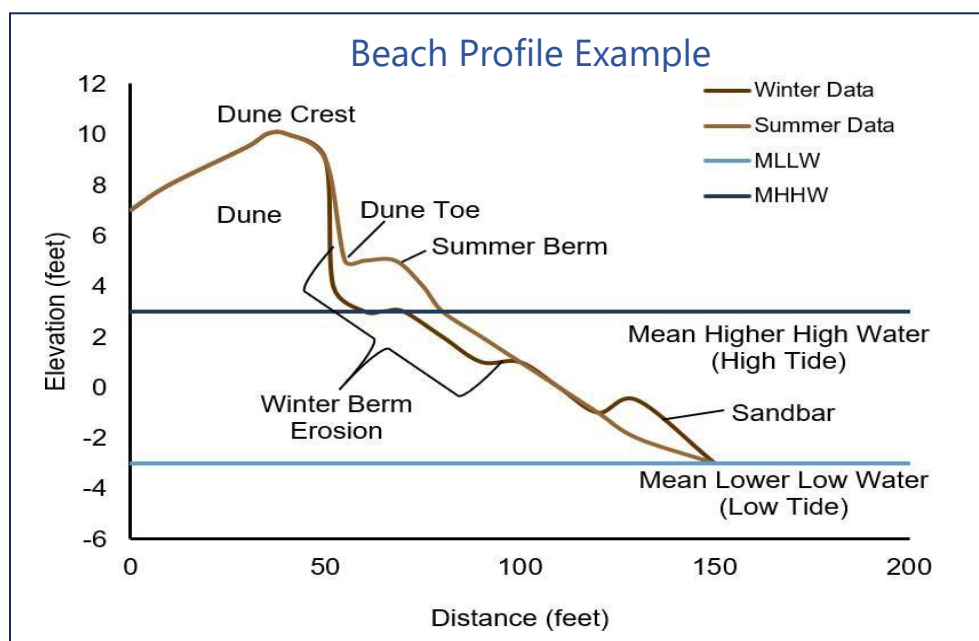


Figure 3: Schematic of a typical beach profile during summer vs winter seasons



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.

The upper extent of the beach, above the MHW contour, 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.

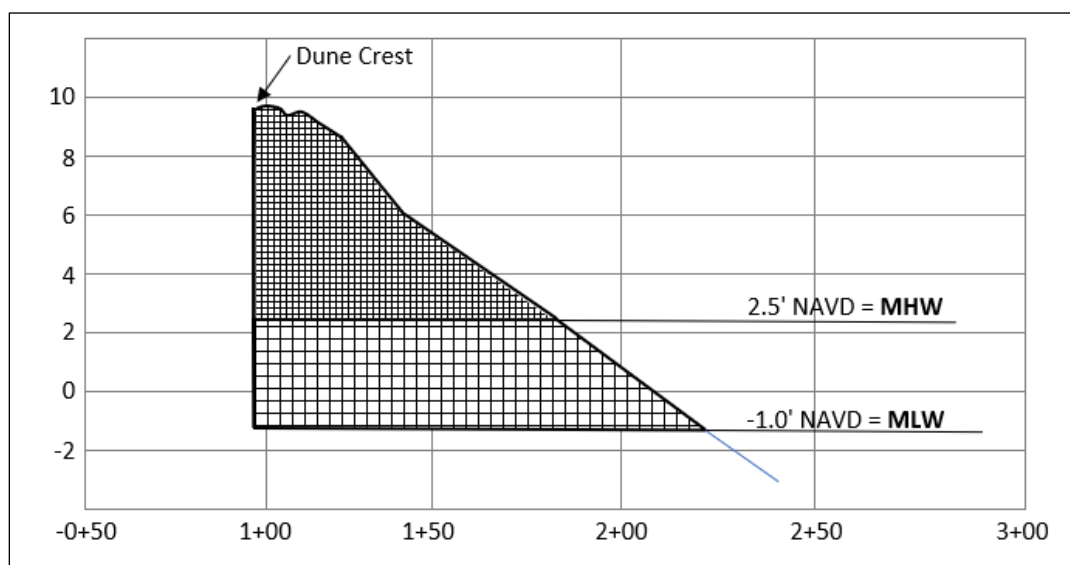


Figure 4: Beach profile sketch showing volume calculations and MHW/MLW contours

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 a representative profile view and photograph per community. Profile views 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. The park's main day-use beach is also located here and includes LRP lines CH-2 and CH-3 (Figure 5A).

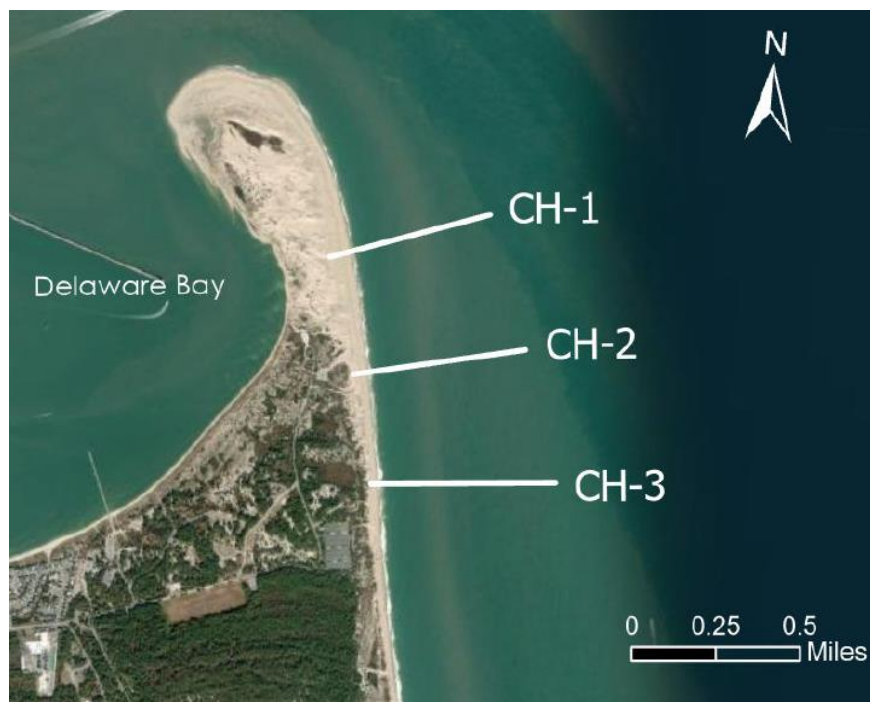


Figure 5A. LRP lines at Cape Henlopen

The average beach volumes determined for Cape Henlopen are shown in Table 5. Significant erosion was observed along Cape Henlopen Beach between the Summer 2022 and 2023 seasons. While volume loss was expected during the Fall/Winter 2023 stormy season, little to no recovery occurred during summer due to Tropical Storm Ophelia. The Delaware coastline was impacted by TS Ophelia in September 2023, and prior to the 'Summer 2023' survey; therefore, impacts to the coastline are captured in the data.

Figure 5B displays the significant loss of dune at CH-2 between the Summer 2022 and Winter 2023 seasons. Erosion of the intertidal zone and dune scarping in the Summer 2023 profile was followed by a large volume increase during Winter 2024. Some of this accreted volume was likely eroded during the previous season due to the tropical storm. 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 2022	9/19/2022	817	1741	1011	2042	1253	2223
Winter 2023	3/7/2023	NA	NA	766	1871	1053	2053
Summer 2023	10/4/2023	638	1546	841	1857	1145	2088
Winter 2024	3/14/2024	NA	NA	938	2108	1058	2042

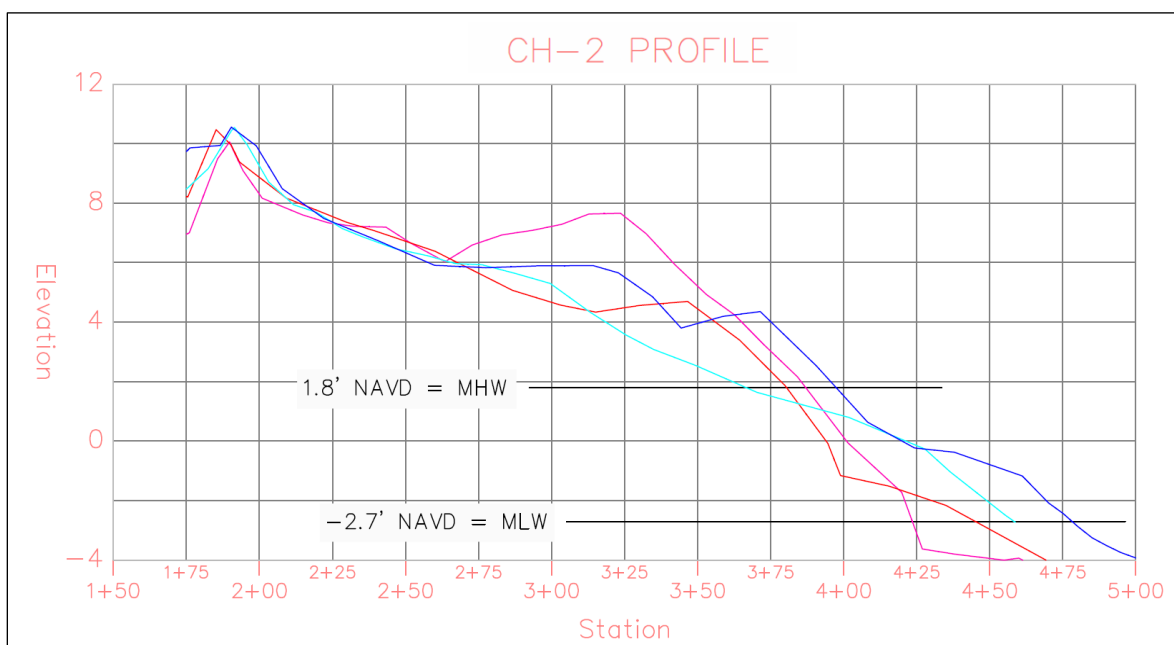


Figure 5B. Beach Profiles at Cape Henlopen, LRP CH-2.

Pink: Summer 2022, Cyan: Winter 2023, Red: Summer 2023, Blue: Winter 2024



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.

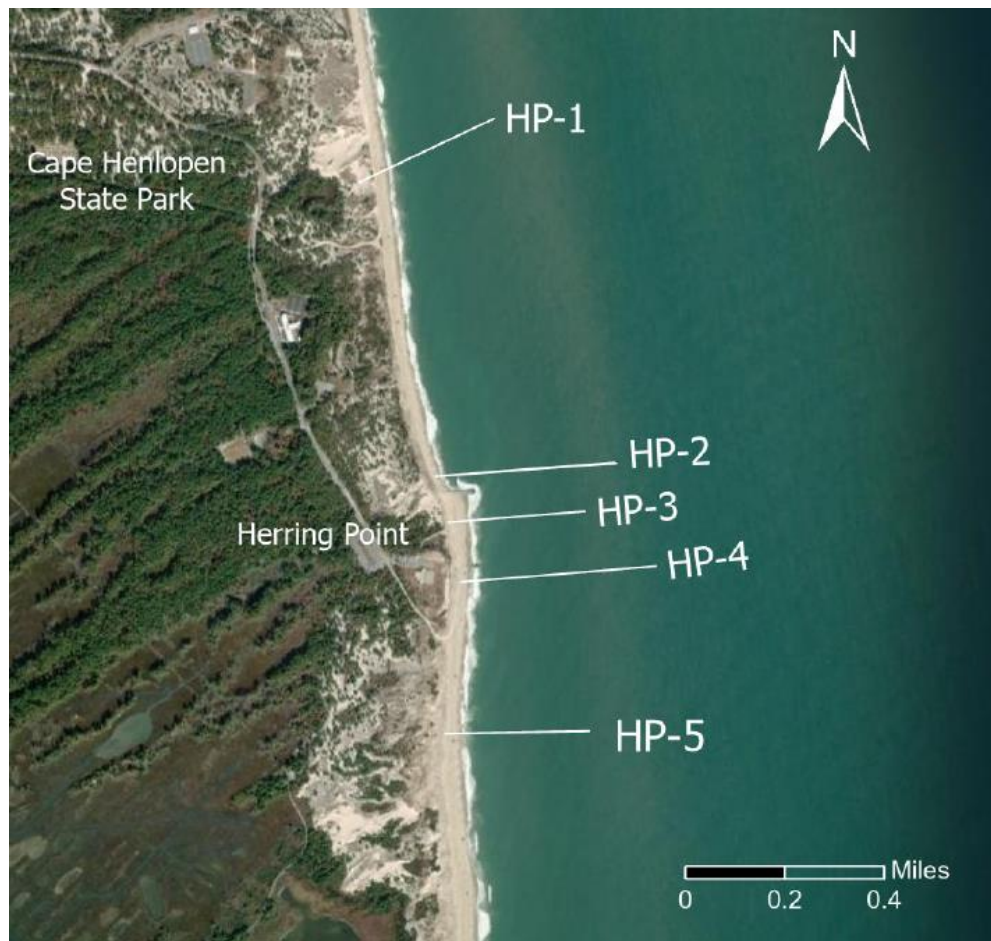


Figure 6A. LRP lines at Herring Point

The average beach volumes determined for Herring Point are shown in Table 6. The two LRP lines north of the north jetty (HP-1, HP-2) demonstrate the expected seasonal change 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. The northernmost LRP line (HP-1) is accreting overtime as increases in volume are measured between the Summer 2022 and Summer 2023 seasons as well as the Winter 2023 and Winter 2024 seasons. Conversely, LRP line HP-2 appears to be eroding slightly overtime with losses in volume determined similarly as above. Situated between the two jetties is LRP line HP-3. This section of beach experienced the least amount of volume change compared to other areas of Herring Point and accreted throughout Summer 2023 and Winter 2024.



South of the south jetty (HP-4, HP-5) eroded during Winter 2023 and continued to erode during Summer 2023. While LRP line HP-4 is influenced by the south jetty and gained volume during Winter 2024, HP-5 eroded considerably. Figure 6B shows the significant loss of volume from Winter 2023 through Winter 2024 at HP-5. The Summer 2022 and 2023 profiles demonstrate a similar seasonal pattern, but the effects of TS Ophelia impacted the volume loss and shift in profile observed. Figure 6C shows an aerial view of Herring Point looking north at the two large jetties.

Table 6: Beach volume calculations for Herring Point

LRP		HP-1		HP-2		HP-3		HP-4		HP-5	
Volume Limit		MHW	MLW	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	cf/lf	cf/lf
Summer 2022	9/19/2022	723	1442	1294	2060	1304	2380	1093	1911	1870	3021
Winter 2023	3/7/2023	650	1168	937	1761	1158	2180	940	1669	1603	2748
Summer 2023	10/4/2023	867	1624	1119	1943	1225	2229	881	1623	1615	2742
Winter 2024	3/14/2024	817	1470	1041	1663	1228	2298	920	1735	1424	2385

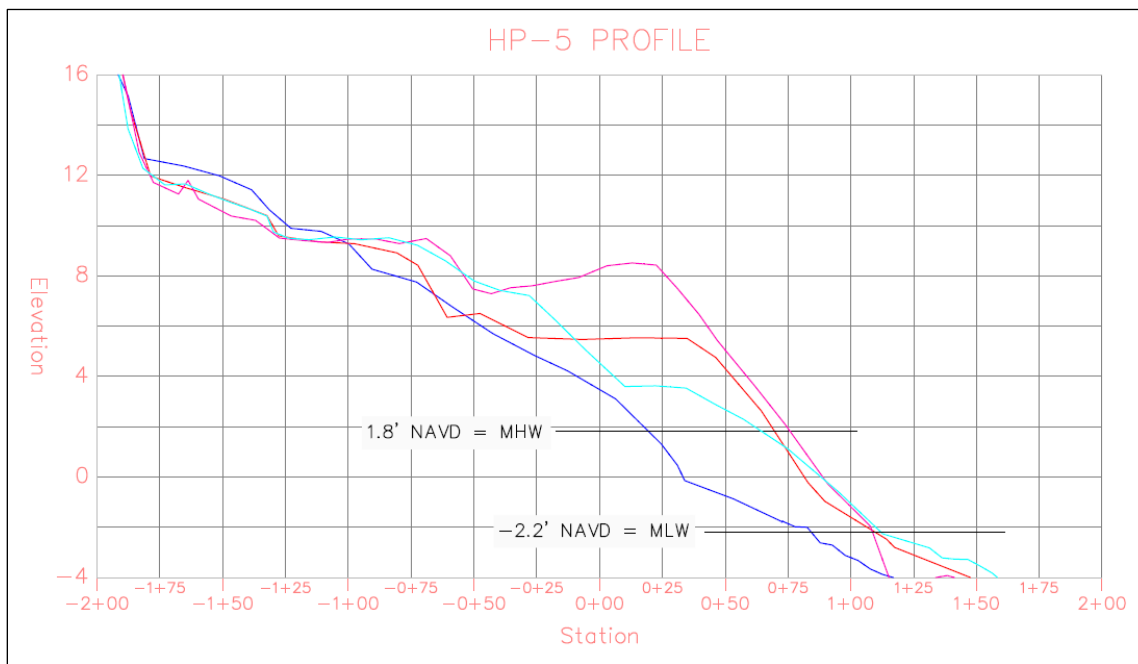


Figure 6B. Beach Profiles at Herring Point, LRP HP-5.

Pink: Summer 2022, Cyan: Winter 2023, Red: Summer 2023, Blue: Winter 2024.



Figure 6C. Herring Point (4/11/2024, 9:40) approaching 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).

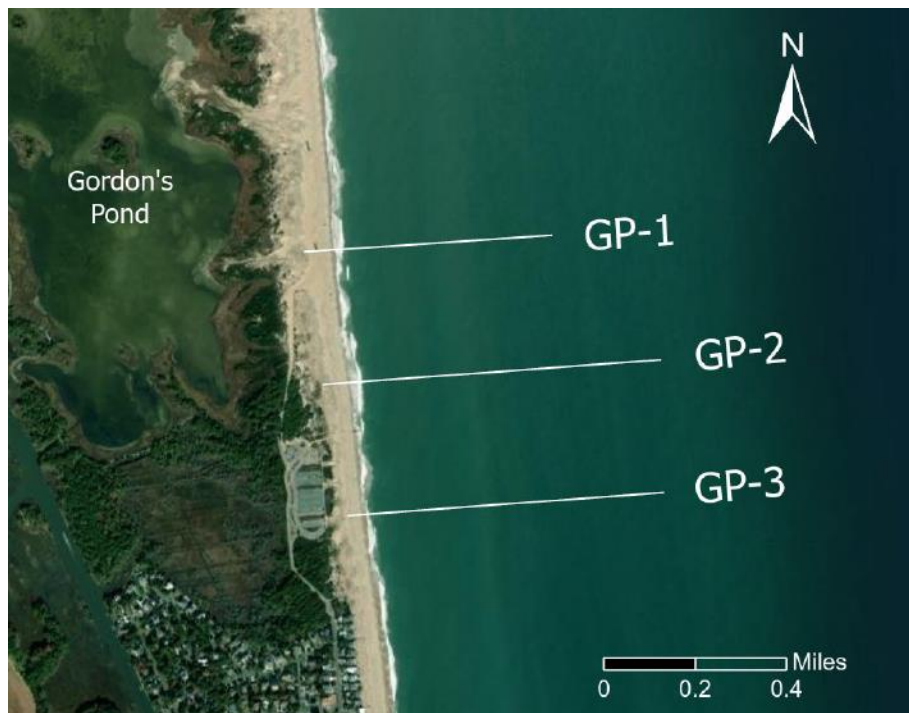


Figure 7A. LRP lines at Gordon's Pond

The average beach volumes determined for Gordon's Pond are shown in Table 7. LRP lines demonstrate a similar pattern of erosion and accretion during the 2023-2024 seasons. Volume losses were measured in Winter 2023 and Summer 2023, followed by accretion in Winter 2024. This seasonal shift was recorded at LRP line GP-1 and demonstrated in Figure 7B. TS Ophelia impacted Delaware's ocean coast in September 2023, prior to the Summer 2023 survey; therefore, the erosive effects of the storm are captured in the data as LRP lines GP-1 and GP-3 continued to lose volume through Summer 2023. Accretion measured during Winter 2024 likely represents some of the material that had eroded the previous season.

Conversely, LRP line GP-2, located just north of the north jetty, showed minimal volume change in Summer 2023. Since the jetty helps trap sand in this area, the overall changes in beach volume are reduced compared to LRP lines GP-1 and GP-3. Figure 7C shows an aerial view of Gordon's Pond beach. The northern jetty is visible, and the WWII Observation Towers are shown in the background.

South of Cape Henlopen State Park is the unincorporated community of North Shores, which includes approximately 2,200 feet of private beach. Survey data is not collected in this section of coastline.



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 2022	9/19/2022	1357	2715	1708	2900	1080	2038
Winter 2023	3/7/2023	1217	2638	1522	2841	894	1901
Summer 2023	10/4/2023	1163	2446	1502	2842	788	1692
Winter 2024	3/14/2024	1255	2500	1418	2868	929	1864

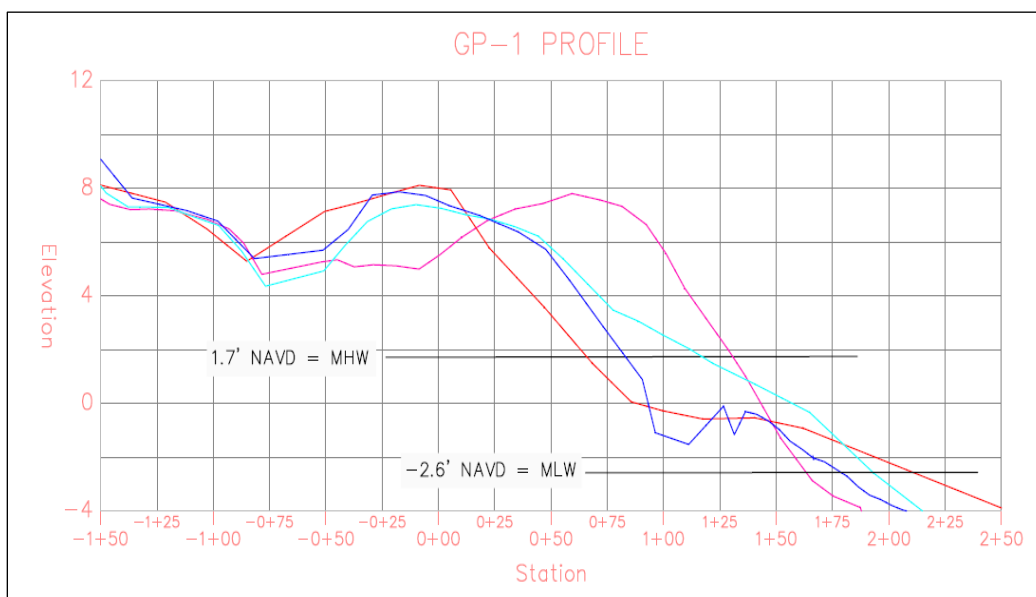


Figure 7B. Beach Profiles at Gordon's Pond, LRP GP-1.
Pink: Summer 2022, Cyan: Winter 2023, Red: Summer 2023, Blue: Winter 2024.



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



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). Rehoboth Beach is a densely developed incorporated town that accounts for over 9,200 feet of coastline that 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 jetties and four additional LRP lines within this stretch of shoreline (Figure 8A).



Figure 8A. LRP lines at Rehoboth Beach

The average beach volumes determined for Rehoboth Beach are shown in Table 8. All beach profiles show a similar seasonal pattern of erosion in Winter 2023 and accretion in Winter 2024; however, the Summer 2023 season differs due to periodic beach nourishment and impacts from TS Ophelia. As one of the federally authorized Delaware Coastal Storm Risk Management Projects described above, Rehoboth Beach was last nourished in May 2023. Therefore, LRP lines RB-2, RB-3, and RB-4 showed a net accretion in Summer 2023 despite the impacts of TS Ophelia, which were also captured in the data. The Summer 2023 profile



demonstrates how erosion of the upper dune washed sand down to the intertidal zone and offshore at LRP line RB-4 (Figure 8B).

Conversely, the Henlopen Acres (RB-1) and Silver Lake regions (RB-5) were not nourished during May 2023 and experienced significant erosion due to the tropical storm. The volume loss at LRP line RB-5 is considerable (Figure 8C) and demonstrates the importance of beach nourishment for reducing the effects of coastal storm erosion along Rehoboth Beach. The volume gain in Winter 2024 likely represents some of the sand that had eroded the previous summer. Figure 8D shows 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		RB-4		RB-5	
Volume Limit		MHW	MLW	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	cf/lf	cf/lf
Summer 2022	9/19/2022	1255	2284	1533	2682	686	1500	1691	2771	1764	2839
Winter 2023	3/7/2023	1185	2280	1484	2636	520	1320	1540	2649	1679	2821
Summer 2023	10/4/2023	1022	2017	1477	2665	543	1495	1493	2712	1403	2412
Winter 2024	3/14/2024	1177	2273	1631	3007	807	1848	1689	2903	1621	2720

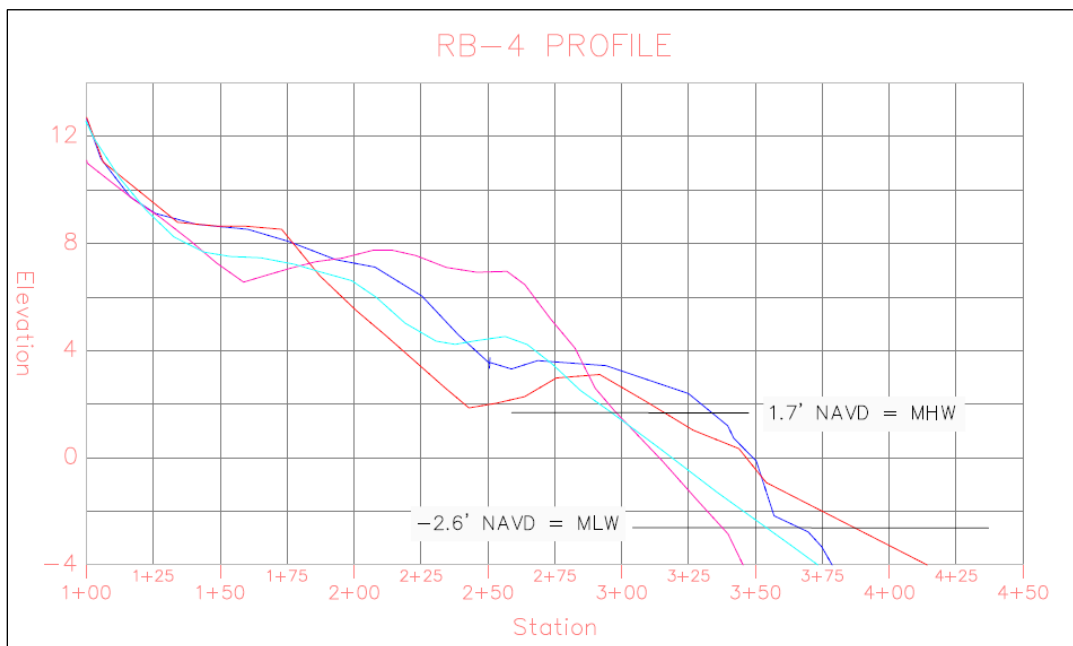


Figure 8B. Beach Profiles at Rehoboth Beach, LRP RB-4
Pink: Summer 2022, Cyan: Winter 2023, Red: Summer 2023, Blue: Winter 2024.

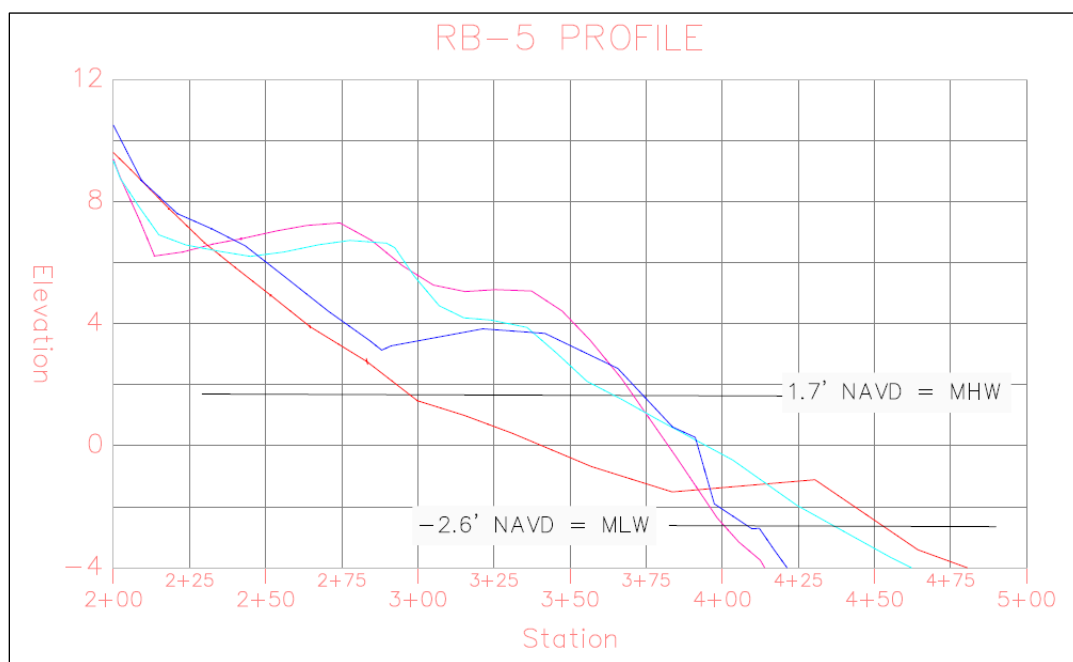


Figure 8C. Beach Profiles at Rehoboth Beach, LRP RB-5.
Pink: Summer 2022, Cyan: Winter 2023, Red: Summer 2023, Blue: Winter 2024.

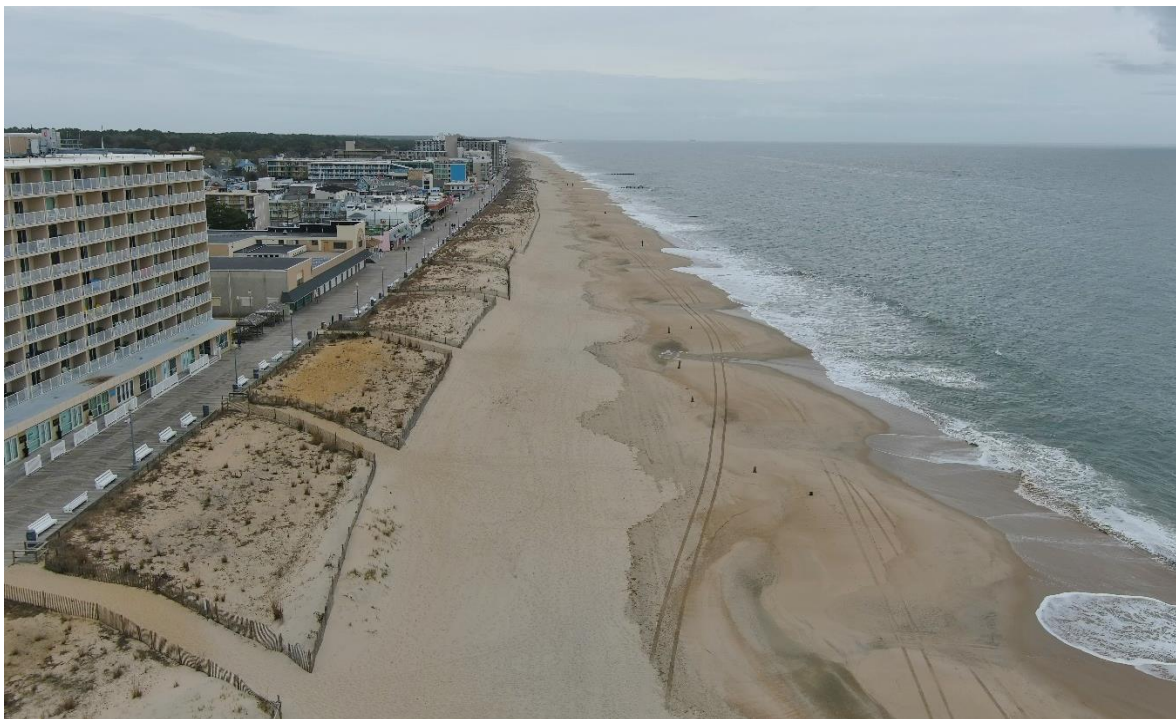


Figure 8D. Rehoboth Beach (4/11/2024, 10:03) approaching high tide, looking north

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 part of the federally authorized Delaware Coastal Storm Risk Management Projects described above and was last nourished in May 2023. Net accretion was measured in Summer 2023 as nourishment offset the volume lost due to TS Ophelia. Figure 9B suggests renourished material from the upper dune washed down to the intertidal zone, where accretion is observed. The increased volume measured in Winter 2024 likely represents some fraction of material that had eroded the prior season. 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 2022	9/19/2022	1531	2522
Winter 2023	3/7/2023	1365	2381
Summer 2023	10/4/2023	1330	2422
Winter 2024	3/14/2024	1508	2643

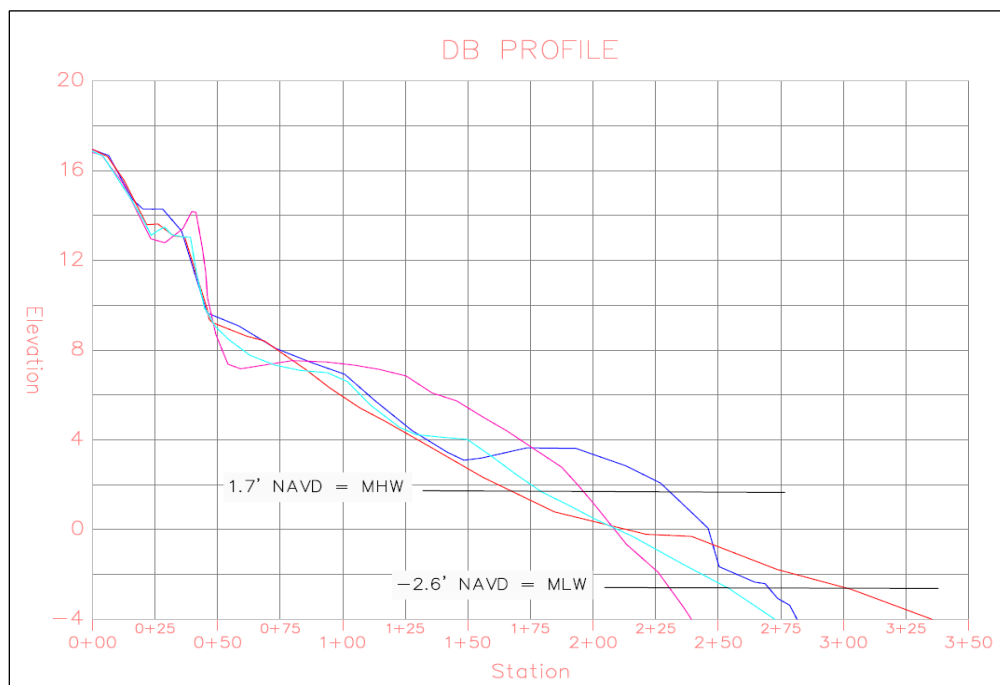


Figure 9B. Beach Profiles at Dewey Beach.

Pink: Summer 2022, Cyan: Winter 2023, Red: Summer 2023, Blue: Winter 2024

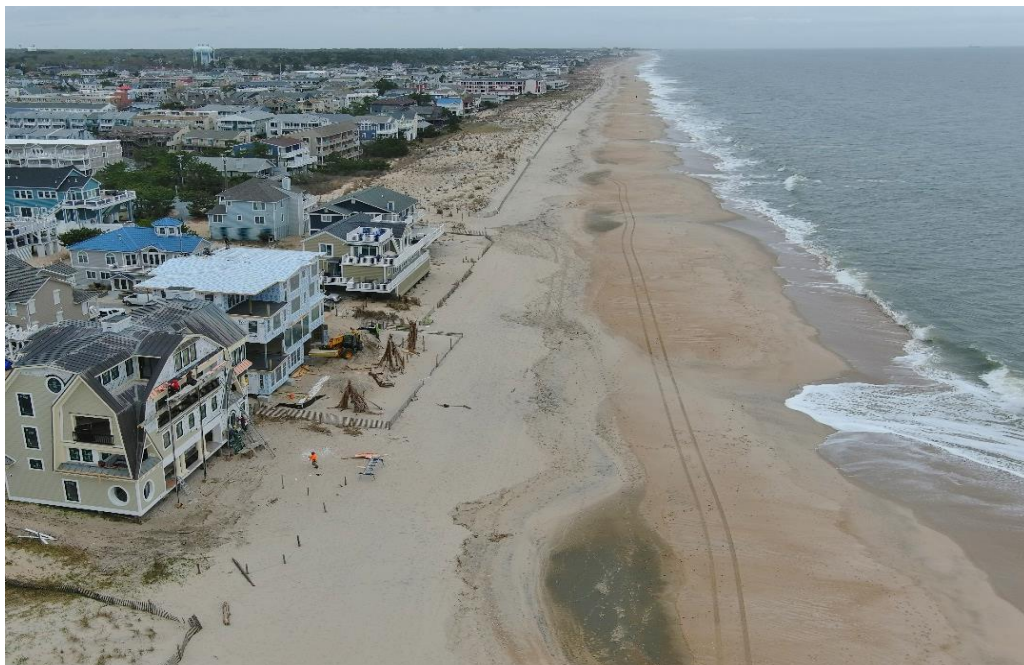


Figure 9C. Dewey Beach (4/11/2024, 10:17) approaching high tide, looking north



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.

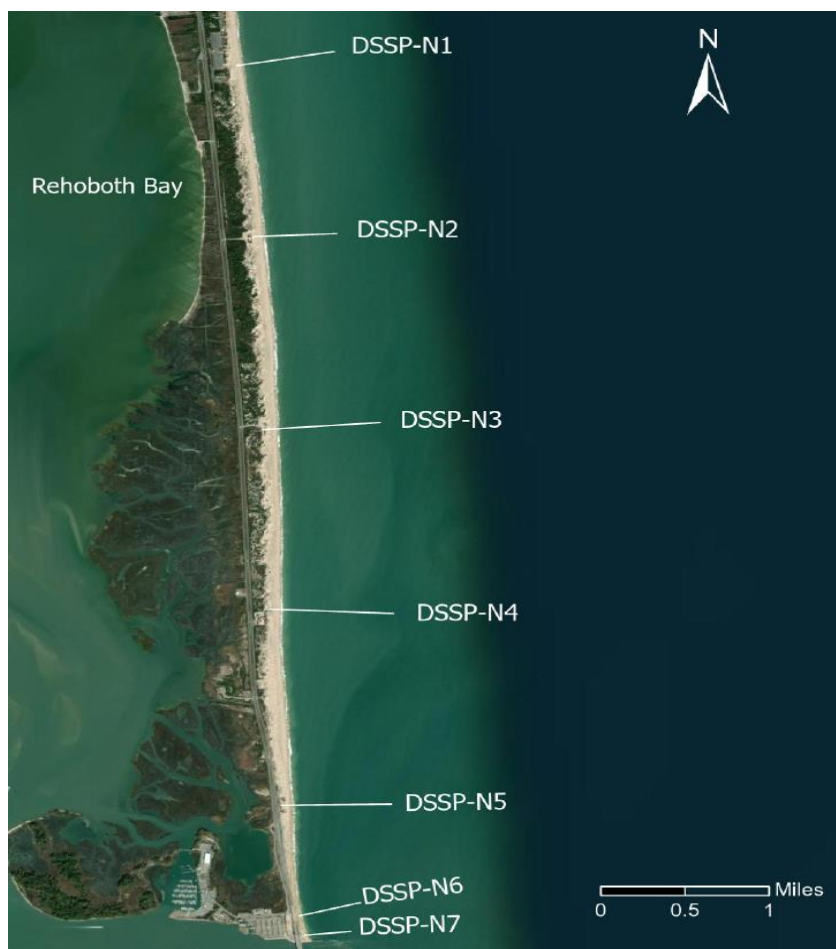


Figure 10A. LRP lines at Delaware Seashore State Park - North

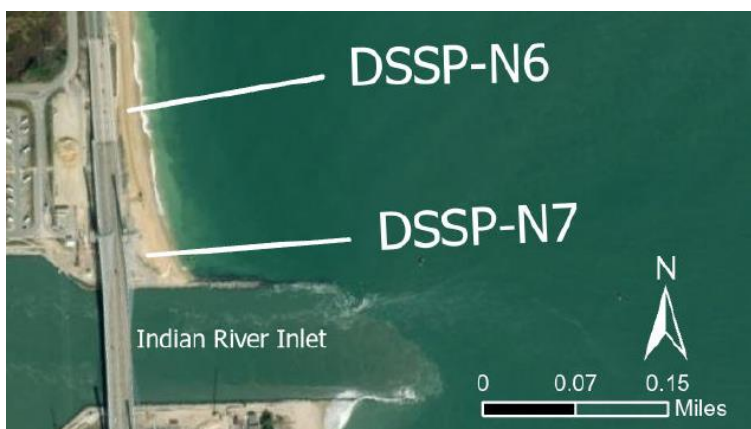


Figure 10B. LRP lines north of Indian River Inlet

The average beach volumes determined for Delaware Seashore State Park - North are shown in Table 10. Seasonal beach change along most of the coastline, specifically LRP lines DSSP-N1 through DSSP-N5, show similar erosion and accretion trends. The volume loss in Winter 2023, followed by additional volume loss in Summer 2023 reflects the expected seasonal change and the impacts of TS Ophelia, respectively. In Winter 2024, accreted material likely includes some of the sand that had eroded the previous season. At LRP line DSSP-N2, Figure 10C demonstrates significant erosion and dune scarping in Summer 2023, and subsequent accretion of the upper and foredunes in Winter 2024.

The seasonal profiles near Indian River Inlet are typically erosional due the presence of the jetties as discussed above. While sand bypassing was the primary method for maintaining the northside beach, the facility became inoperable in 2019 and DNREC has since relied on truck-hauled sand from inland sources for repairs. Due to the erosive October 2022 storms, this shoreline was nourished in Fall 2022, and thus LRP lines DSSP-N6 and DSSP-N7 both gain volume in the Winter 2023 profile. However, Figure 10D suggests some of the nourished material had eroded from the upper dune and washed down to the intertidal zone, where you see most of the accreted volume. Drastic coastal erosion due to TS Ophelia is evident in the Summer 2023 profile as well as the continued volume loss through Winter 2024 (Figure 10D).

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 2022	9/19/2022	3204	4638	1620	2641	2500	3756	2872	4309
Winter 2023	3/7/2023	2952	4421	1528	2601	2392	3710	2820	4310
Summer 2023	10/4/2023	3037	4459	1311	2355	2366	3688	2645	4109
Winter 2024	3/14/2024	3375	4898	1657	2827	2454	3793	2929	4441



Table 10 Continued: Beach volume calculations for Delaware Seashore State Park – North							
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 2022	9/19/2022	1387	2242	1295	1913	932	1400
Winter 2023	3/7/2023	1322	2254	1234	2127	1205	2066
Summer 2023	10/4/2023	1039	1915	638	1198	574	1115
Winter 2024	3/14/2024	1226	2079	383	795	380	762

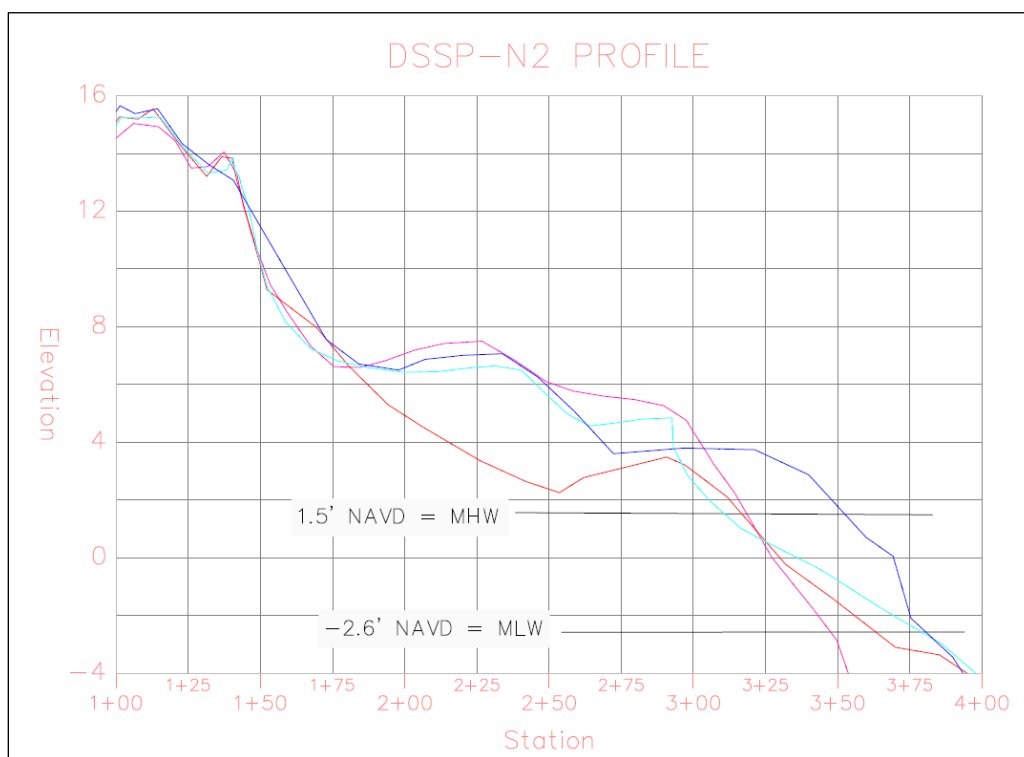


Figure 10C. Beach Profiles at Delaware Seashore State Park – North, LRP DSSP-N2
Pink: Summer 2022, Cyan: Winter 2023, Red: Summer 2023, Blue: Winter 2024.

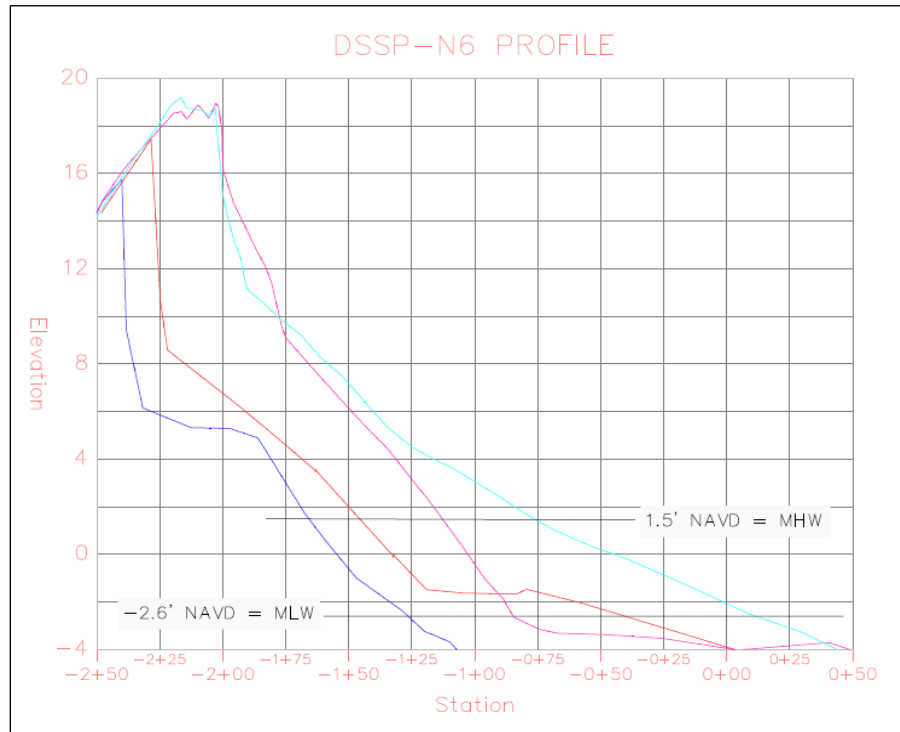


Figure 10D. Beach Profiles at Delaware Seashore State Park – North, LRP DSSP-N6
Pink: Summer 2022, Cyan: Winter 2023, Red: Summer 2023, Blue: Winter 2024.

Figure 10E shows an aerial view of the Delaware Seashore State Park - North coastline looking south toward Indian River Inlet at high tide.



Figure 10E. DE Seashore State Park - North (4/11/2024, 11:07) at high tide, looking south

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'R 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 survey data from south of Indian River Inlet was collected on 9/20/2023, prior to Tropical Storm Ophelia; therefore, impacts from the storm are not captured in the Summer 2023 profiles. Directly adjacent to the south jetty is LRP line DSSP-S1, which eroded considerably in Winter 2023 but recovered the volume lost in Summer 2023. Further accretion was measured in Winter 2024, and Figure 11B demonstrates the significant volume increase in the foredune compared to Summer 2023. Accreted sand had likely eroded the previous season due to TS Ophelia and subsequently became trapped by the south jetty. Overall, this area appears accretional since the Summer 2023 profiles contain more volume than Summer 2022, and similarly the Winter 2024 profiles contain more volume than Winter 2023.



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 2022	9/15/2022	1016	2022	2126	3342
Winter 2023	3/16/2023	909	1809	2164	3378
Summer 2023	9/20/2023	1111	2093	2350	3654
Winter 2024	3/13/2024	1109	2398	2425	3759

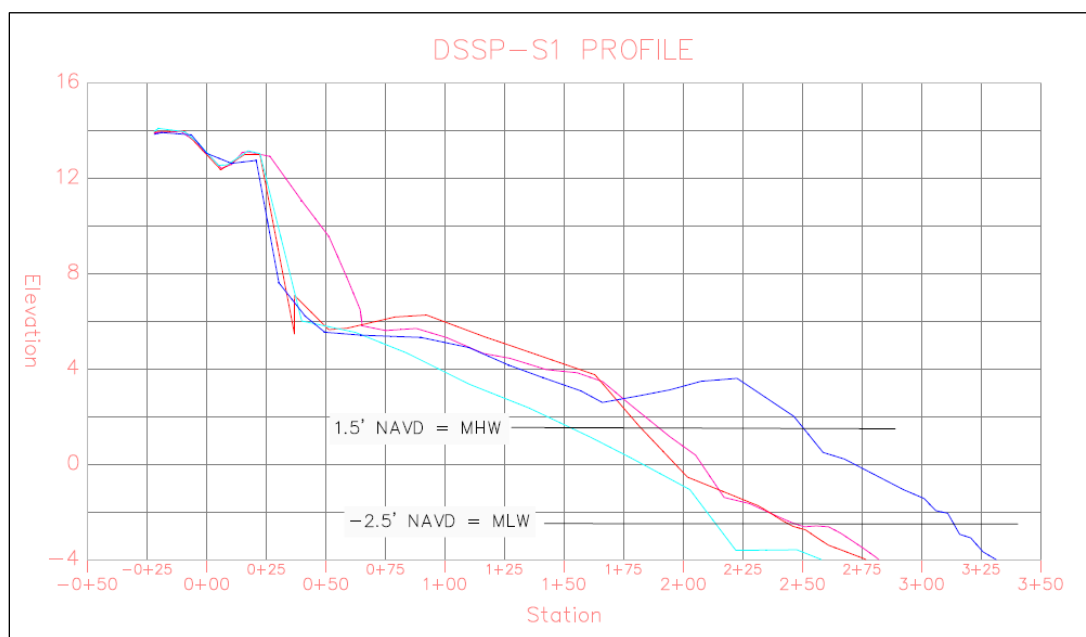


Figure 11B. Beach Profiles at Delaware Seashore State Park - South, LRP DSSP-S1.
Pink: Summer 2022, Cyan: Winter 2023, Red: Summer 2023, Blue: Winter 2024.

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 12C. 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).

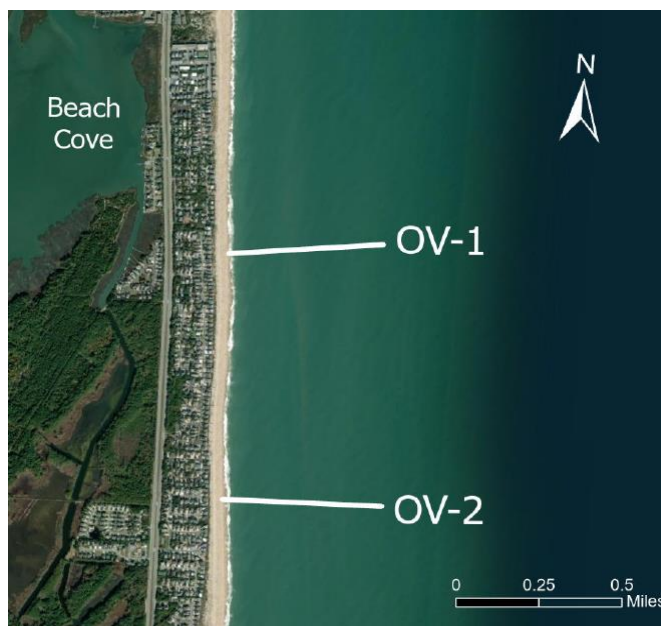


Figure 12A. LRP line at Oceanview Beach

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 2022	9/15/2022	1291	2222	1362	2303
Winter 2023	3/16/2023	1326	2244	1382	2338
Summer 2023	9/20/2023	1471	2428	1473	2531
Winter 2024	3/13/2024	1226	2079	1369	2404

The average beach volumes determined for Oceanview are shown in Table 12. Overall, beach change appears to be accretional in this area since the Summer 2023 surveys contains more volume than Summer 2022, and similarly the Winter 2024 surveys contain more volume than Winter 2023. However, erosion between the Summer 2023 and Winter



2024 seasons is observed at both LRP lines. In Figure 12B, the Winter 2024 profile shows upper dune face scarping and erosion of sand to the intertidal zone. Figure 12C shows an aerial view of Oceanview at high tide looking north.

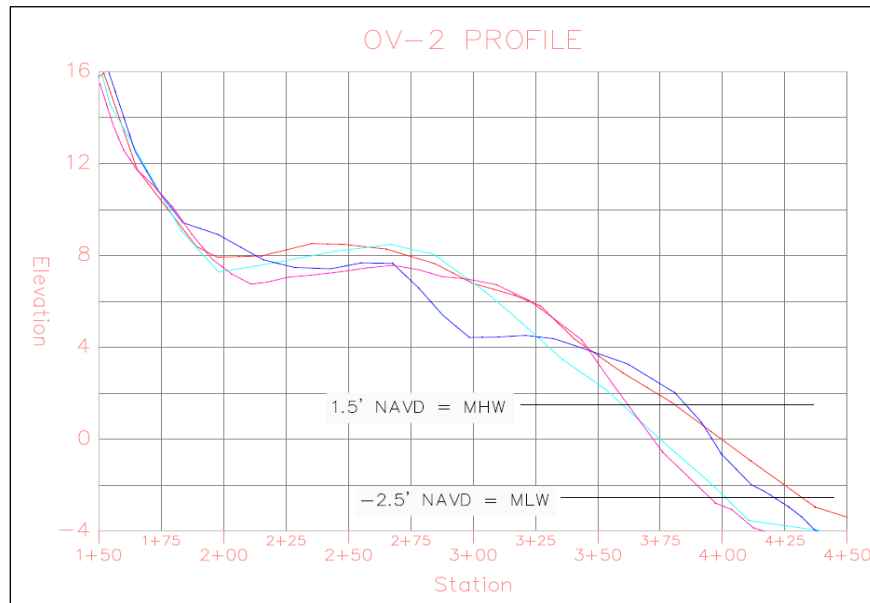


Figure 12B. Beach Profiles at Oceanview, LRP OV-2.

Pink: Summer 2022, Cyan: Winter 2023, Red: Summer 2023, Blue: Winter 2024.

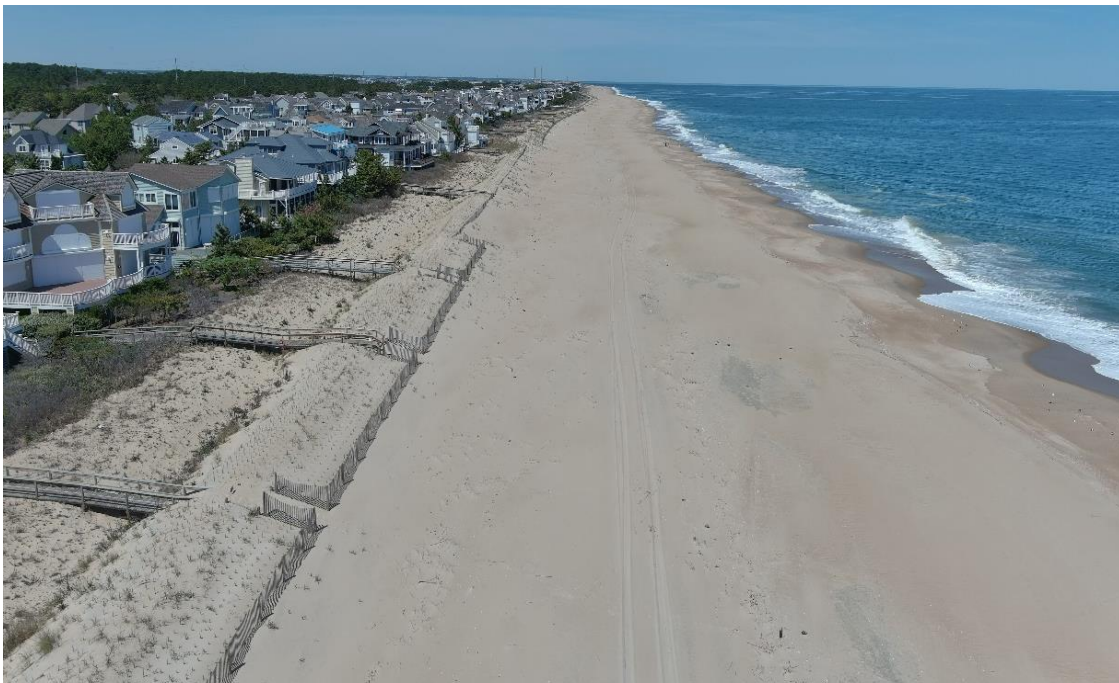


Figure 12C. Aerial view of Oceanview (4/16/2024, 13:56) at high tide, looking north



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).

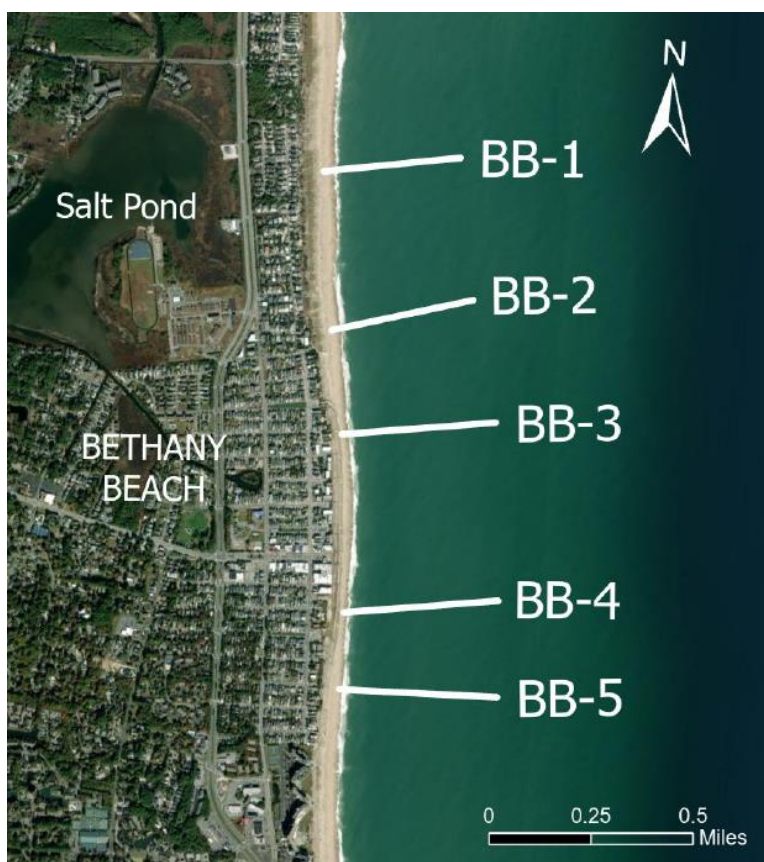


Figure 13A. LRP lines at Bethany Beach

The average beach volumes determined for Bethany Beach are shown in Table 13. As one of the federally authorized Delaware Coastal Storm Risk Management Projects described above, Bethany Beach was last nourished in July 2023. Therefore, significant accretion is captured in the Summer 2023 profiles for LRP lines BB-2 through BB-5. Overall, Bethany Beach demonstrates the expected seasonal trends of erosion between summer and winter followed by recovery between the winter and summer profiles. Periodic nourishment helped to maintain these seasonal patterns, especially following the erosive effects of TS Ophelia. In Figure 13B, the Winter 2024 profile captures the impacts of the coastal storm and shows that much of the nourished material had eroded offshore.



Table 13: Beach volume calculations for Bethany Beach

LRP		BB-1		BB-2		BB-3		BB-4		BB-5	
Volume Limit		MHW	MLW	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	cf/lf	cf/lf
Summer 2022	9/15/2022	2821	4247	2156	3524	1031	1844	1000	1751	1846	2922
Winter 2023	3/16/2023	2715	4144	2156	3492	845	1622	837	1567	1765	2840
Summer 2023	9/20/2023	2901	4354	2398	3908	1491	2544	1589	2645	2051	3330
Winter 2024	3/13/2024	2661	4104	2109	3530	980	1878	984	1844	1749	3023

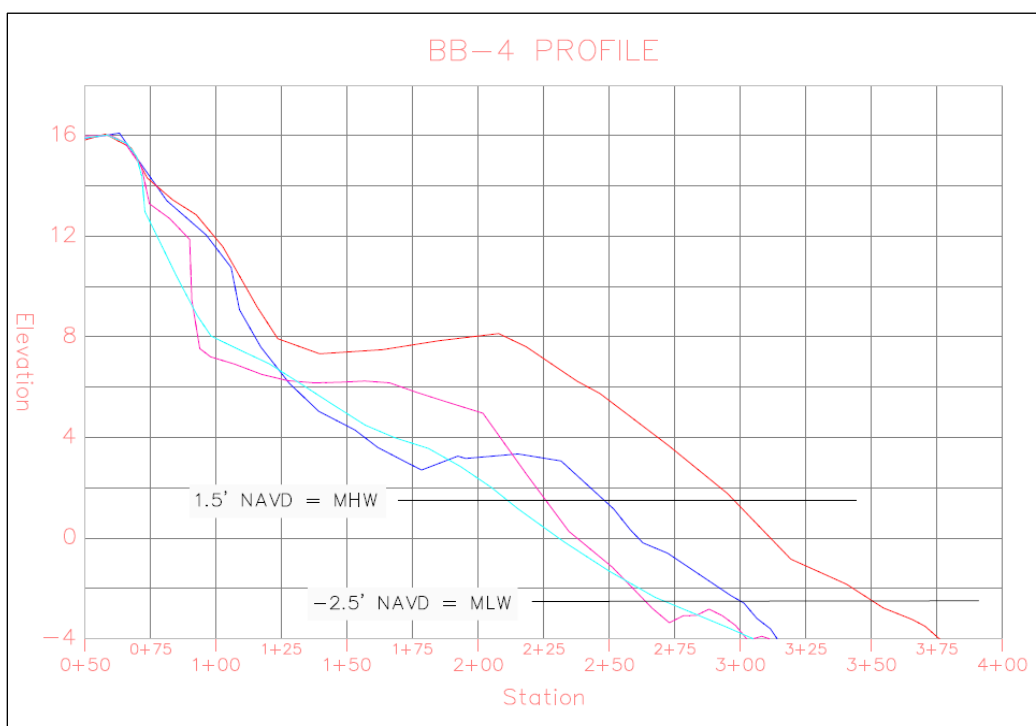


Figure 13B. Beach Profiles at Bethany Beach, LRP BB-4.

Pink: Summer 2022, Cyan: Winter 2023, Red: Summer 2023, Blue: Winter 2024.

Figure 13C shows an aerial view of the town of Bethany Beach looking north while approaching high tide. One of the main beach crossovers and the Bethany Beach Boardwalk are visible in the photo.



Figure 13C. Bethany Beach (4/16/2024, 13:38) approaching 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 Risk Management Projects described above, South Bethany was last nourished in July 2023. Beach profiles demonstrate the typical seasonal trends with volume loss during fall/winter followed by volume recovery during the summer months. Figure 14B clearly shows accretion of the Summer 2023 nourished profile, followed by a severely eroded Winter 2024 profile that reflects the impacts of TS Ophelia on the shoreline.

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 2022	9/15/2022	2267	3620	1494	2401
Winter 2023	3/16/2023	2129	3531	1347	2253
Summer 2023	9/20/2023	2530	4085	2195	3386
Winter 2024	3/13/2024	2278	3733	1500	2456



Figure 14B. Beach Profiles at South Bethan Beach, LRP SBB-2.

Pink: Summer 2022, Cyan: Winter 2023, Red: Summer 2023, Blue: Winter 2024.



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

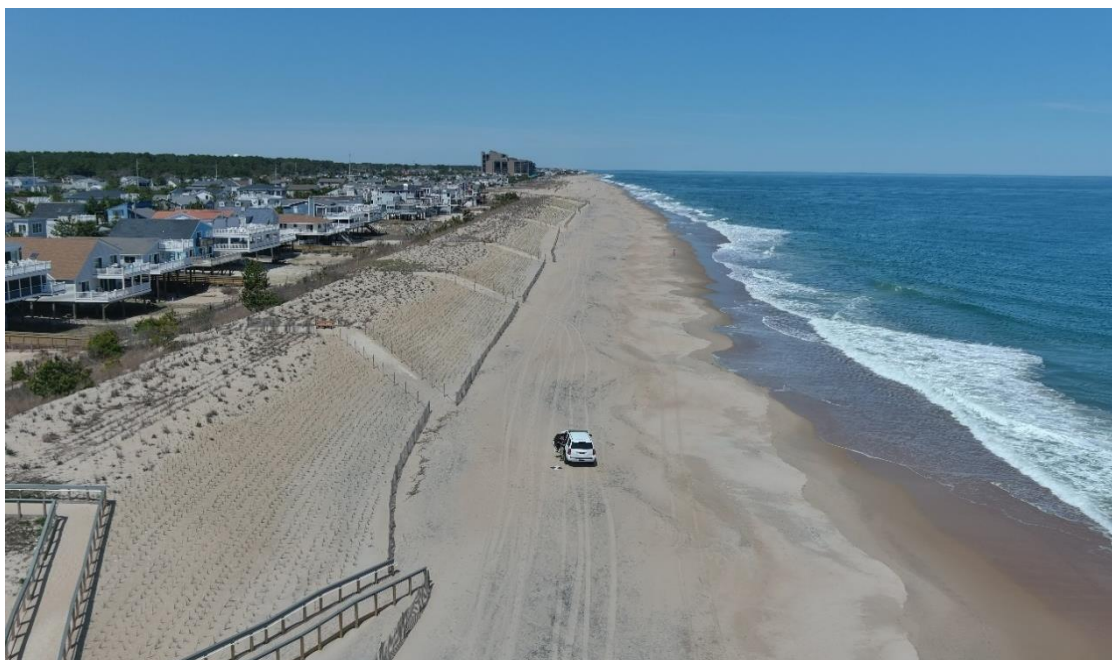


Figure 14C. South Bethany Beach (4/16/2024, 13:27) approaching high tide, looking north



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).

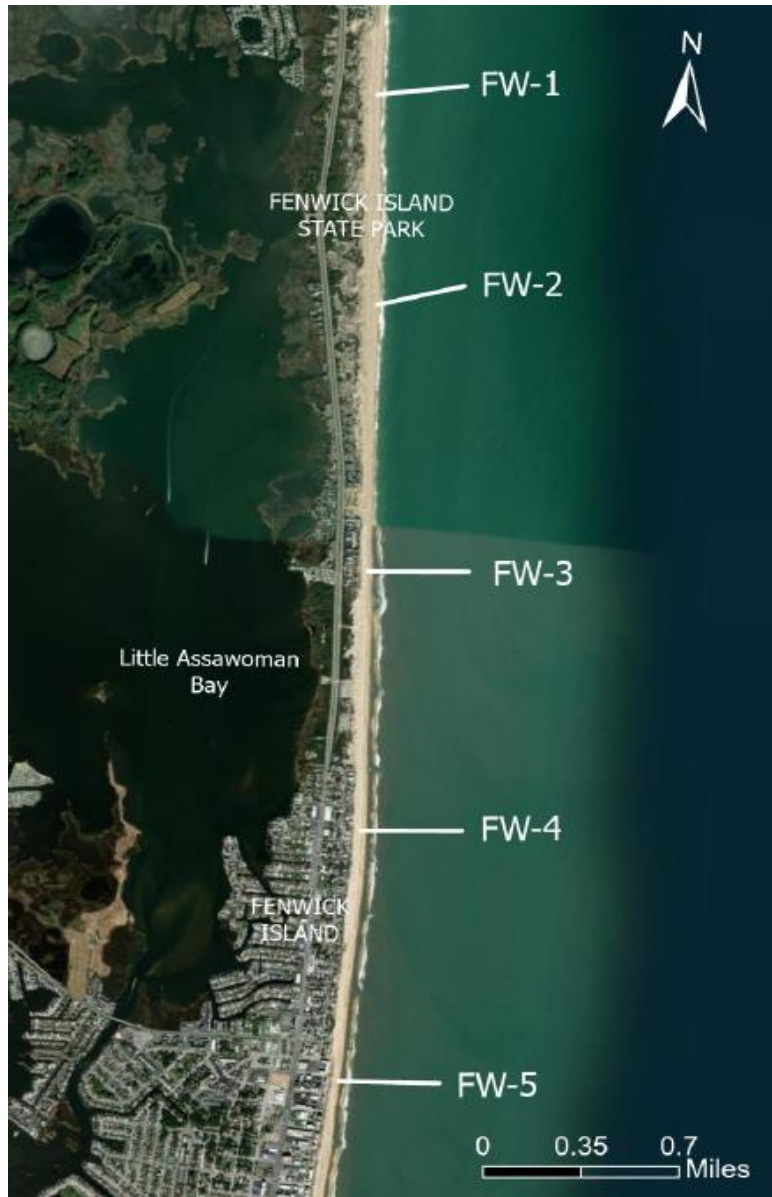


Figure 15A. LRP lines at Fenwick Island

The average beach volumes determined for Fenwick Island are shown in Table 15. Fenwick Island beaches show accretion from Summer 2022 through Summer 2023. This is the case for all profiles except the southernmost LRP line, FW-5, which eroded during Winter 2023 but recovered volume in Summer 2023. Accretion measured in Summer 2023, particularly

along the public beaches, is due to periodic nourishment that completed in June 2023 as part of the federally authorized Delaware Coastal Storm Risk Management Projects described above. Substantial volume loss in Winter 2024 was likely caused by the erosive effects of TS Ophelia; however, the central Fenwick Island coast was the only area to accrete volume during this time.

Table 15: Beach volume calculations for Fenwick Island

LRP		FW-1		FW-2		FW-3		FW-4		FW-5	
Volume Limit		MHW	MLW	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	cf/lf	cf/lf
Summer 2022	9/15/22	2745	4188	2200	3632	1830	2884	1763	2815	888	1631
Winter 2023	3/16/23	2700	4238	2437	4073	1919	3046	1893	3020	815	1559
Summer 2023	9/20/23	2995	4668	2678	4224	1954	3059	2429	3727	1011	1790
Winter 2024	3/13/24	2884	4547	2381	3997	2089	3308	2018	3310	736	1413

Figure 15C demonstrates seasonal beach change for the central coast of Fenwick Island State Park (FW-2). The Summer 2023 profile is greater in elevation near the dune but lower in elevation toward the shoreline compared to Winter 2023. However, the Winter 2024 profile captures the impacts from TS Ophelia with significant erosion of the dune and accretion towards the shoreline.

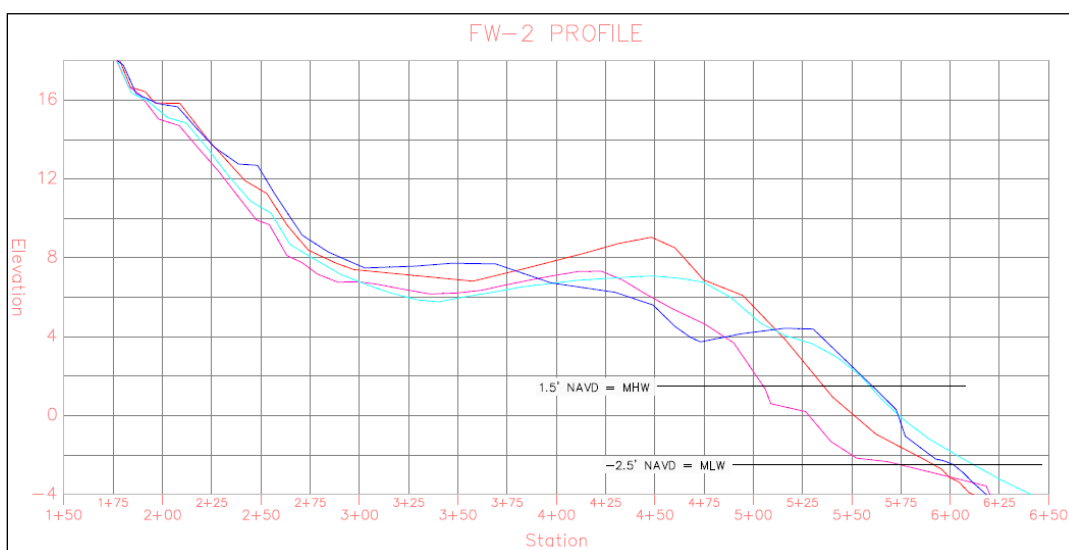


Figure 15C. Beach Profiles at Fenwick Island, LRP FW-2.

Pink: Summer 2022, Cyan: Winter 2023, Red: Summer 2023, Blue: Winter 2024.



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.



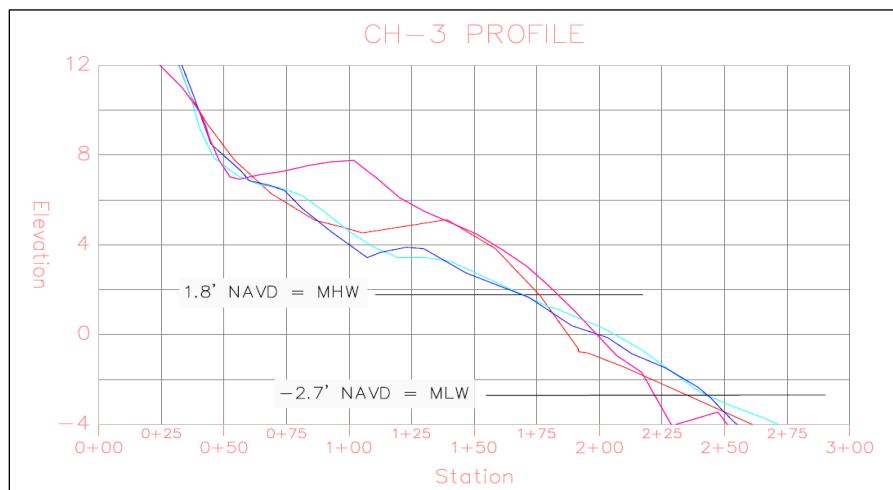
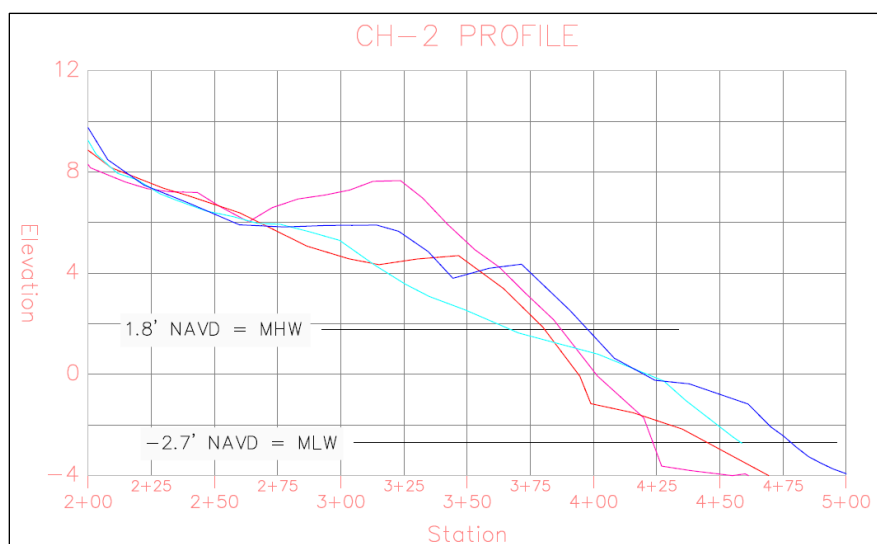
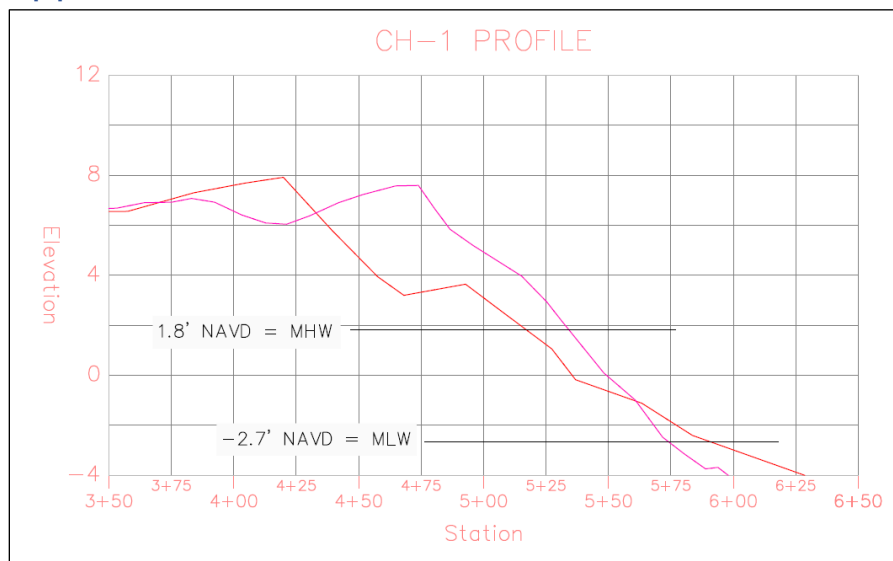
Figure 15C. Fenwick Island State Park (4/16/24, 13:14) approaching high tide, looking north.

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Appendix 1: Ocean Coast Profile Views



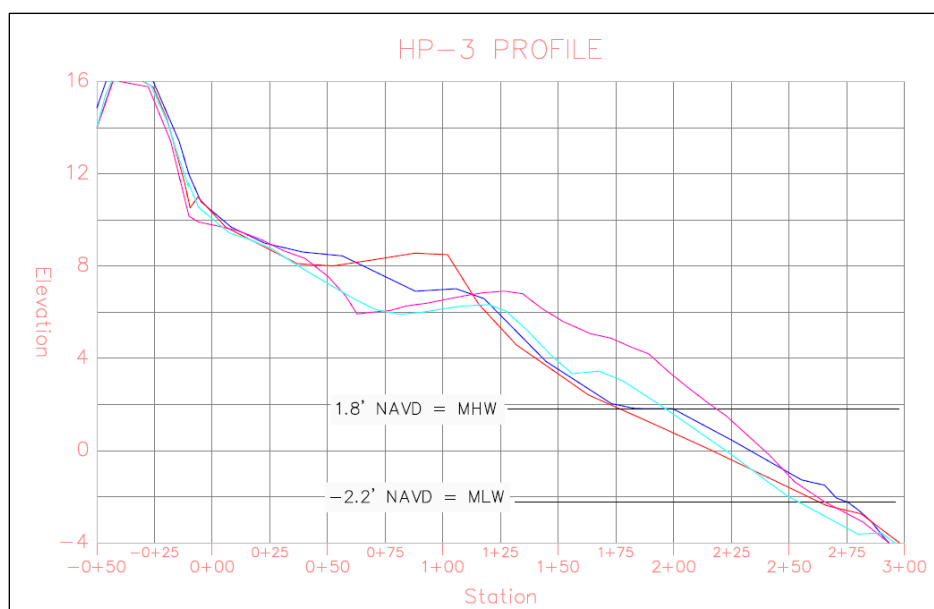
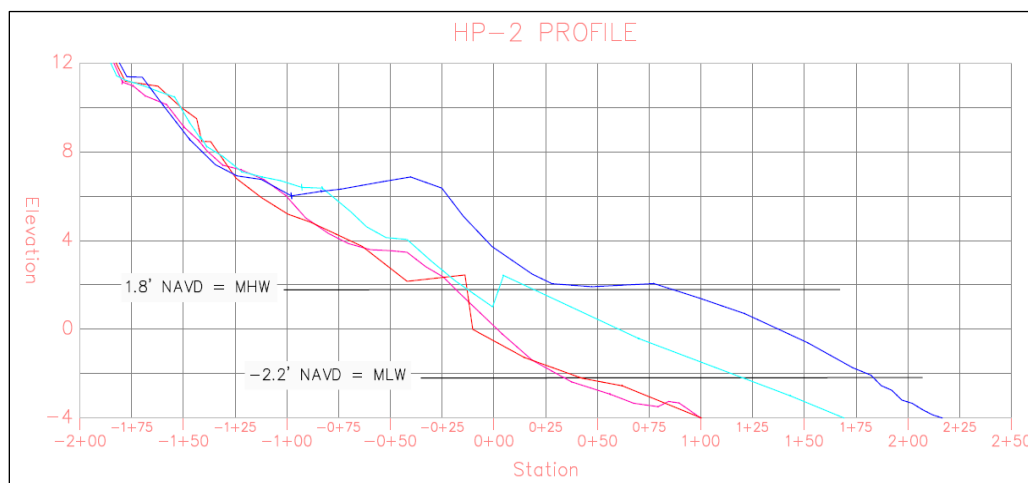
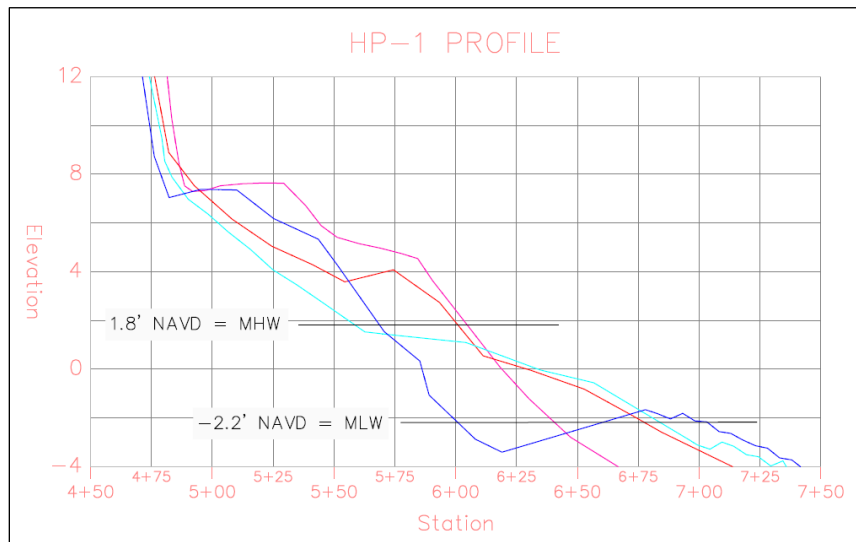
LEGEND

Pink: Summer 2022

Cyan: Winter 2023

Red: Summer 2023

Blue: Winter 2024



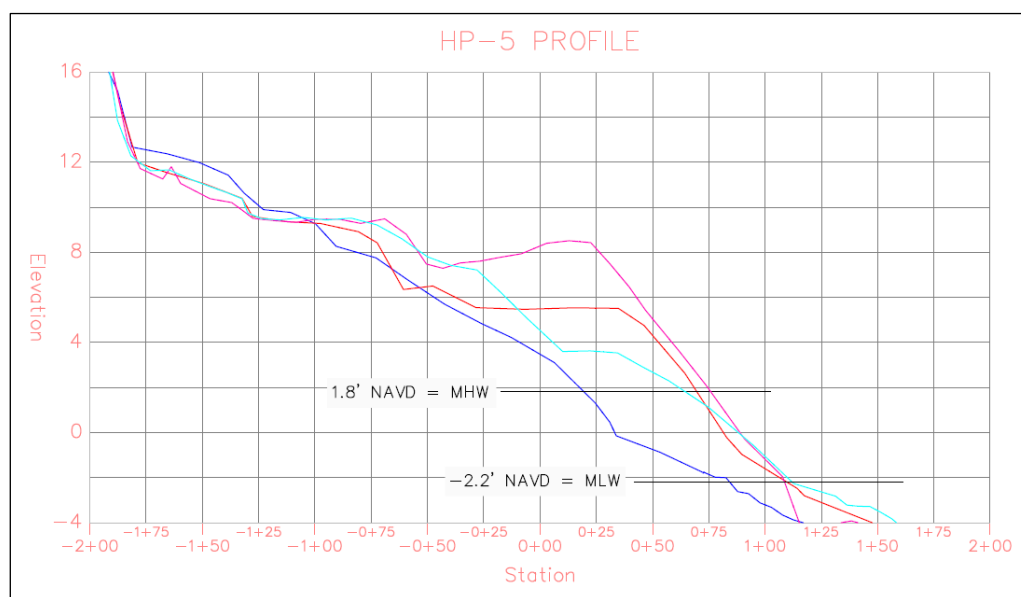
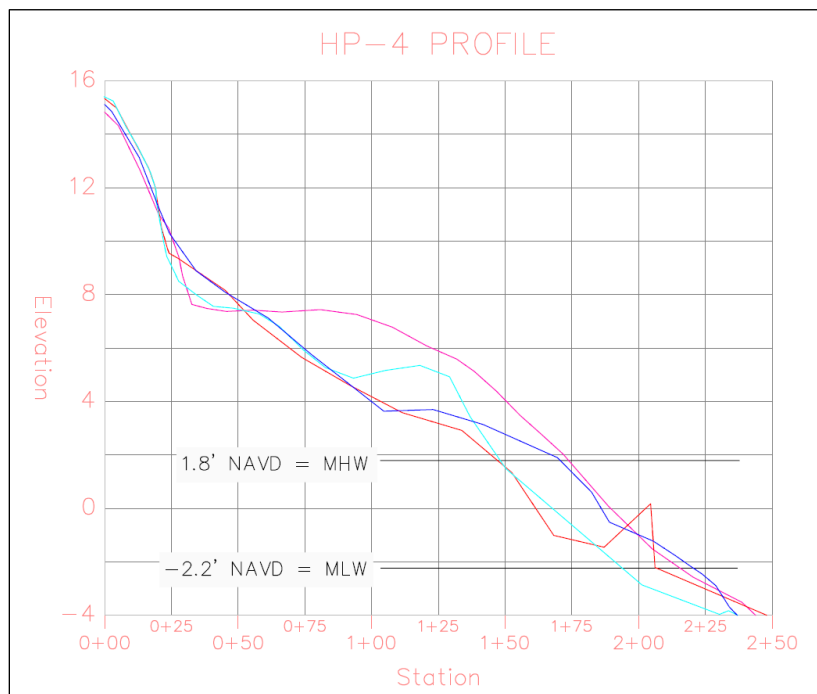
LEGEND

Pink: Summer 2022

Cyan: Winter 2023

Red: Summer 2023

Blue: Winter 2024



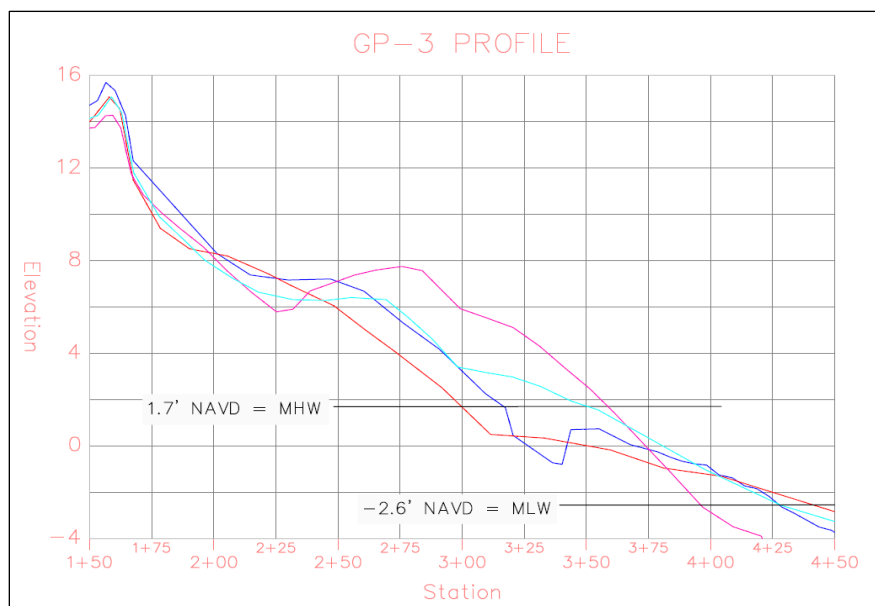
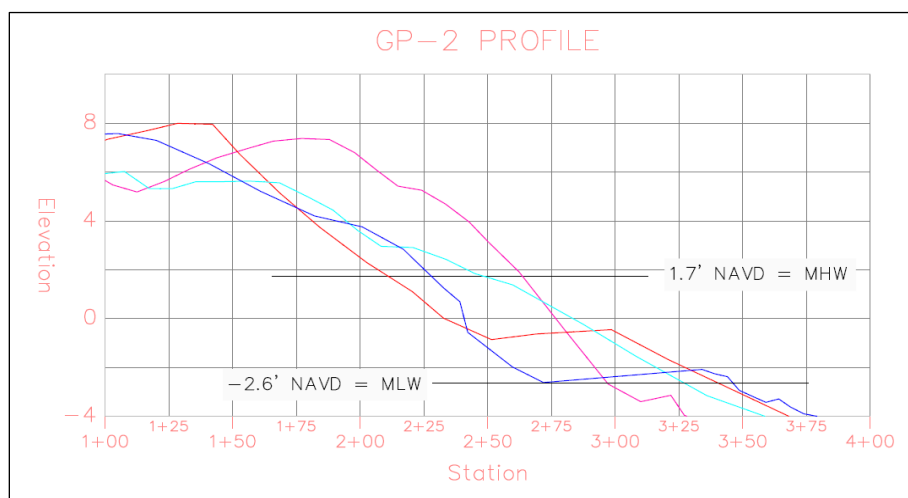
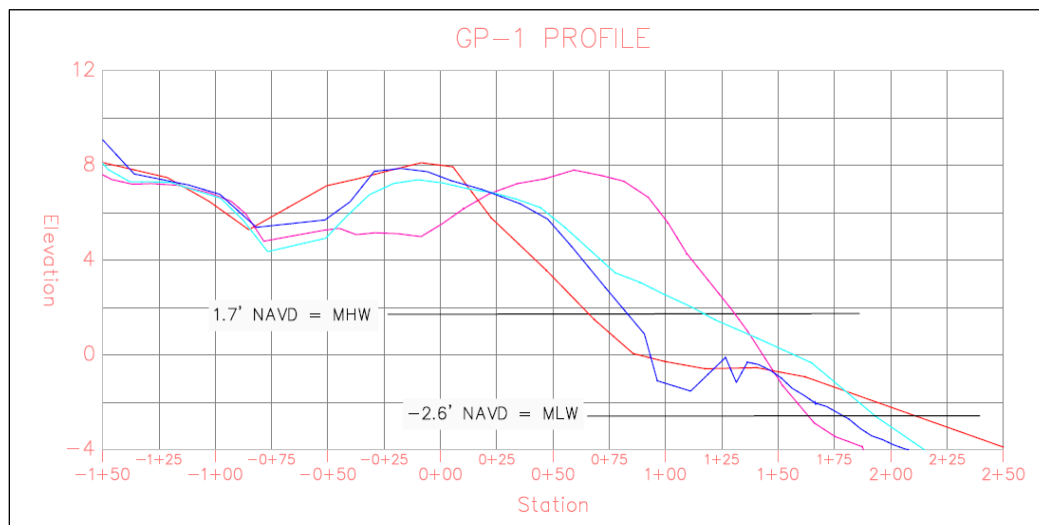
LEGEND

Pink: Summer 2022

Cyan: Winter 2023

Red: Summer 2023

Blue: Winter 2024



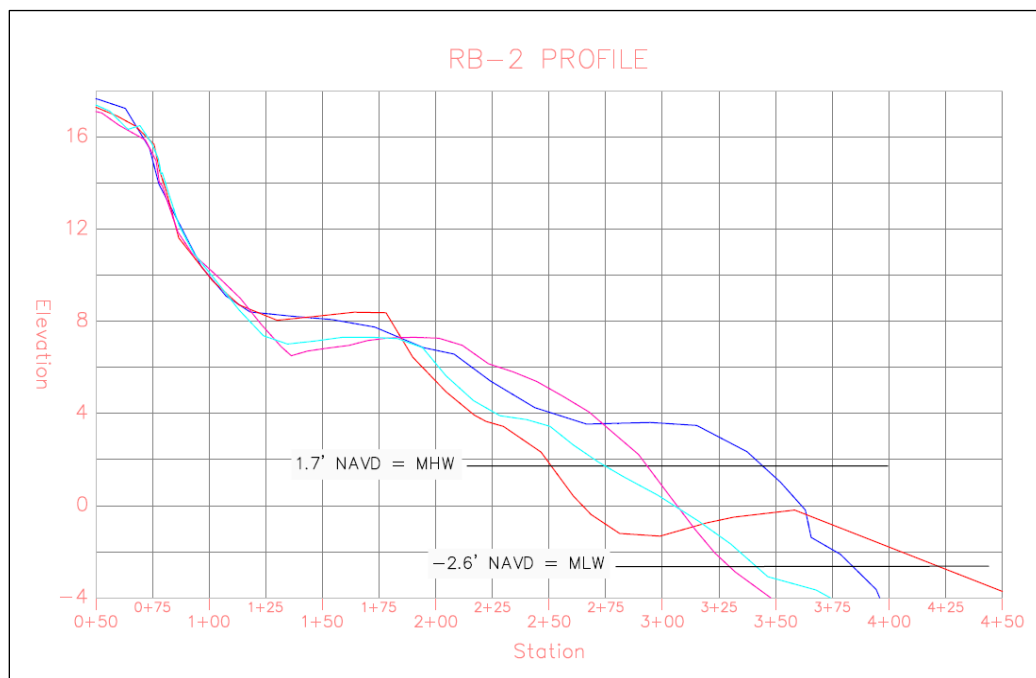
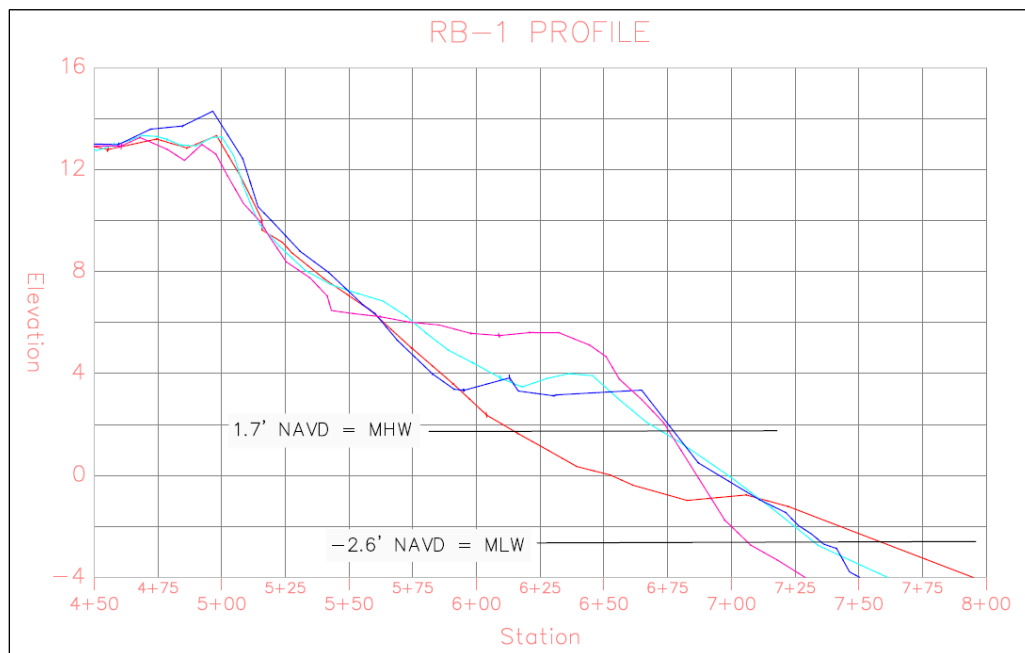
LEGEND

Pink: Summer 2022

Cyan: Winter 2023

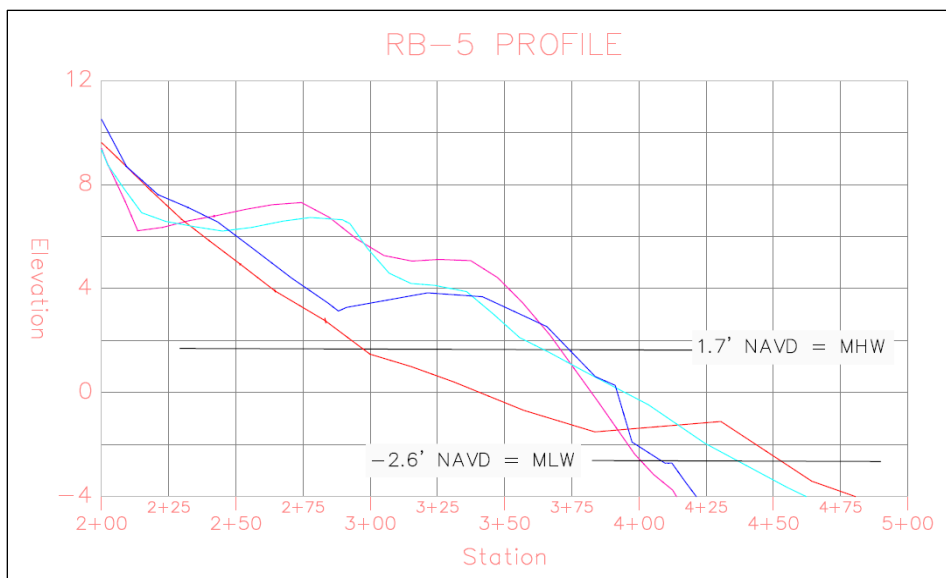
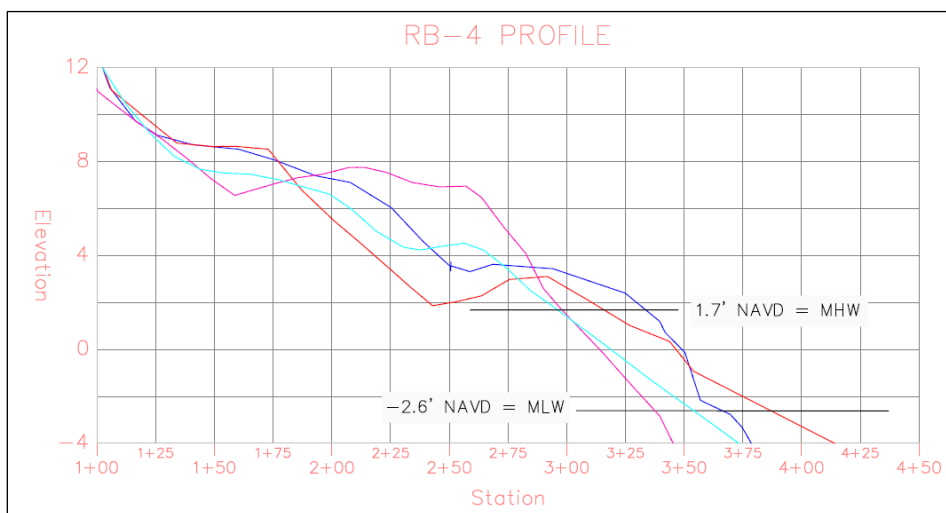
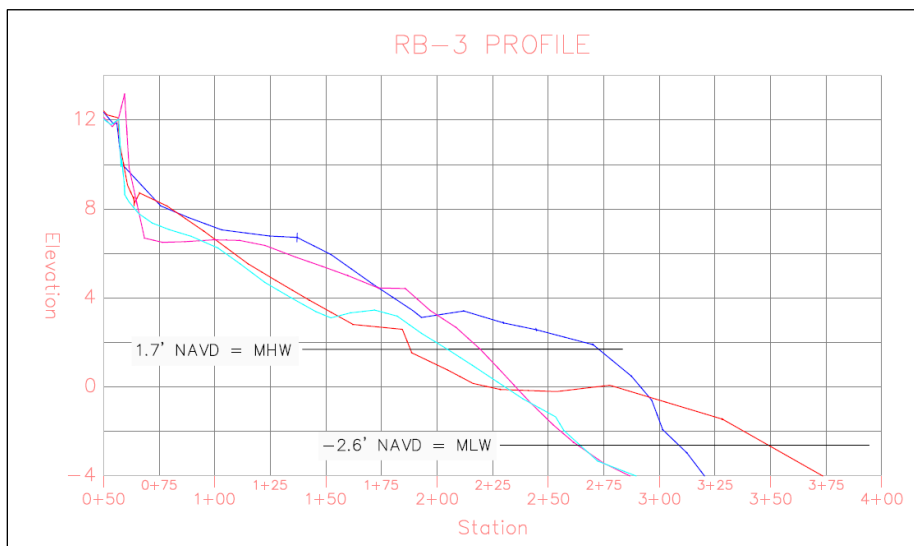
Red: Summer 2023

Blue: Winter 2024



LEGEND

Pink: Summer 2022
Cyan: Winter 2023
Red: Summer 2023
Blue: Winter 2024



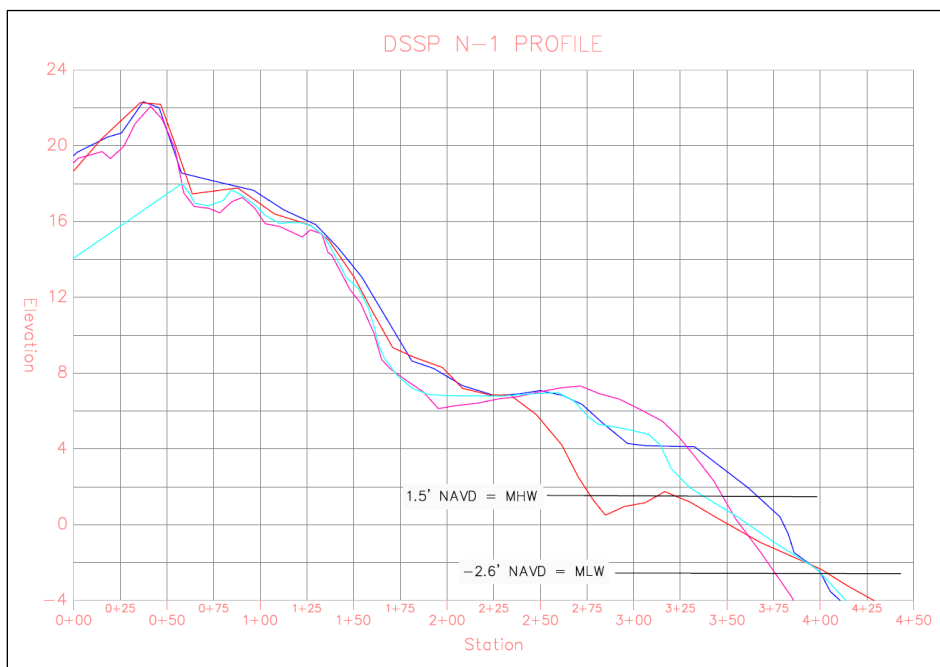
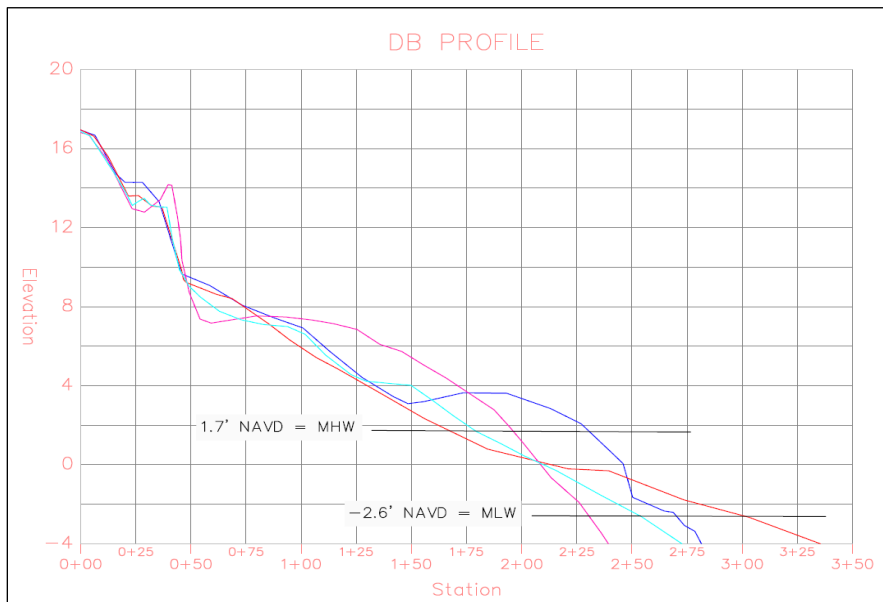
LEGEND

Pink: Summer 2022

Cyan: Winter 2023

Red: Summer 2023

Blue: Winter 2024



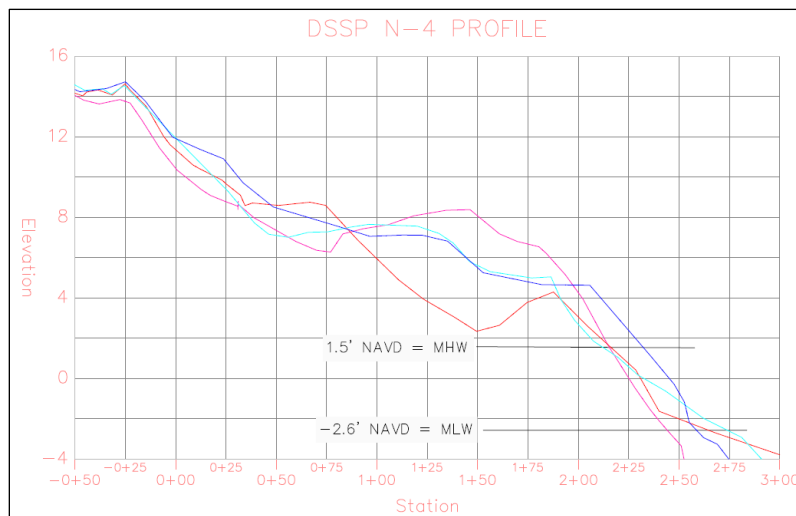
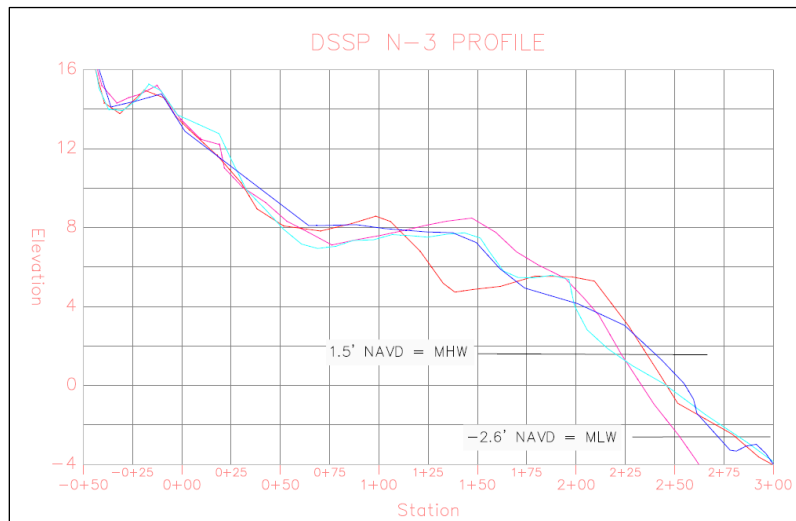
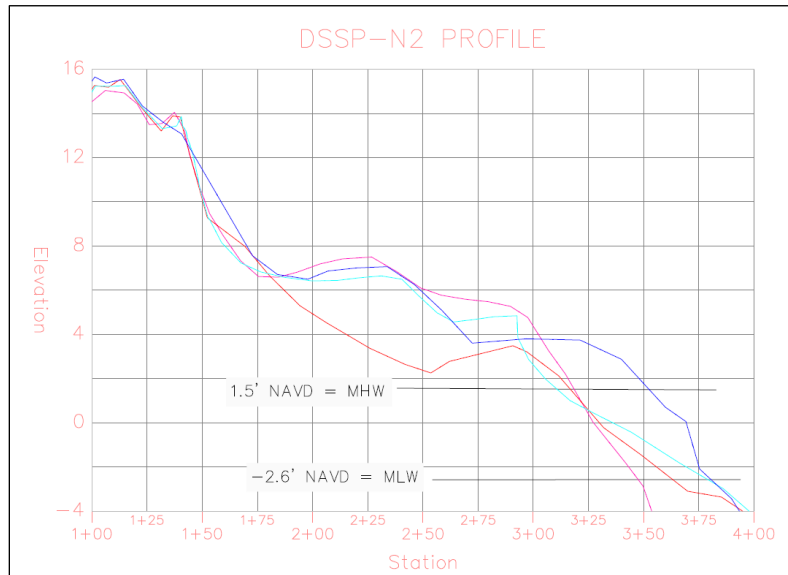
LEGEND

Pink: Summer 2022

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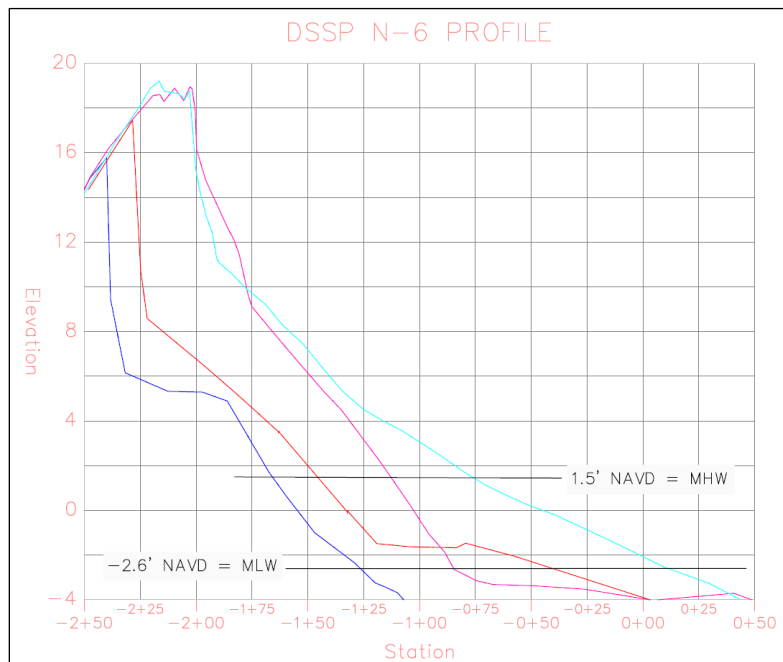
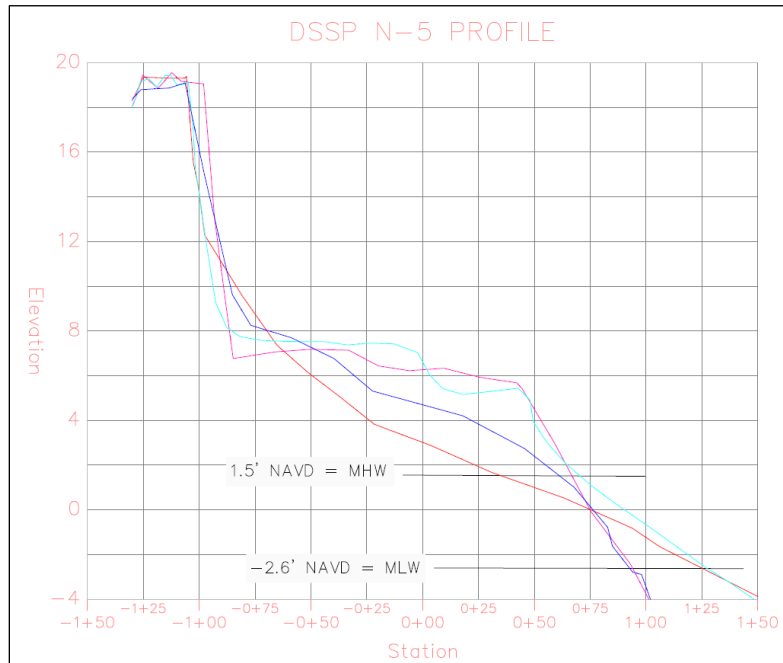
LEGEND

Pink: Summer 2022

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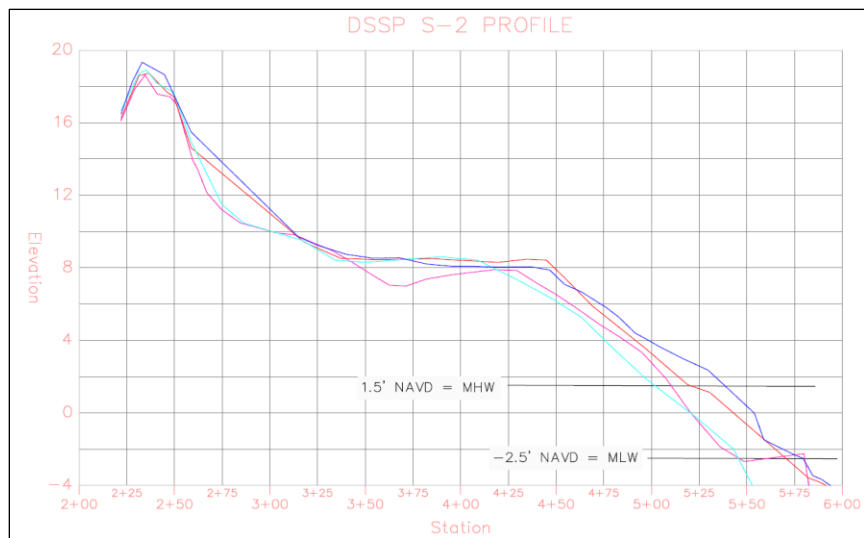
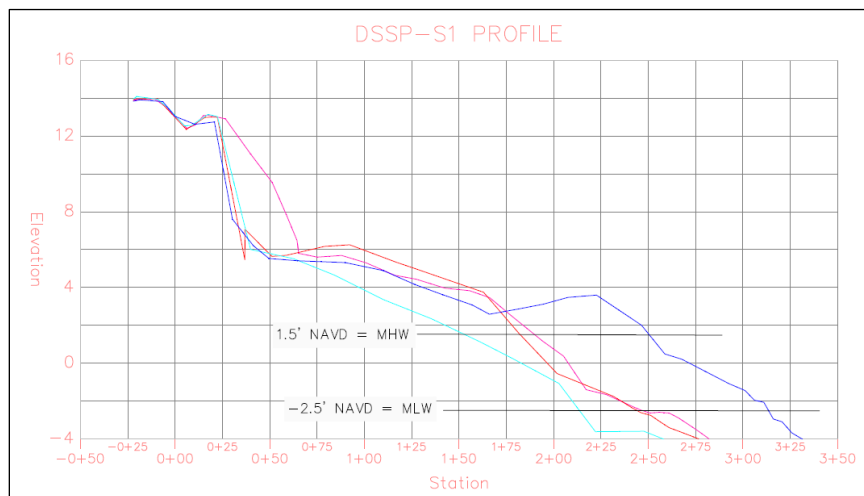
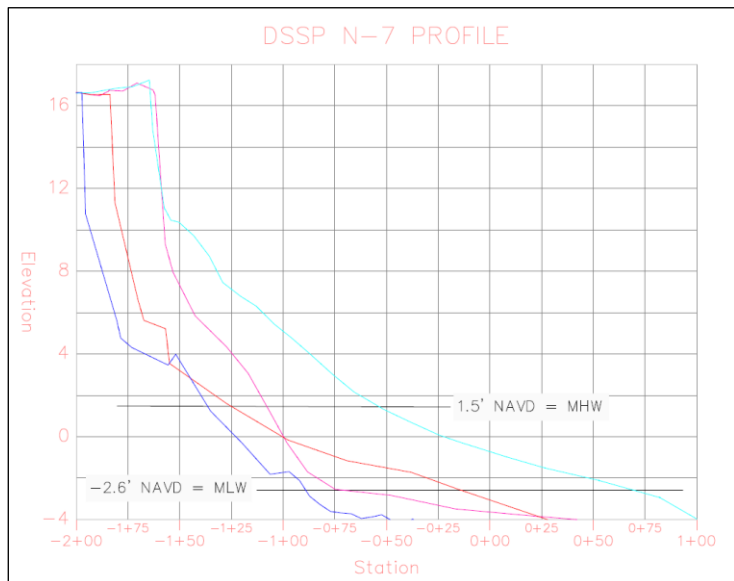
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Pink: Summer 2022

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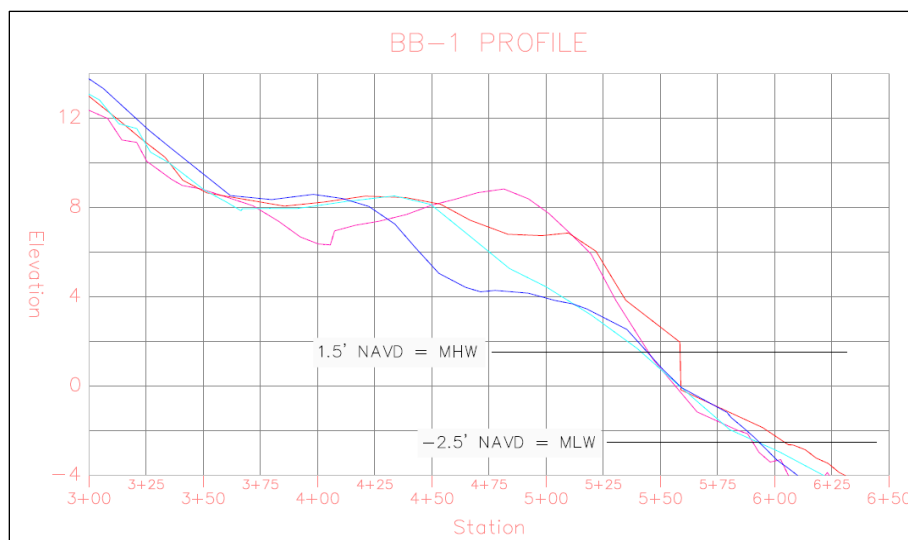
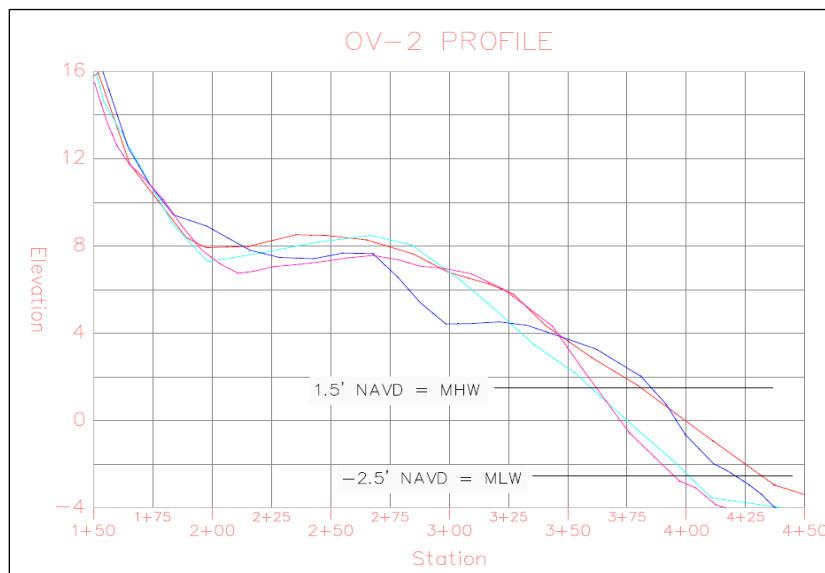
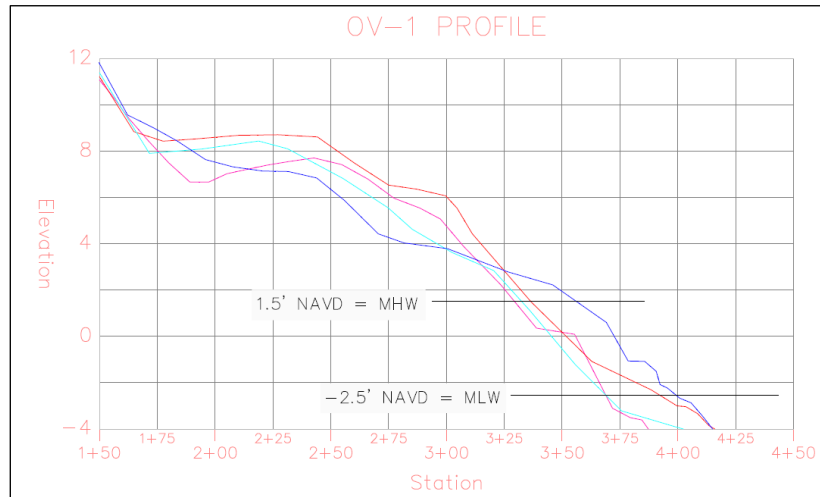
LEGEND

Pink: Summer 2022

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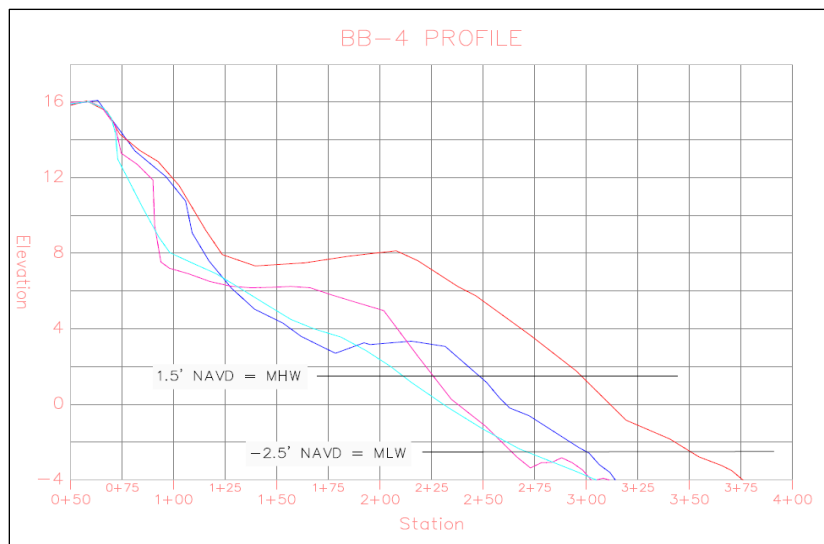
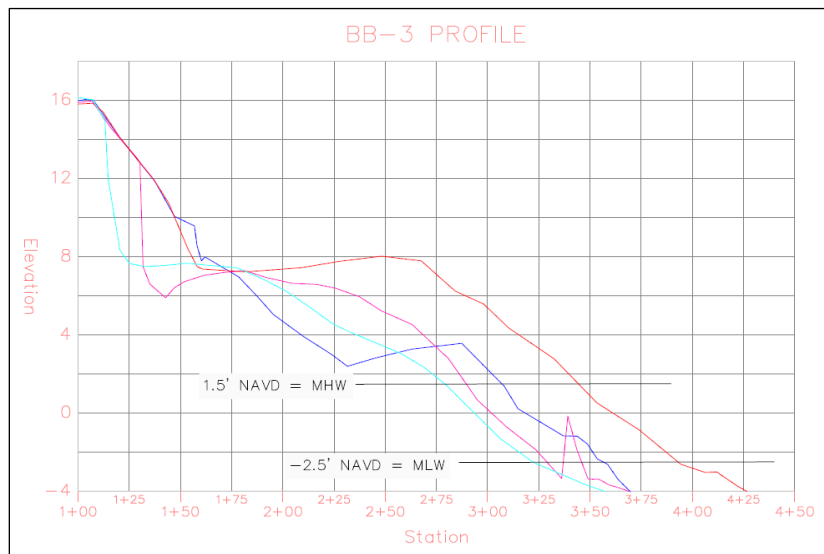
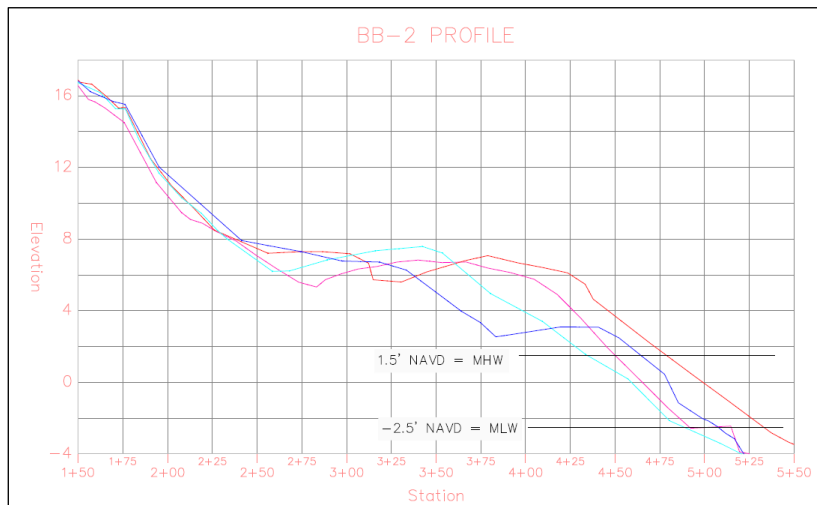
LEGEND

Pink: Summer 2022

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Red: Summer 2023

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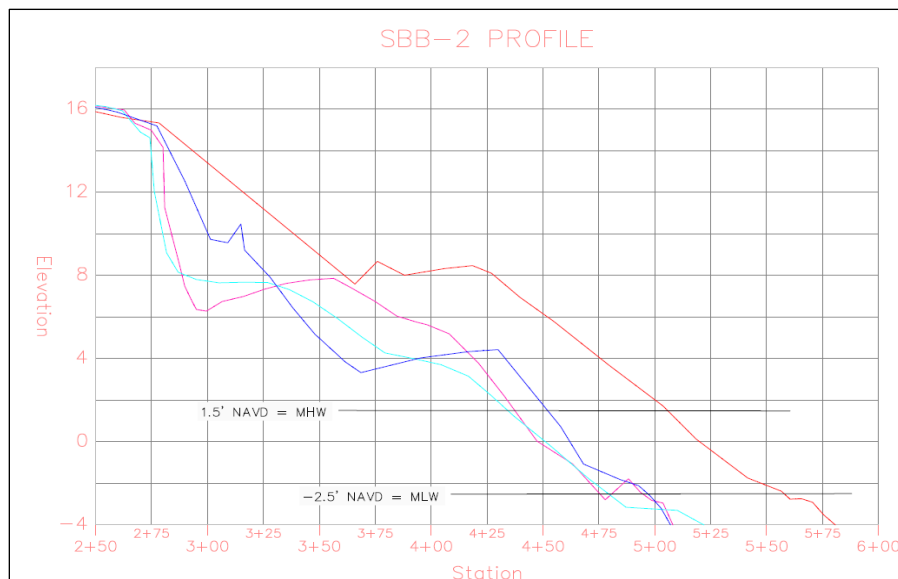
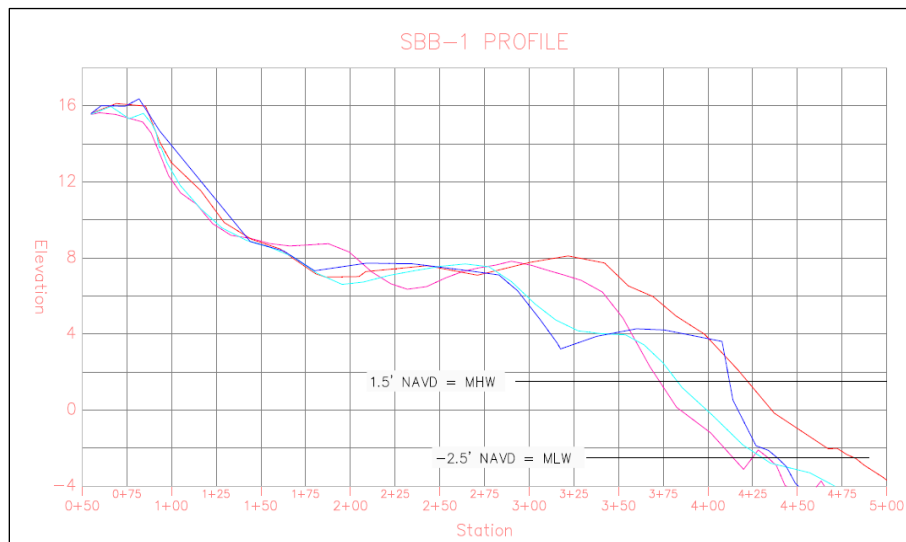
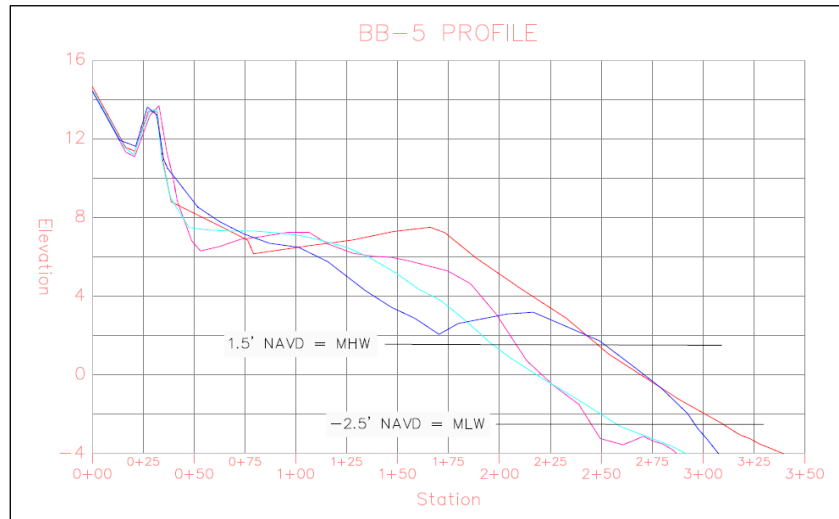
LEGEND

Pink: Summer 2022

Cyan: Winter 2023

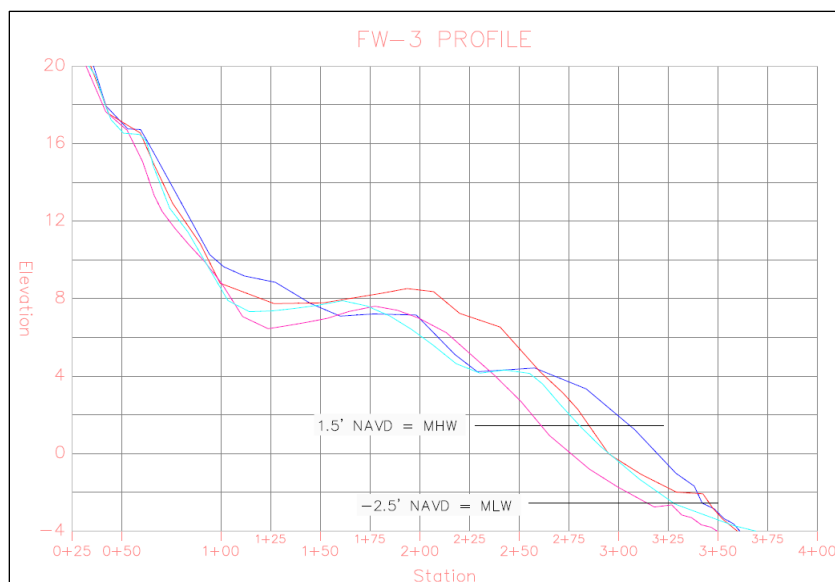
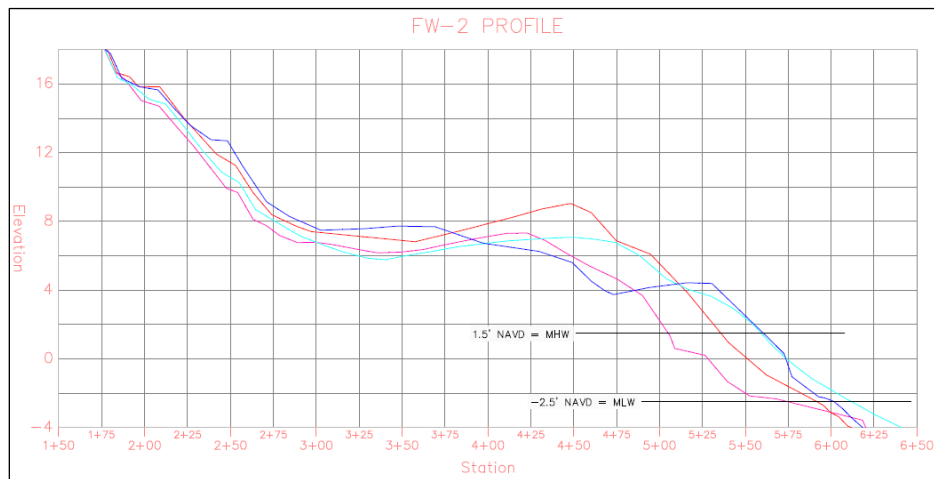
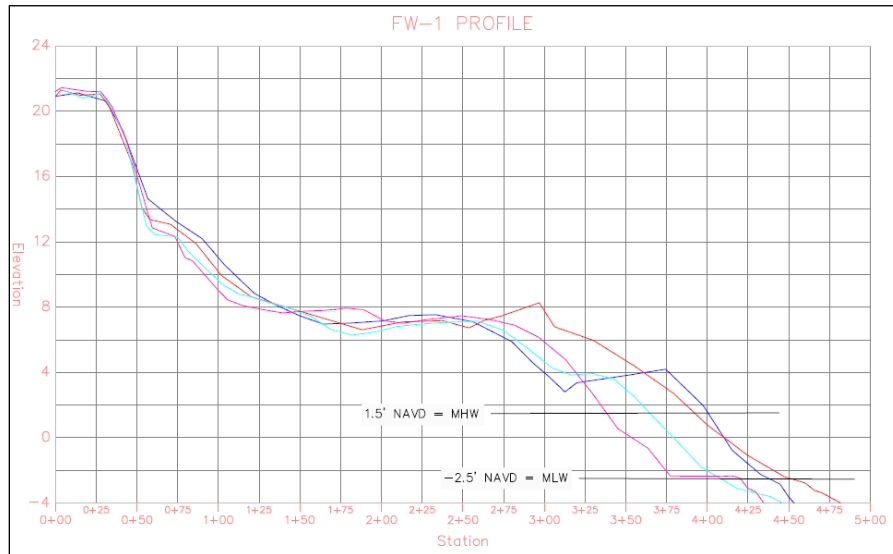
Red: Summer 2023

Blue: Winter 2024



LEGEND

Pink: Summer 2022
Cyan: Winter 2023
Red: Summer 2023
Blue: Winter 2024



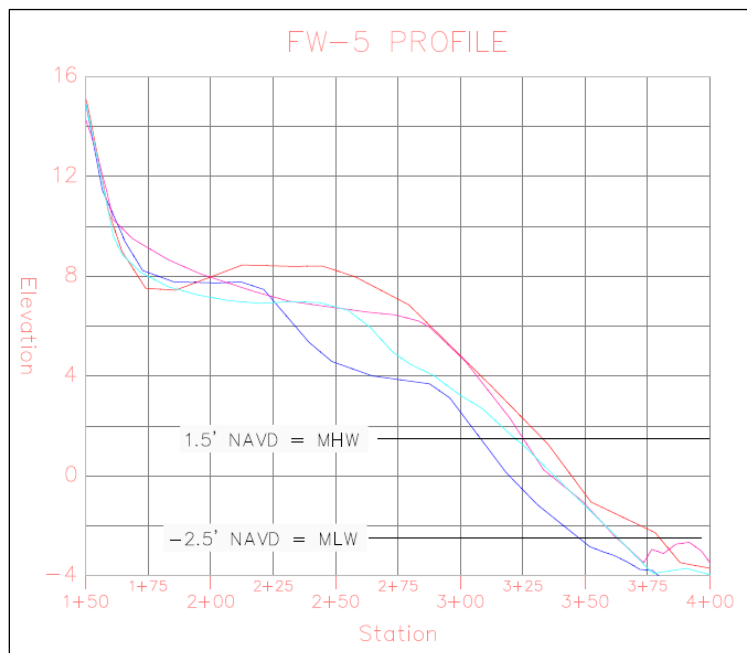
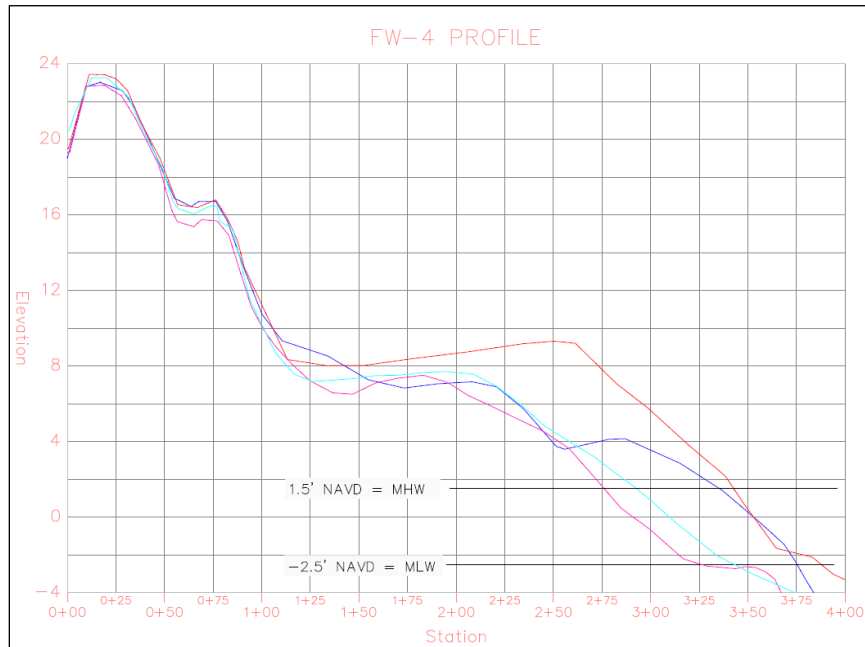
LEGEND

Pink: Summer 2022

Cyan: Winter 2023

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LEGEND

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Red: Summer 2023

Blue: Winter 2024



Appendix 2: Ocean Coast Photographs

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



Photo taken approaching high tide looking north at the jetties.

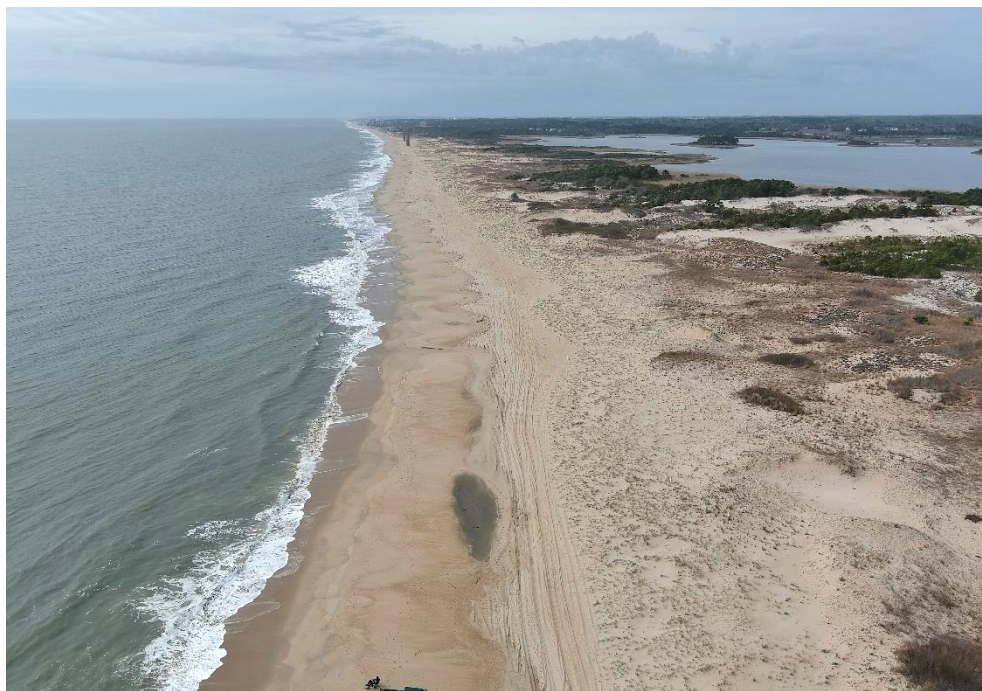


Photo taken approaching high tide looking south.



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.

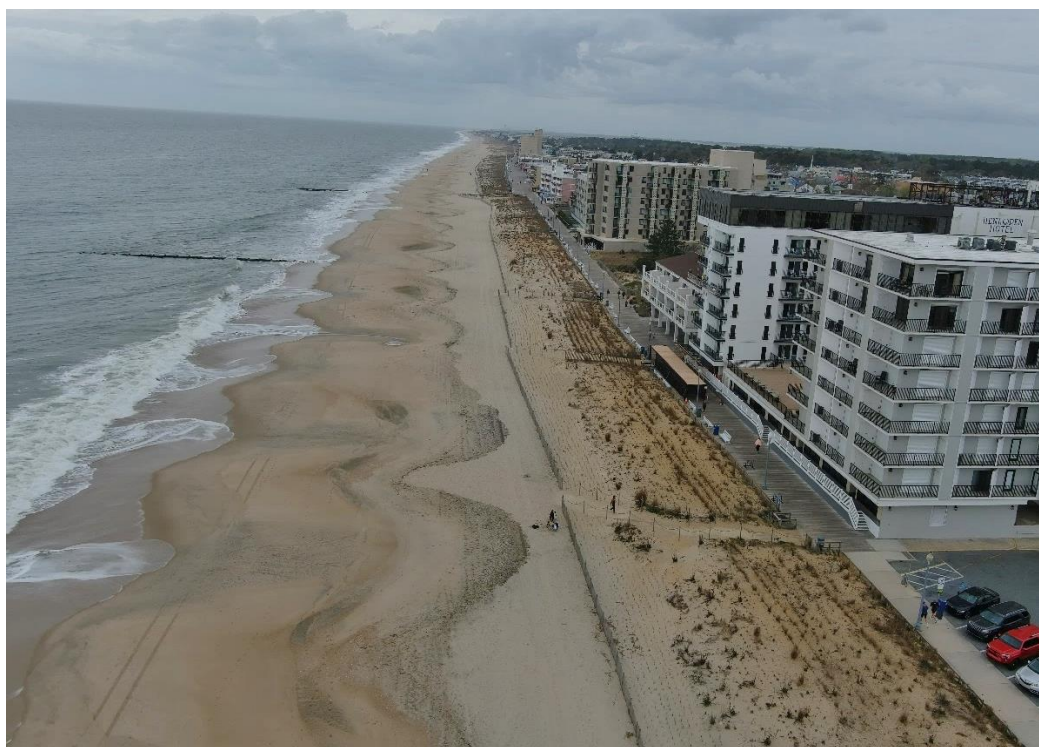


Photo taken approaching high tide looking south. Two groins are visible as well as the northern end of the Rehoboth Boardwalk.



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



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

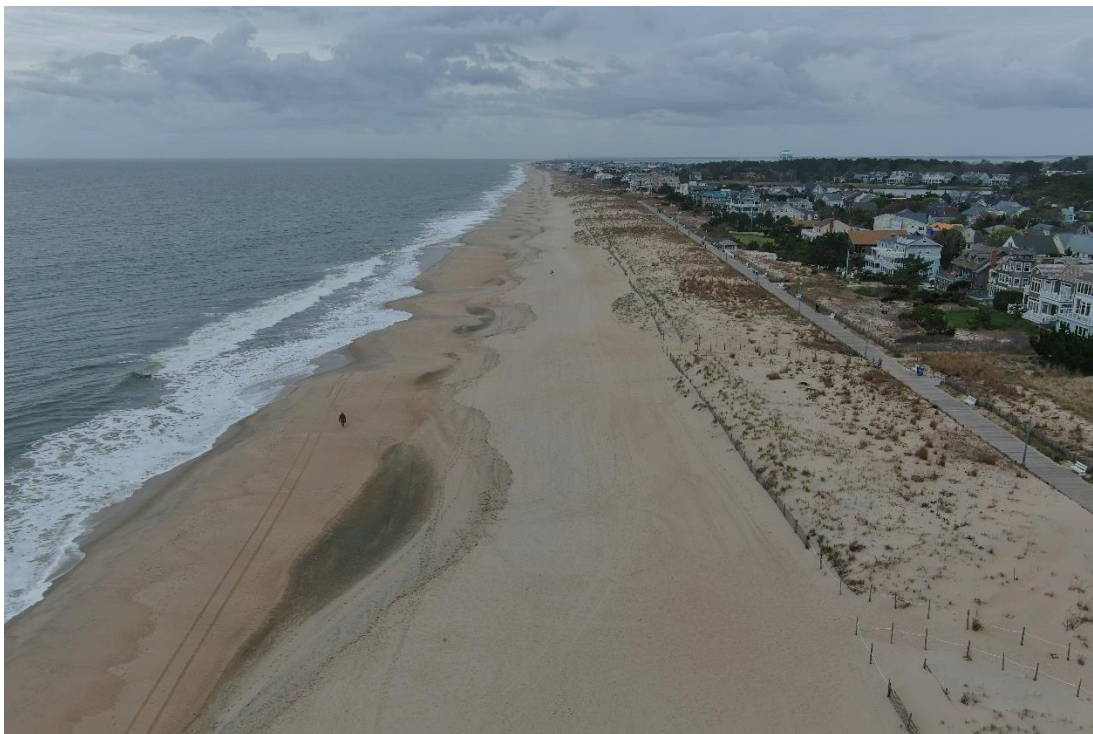


Photo taken approaching high tide looking south at the southern end of the Rehoboth Boardwalk.



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



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



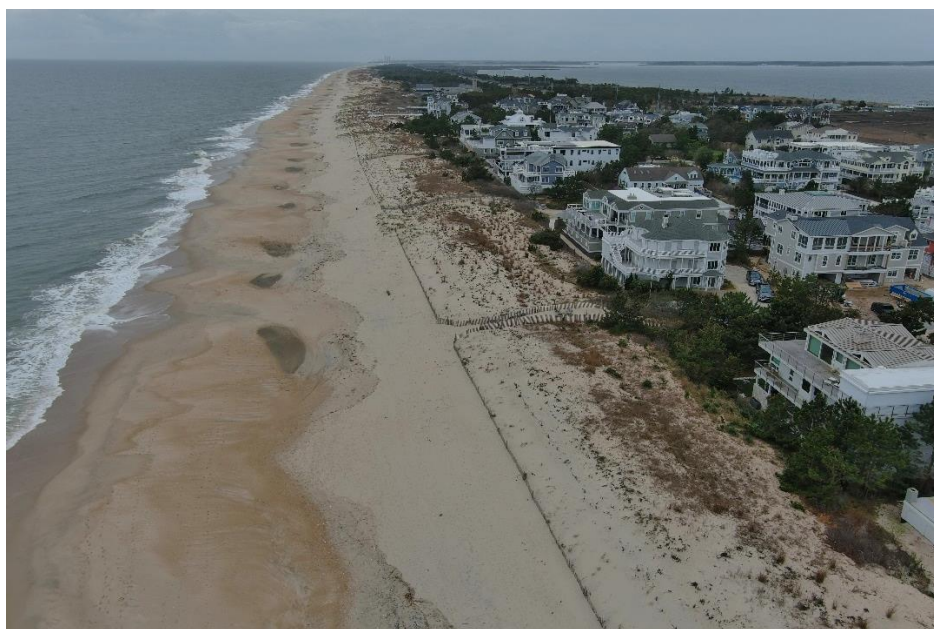
Northern Section (near Clayton St): Photo taken at high tide looking south.



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.

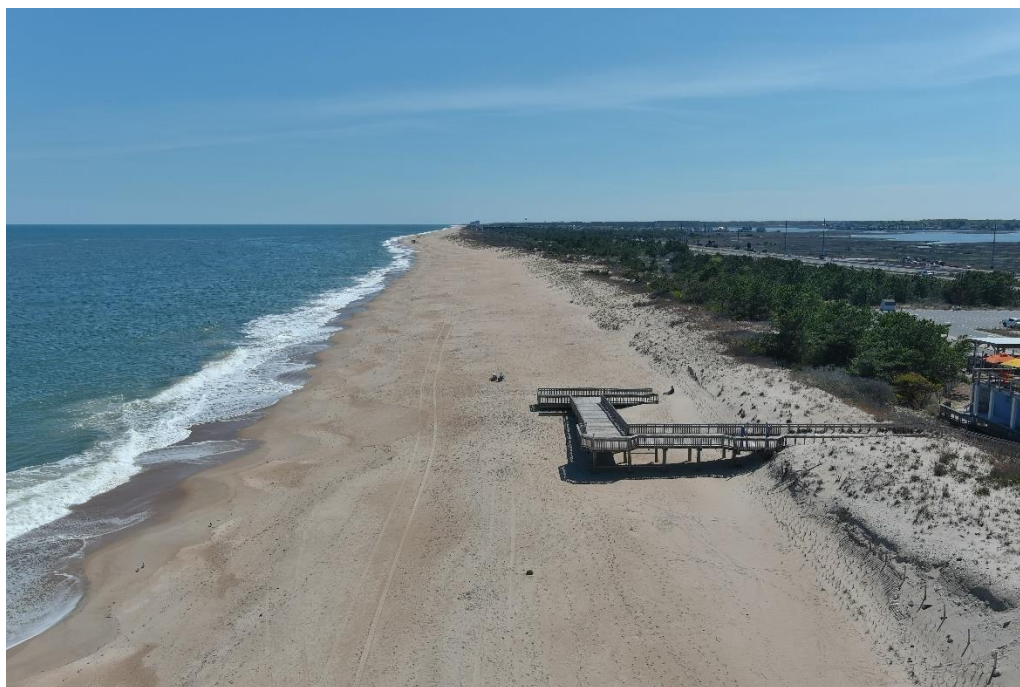


Photo taken from the southside Inlet beach approaching high tide looking south.



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

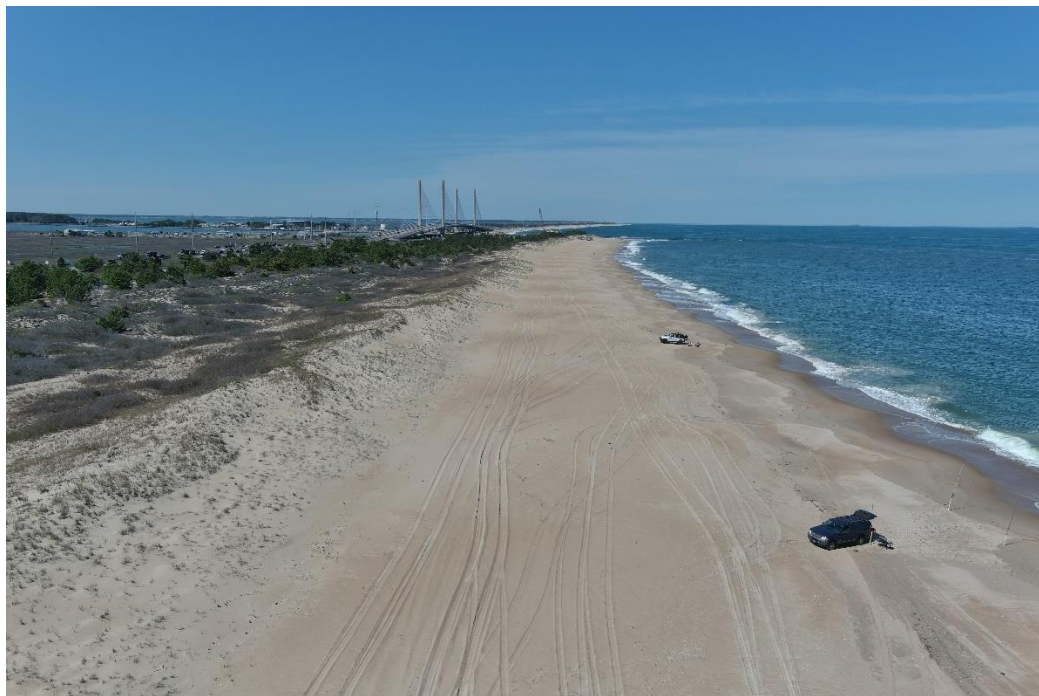


Photo taken from 3R's Beach approaching high tide looking north.



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



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

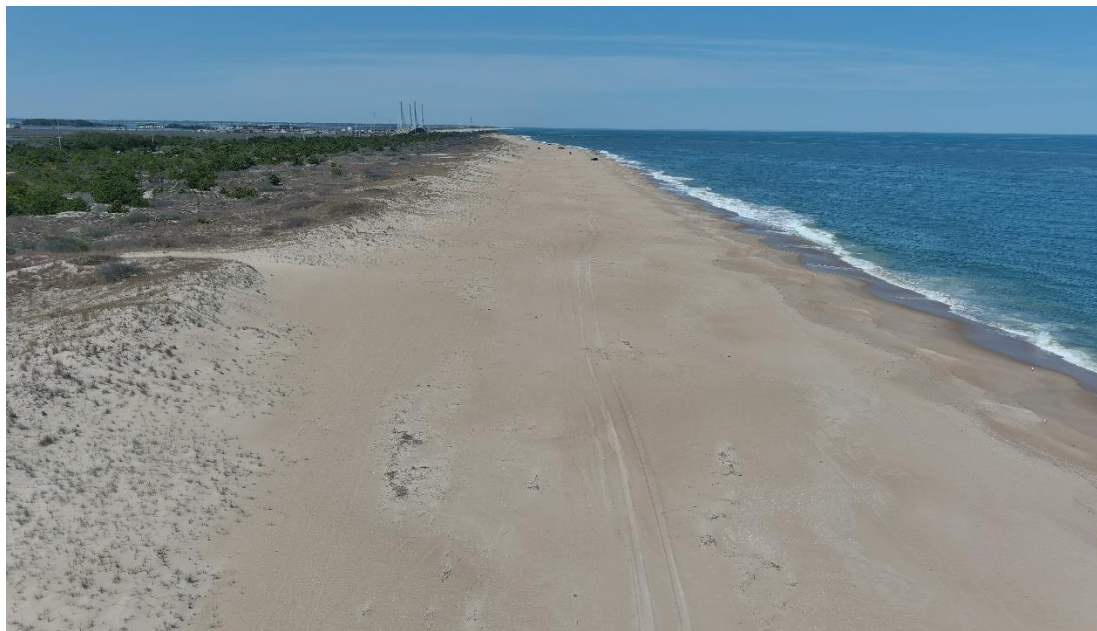


Photo taken approaching high tide looking north at Delaware Seashore State Park.



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



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

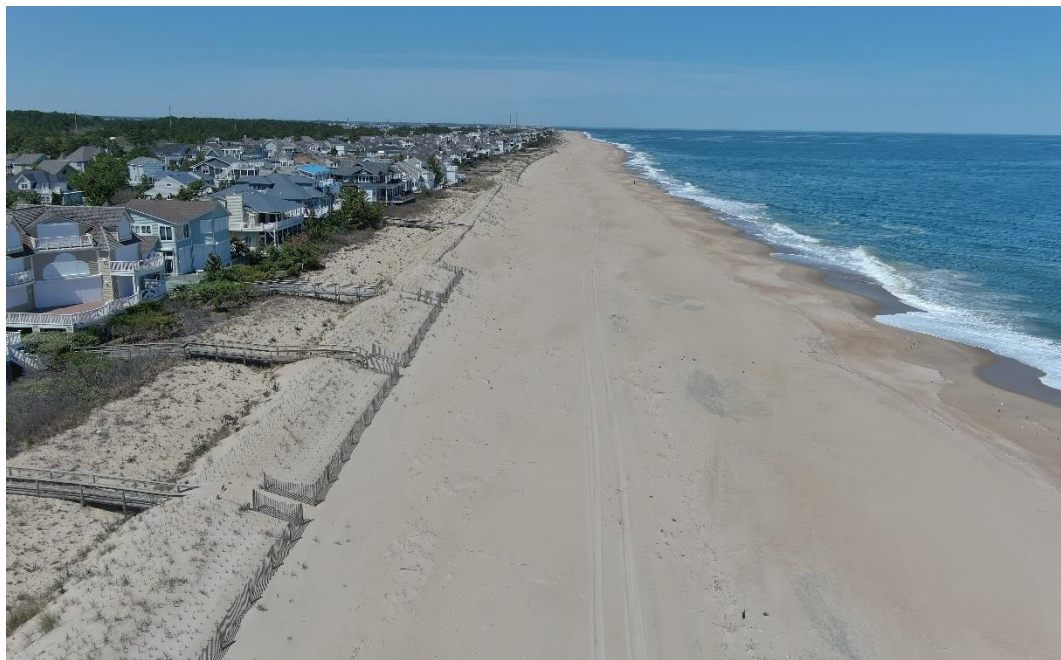


Photo taken near The Preserve Beach Community approaching high tide looking north.



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.

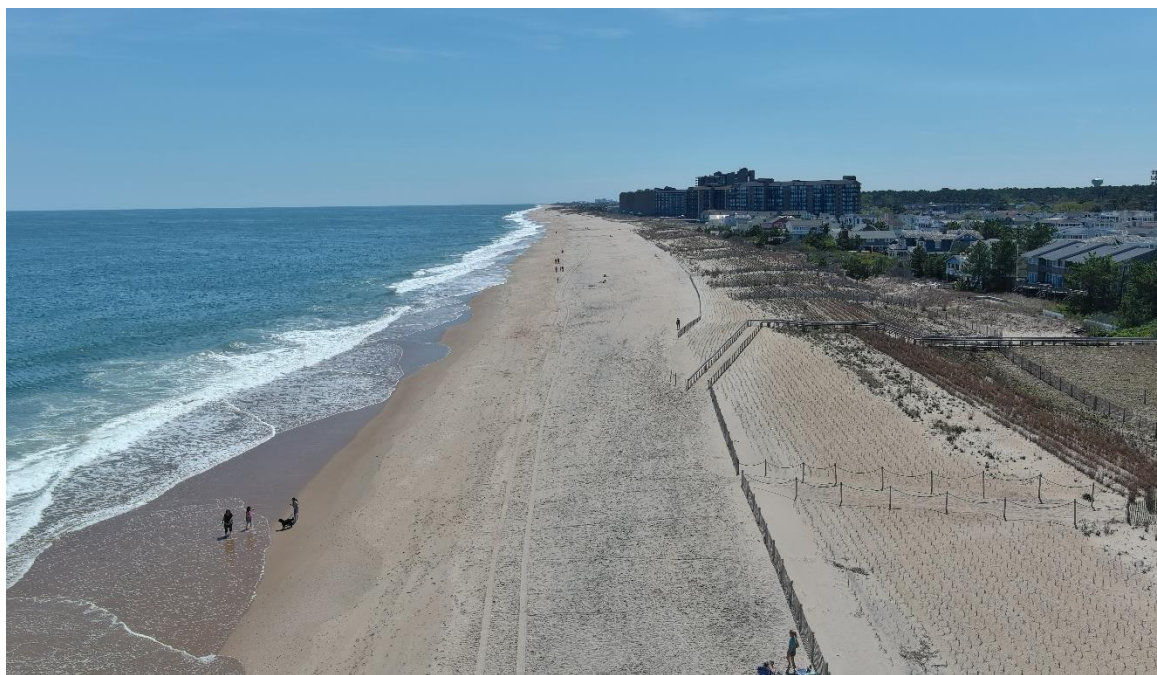


Photo taken from the Town of Bethany Beach approaching high tide looking south. The tall, Sea Colony Condominiums are visible.



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

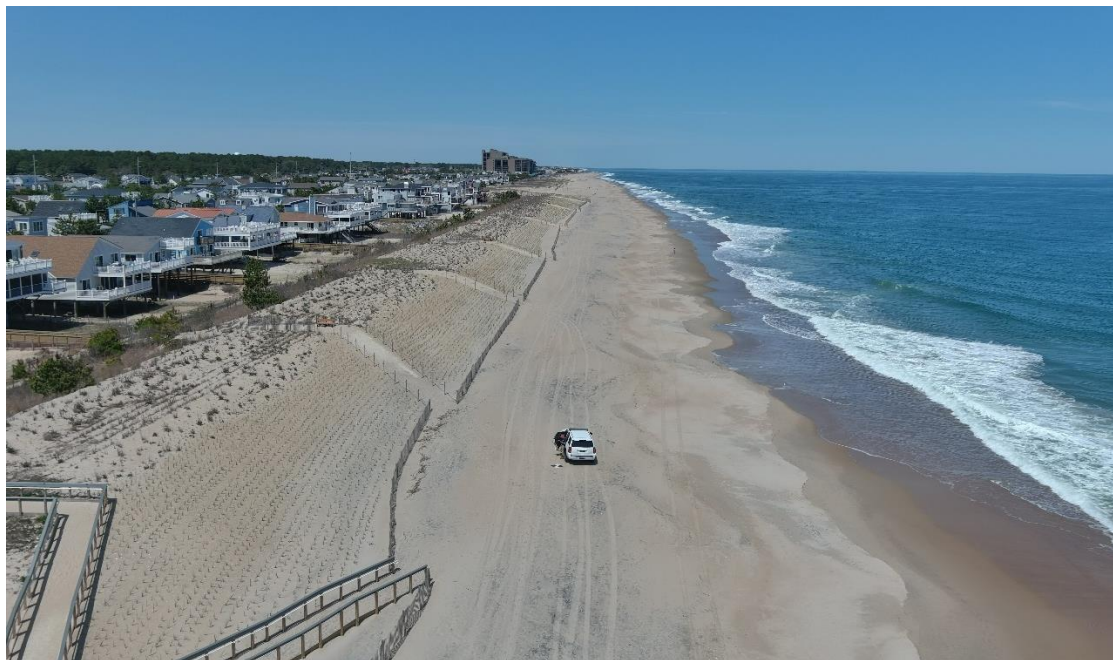


Photo taken from South Bethany Beach approaching high tide looking north. The Sea Colony Condominiums are visible in the background.



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.

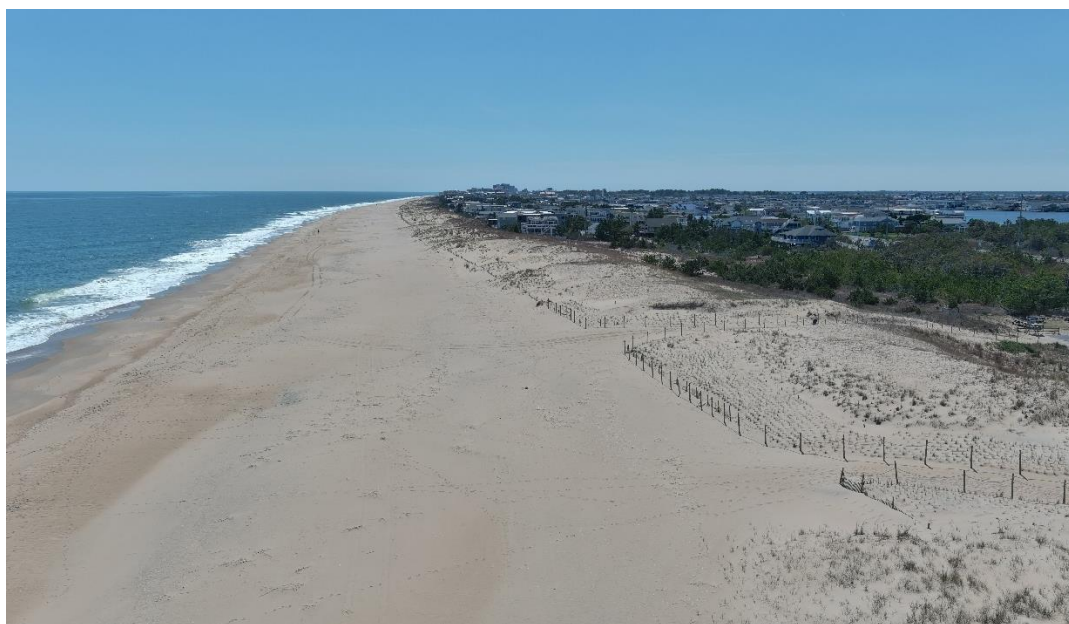


Photo taken from Fenwick Island State Park approaching high tide looking south.



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 boarder.