APPENDIX

Testimony of Prof. Anthony J. Broccoli to the Assembly Environment, Natural Resources, and Solid Waste and Senate Environment and Energy Committees

August 1, 2024

LMH Room, Toms River Municipal Complex, 33 Washington Street, Toms River, New Jersey

Good morning. My name is Anthony Broccoli, and I am a Distinguished Professor of Atmospheric Science in the Rutgers University Department of Environmental Sciences, and a faculty advisor of the New Jersey Climate Change Resource Center. Thank you for the invitation to talk about how the effects of climate change are being felt in New Jersey, especially along the Jersey Shore.

The New Jersey Climate Change Resource Center recently released its State of the Climate report for 2023, and I will briefly review some of the findings of this report, starting with a global perspective and then drilling down to the local level.

Global average temperature has risen by approximately 2°F since the late 19th century, and it has been rising more rapidly in recent decades. Data from NASA indicate that 2023 was the warmest year on record, and the period from 2014-2023 was the warmest ten years going back to 1880. Based on the first half of the year, it is entirely possible that 2024 will break last year's global temperature record.

Rising temperatures have caused global sea level to increase. Global sea level has risen by more than 7 inches since the early 20th century. As the ocean warms, the water expands, increasing the volume of the ocean. During the past several decades, the great ice sheets that cover most of Greenland and Antarctica have been shrinking, as have almost all mountain glaciers throughout the world. The ice lost from these glaciers and ice sheets adds water to the ocean. As a result, sea level rise is accelerating. If we look at just the past ten years, the global rate of sea level rise has more than doubled to about 1.8 inches per decade.

Turning our attention to climate in New Jersey, average annual temperatures have risen by about 4 °F since the late 19th century, which is faster than the global average. Warming has occurred in all four seasons, although temperatures have risen most rapidly in winter. Much of this warming has taken place since 1970, when New Jersey has warmed at a rate of about two-thirds of a degree Fahrenheit per decade. Out of the 20 warmest years since 1895, 15 have occurred since 2000, including 2023, which was the 3rd warmest year on record for our state.

As might be expected in a warming world, New Jersey has experienced more warm extremes and fewer cold extremes. Looking at monthly extremes, we can define an unusually warm month as

one that is among the five warmest for that time of year, and an unusually cold month as one that is among the five coldest. In recent years, unusually warm months have been far more prevalent than unusually cold months, outnumbering them by 48 to 0 since 1990. In addition, the 12 warmest summers in New Jersey have all occurred in the past 25 years.

Our state has also received more rain in recent times. Annual precipitation in New Jersey has increased by just under 10% since statewide records began in 1895. This trend is relatively small compared with the year-to-year variability of precipitation. But larger increases in the amount of precipitation falling in heavy rain events have been noted throughout the northeastern United States, including New Jersey. The number of days on which precipitation of 2 inches or more occurred has increased by 49% since 1958. This trend is expected to continue, as heavy precipitation events are anticipated to become more intense and more frequent as temperature increases, with implications for the frequency of inland flooding along New Jersey's rivers and streams.

There are other important effects of climate change that will impact the residents of New Jersey, including greater vulnerability to heat-related illness, increases in the ranges of insect pests, changes in coastal ecosystems including abundances of fish species, and increased chances of wildfires and wildfire smoke. But here at the Jersey Shore, the greatest potential impact of climate change is sea level rise.

Sea level rise along the New Jersey coast has been more rapid than the global average because the land is sinking while water levels are rising. At Atlantic City, sea level has risen by more than 18 inches since records began in 1911. Among the effects of this rise in water levels has been an increase in the frequency of so-called "sunny-day flooding," in which flooding occurs even in the absence of coastal storms. During the 1950s, sunny-day flooding at Atlantic City averaged less than one day per year, but the rate had increased to about 8 days per year in the decade ending in 2016.

As the ocean continues to warm and glaciers and ice sheets continue to melt, sea level rise is expected to accelerate. According to the most recent Rutgers-led report of the Scientific and Technical Advisory Panel, by 2030 sea level is projected to increase by 0.5–1.1 feet relative to the 1991–2009 baseline, and by 0.9–2.1 feet by 2050. The panel uses ranges to represent the outcomes that have a 2 in 3 chance of occurring—smaller or larger increases are possible but unlikely. Beyond 2050, the amount of sea level rise will depend on future emissions of heat-trapping greenhouse gases. In a moderate emissions scenario, the likely range of sea-level rise in 2100 is expected to be 2.0-5.1 feet. Higher emissions would lead to greater sea level rise and lower emissions would cause a smaller amount.

Rising seas will dramatically increase the threat of coastal flooding, not only along our oceanfront beaches, but also along Delaware Bay, coastal back bays, and the estuaries of rivers such as the Delaware, Raritan, Passaic, and Hackensack; to name just a few. By 2060, sunny-

2x

day or nuisance flooding in Atlantic City is projected to occur at least 85 times a year, even with moderate greenhouse gas emissions. But the most severe impacts will occur when coastal storms drive water toward the coast. These storm surge events can raise water levels several feet, and their effects will be added to the effects of rising seas. Hurricane Sandy was an extreme example, producing 5-9 feet of storm surge along much of the New Jersey coast, but even a strong winter storm can produce 2-3 feet of surge.

How will climate change affect coastal storms? This is an important but challenging question that is the subject of ongoing research. There is good evidence that a warming climate will make hurricanes stronger and wetter. Whether they will change in frequency remains uncertain.

A more common occurrence along the Jersey Shore are winter storms, often called nor'easters, which typically bring the threat of some coastal flooding several times each year. The relationship between warming and the intensity of winter storms is not as straightforward as it is for hurricanes, and continued research will be required to anticipate how they will change in the future.

Despite the uncertainties that I've just described, we can say something about the bottom line for coastal communities. There is high confidence that coastal flooding from future storms will be more frequent and more severe, as rising sea levels raise the baseline for such flooding events. For example, some of my colleagues at Rutgers have estimated that the rise in sea level since 1880 caused about 38,000 more people in New Jersey to be affected by Hurricane Sandy's floodwaters. The future rise in sea level will likewise increase the areas at risk of coastal flooding.

Many of our traditional strategies for planning for future weather and climate events assume that they will look a lot like the events that we have experienced in the past. Climate change invalidates this assumption. Instead, we must prepare for and adapt to conditions that will likely be quite different from what we have seen in the past.

Because the primary driver of future climate change is the emission of carbon dioxide and other greenhouse gases into the atmosphere, there is the potential to reduce the impacts of future climate change through the development of alternative sources of energy and policies to discourage carbon dioxide emissions.

But regardless of what policy direction we ultimately follow, we are already experiencing changes in climate, and there is no realistic scenario in which future changes can be completely avoided. With that sobering fact in mind, it will be necessary to adapt to the changes in climate that are already in the pipeline, even if policies are implemented to reduce carbon emissions worldwide.

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Adapting to a changing climate is a process that must be informed by the best available science. We can't adequately prepare if we don't know what impacts are coming. Fortunately, the tools we use to make projections of future climate are steadily improving. Furthermore, climate resiliency efforts here in New Jersey are well underway, as you have heard and will hear from some of the other speakers at this hearing. Such efforts are crucial if we are to meet the challenges posed to our communities by climate change, which is arguably the most important environmental issue of the 21st century.

To the committee chairs and members, thank you again for the chance to talk with you today and provide an overview of this critical issue.

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RUTGERS MACH Megalopolitan Coastal Transformation Hub

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August 1, 2024

Thank you for the honor to be here today and for the opportunity to share how Rutgers University has been on the forefront of making applied research useable and useful to decision-makers, like you. The roles I have at the University allow me to act as the bridge between research, like Tony and Ning shared, and professionals working along the coast of New Jersey who may not have a science background, but who seek information from Rutgers to inform their thinking.

I have been at the University for over 20 years now and have always had the benefit of working at the coast. Currently I serve as the Administrative Director for the Megalopolitan Coastal Transformation Hub (aka MACH), and I am a member of the leadership team for the Rutgers – led NJ Climate Change Resource Center.

Besides my professional titles, I am a resident of a small coastal community in Southern Ocean County, where it is common to receive texts from the school district alerting families that bus routes will be altered due to flooded roadways, what we refer to as sunny day flooding a consequence of sea level rise. Further, my daily commute to work, out to the Rutgers University Marine Field Station, reminds me of how precious our coast is and how it is also very exposed and already impacted by climate change.

As Rutgers staff embedded at the coast, we are considered trusted sources of science-based information and anchors in the community. It is through this shared, lived experience, and decades of relationship-building with coastal decision-makers, that Rutgers staff and scientists continue to provide useful and used information to help make communities more resilient.

Today I am going to cover the following topics:

- How the Climate Change Resource Center is a key to part of improving New Jersey's climate resilience and adaptation;
- Ways in which the MACH consortium builds on our success in New Jersey and expands it to other large urban megaregions surrounding NJ; and,
- How we are training the next generation of coastal professionals to tackle multi-faceted challenges like coastal resilience.

Before I dive in, I want to make sure when I use the word "coast" you know I mean any area that is influenced by the tide. I am not just talking about the "Shore".

I also want to thank the legislature for your ongoing commitment to our work and specifically for your support of the New Jersey Climate Change Resource Center. With your ongoing support, the Resource Center can continue to provide applied research, tools, technical guidance, and training to professionals across the coast. We draw upon the expertise of New Jersey's world-renowned scientists to design and develop products and services that meet the needs of our users.

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Some of the flagship Resource Center products, include the NJFloodMapper, Municipal Climate Snapshots, and NJHealthAdapt. These tools are hosted under the umbrella of the NJAdapt platform; our Floodmapper tool alone has 60,000 users annually.

Tools alone are not sufficient but are one set of approaches that the Climate Change Resource Center utilizes to make meaning out of the climate science data shared before. We pair tools with technical assistance, guided questions and learning modules, to ensure that the data provided connect to what decision-makers value, and already know, so that our new knowledge is additive to their lived experiences and local knowledge and can help these decision-makers also communicate risk to their constituents.

An example of how we take data, like a future sea level rise projection, and turn it into meaningful knowledge can be demonstrated in an analysis of what 5 additional feet of inundation would mean to the coast. This example is particularly relevant because 5ft is the amount of sea level rise proposed through the NJ PACT REAL rules to delineate the coastal inundation zone. Using the NJAdapt platform, a local construction code official can map what 5 ft of inundation looks like against other local data sets such as roads, schools, police and fire stations, nursing homes, and other critical local assets. Zooming out to the state-wide level, the state floodplain program can learn that with 5ft of permanent inundation, more than 123,000 residential properties are impacted, putting close to $ in property value at risk. These data can be particularly useful for municipalities as they develop "Climate Change Related Hazard Vulnerability Assessments" now required under the Municipal Land Use Law, as the legislature revised it in 2021.

The MACH consortium that I help direct expands our view regionally into NYC and Philadelphia. We are working directly with city and county decision-makers to co-design novel research based on their adaptation questions. With initial funding from the National Science Foundation, the consortium brings in expertise from 12 institutions beyond Rutgers, including Princeton and Montclair State. Both Tony and Ning are key members of the research team, and several of the other speakers joining us today are members of our advisory panels.

Our researchers are examining coastal hazards such as current and future sea level rise, hurricanes, nor'easters, and the compound reality of a future hurricane also paired with a power outage and a heat wave, as we saw in Texas with Hurricane Beryl earlier this month. We look at how these hazards interact with housing and insurance mortgages, with municipal finances, and with how people – particularly low-income residents – make decisions about climate risk. We also have a major focus on the equity, or inequity, of climate impacts and adaptation. Many of the other speakers joining me today in providing testimony are members of our advisory panels.

A key goal of the MACH consortium, and of several other programs at Rutgers, is training for the next generation of coastal and climate adaptation professionals. Coastal resilience is not a "one topic" or "one skill" challenge. Increasing resilience and adaptation along the coast of NJ is going to take an "all hands-on deck" approach, with collaboration across disciplines and sectors. Rutgers' coastal climate resilience graduate students are trained and think about how their disciplinary knowledge complements the knowledge of their peers and work in teams across disciplines to solve problems of climate adaptation. They also learn the skills needed to participate in use-inspired research or lead science translation efforts with stakeholders, ensuring that new science helps to inform real-world questions. Science communication, translation, active

listening, and appreciation of diverse perspectives are all focal areas of our graduate student training. Alumni are finding great success as early career professionals, working at jobs in the non-profit, state, federal, and academic sectors.

Through the Climate Change Resource Center, Rutgers and Princeton students are putting their training to work as members of the Center's Climate Corps, working with staff mentors to get experience with hands-on application of their knowledge. To date, we have mentored and trained about 40 Climate Corps students who have provided direct assistance on a range of climate topics such as urban resilience, health and lifelines, flood hazard analyses, and vulnerability assessments. The NJ Climate Change Resource Center is also addressing the needs of K-12 teachers by working in partnerships with these educators to develop lessons to meet the requirements of the new climate standards in education and integrating our data and tools into these plans.

In closing, I want to share one final thought –and this is one of the same lessons I try to instill in our students - Resilience along the coast of NJ means something different to each person. For mayors, it may mean retaining their tax base and municipal services. For natural area managers, it may be allowing natural processes to determine the path forward and the timeline. For families who have been coming to the Shore for generation after generation, it may be the ability for future generations to build the same memories they have. Sometimes these various visions of "resilience" are going to conflict with one another.

Data alone will not ensure resilience. Data is the "head" part of our work, but we also need to lean into the "heart". We all need to hone skills like collaboration, listening, learning and flexibility. The coast is part of who we are as New Jerseyans. To adapt to the changing coast, we need to connect the knowledge we are developing about the future to what people care most deeply about.

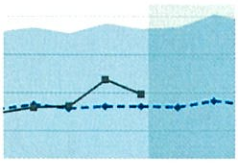
Thank you for the honor of being with you today and for allowing me to share what we do and how we do it.

RUTGERS–NEW BRUNSWICK
New Jersey Climate Change Resource Center

NJ ADAPT: Tools and Support for Local Governments

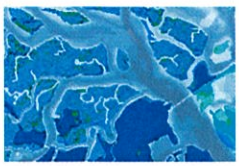
The NJ Climate Change Resource Center (CCRC) can help local governments use NJ ADAPT, a suite of online decision-support data tools designed for climate hazard planning.

NJ ADAPT is composed of eight data-visualization tools



Climate Dashboard
NJ climate trends in moderate and high emissions scenarios

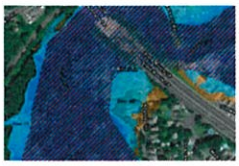
Climate Snapshots
Climate risks by municipality, county and statewide



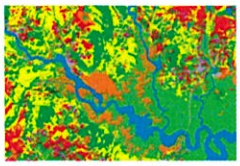
NJ FloodMapper
An interactive flood exposure data mapping tool

Climate Planning Tool
A guide to using coastal flooding data in climate planning

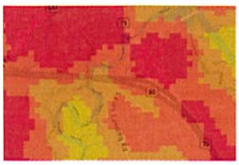
NJ HazAdapt
Data and resources for hazard mitigation planning



Local Planning Navigator
A decision-support tool for building community resilience



NJ Forest Adapt
A data mapping tool for forest management



NJ Public Health Adapt
Climate planning for improved health outcomes

What resources and support does the CCRC offer local governments?

Training
- Become more proficient with NJ ADAPT tools and data
- Better understand climate change hazards and impacts in NJ

Technical assistance
- Curated mapping and data packages for custom analysis
- Customized support with local uses of NJ ADAPT tools

Go to CCRC

How can local governments use NJ ADAPT?

COMMUNITY PLANNING. NJ ADAPT allows users to build interactive maps and access location-specific data analysis of community assets and hazards to support planning related to land use, open space, housing, transportation, etc.

MUNICIPAL MASTER PLAN UPDATES. The Local Planning Navigator is specifically designed to complete certain elements of a Climate Change Related Hazard Vulnerability Assessment as required by the Municipal Land Use Law. It can also support other local land use decisions such as establishment of areas in need of redevelopment, zoning, individual development applications, and waivers of local land use ordinances.

HAZARD MITIGATION PLANNING. HazAdapt, developed with the NJ Office of Emergency Management, provides easy access to data and resources to assist with development of hazard mitigation plans.

FUNDING APPLICATIONS. NJADAPT allows users to access relevant data and build custom maps to meet the requirements of grant applications (e.g., mapping socially vulnerable populations at risk of flooding).

COMMUNITY RATING SYSTEM CREDITS. NJ ADAPT provides information on current and future flood conditions and facilitates public outreach through local Climate Snapshots.

Email tropiano@ejb.rutgers.edu for more information about training and technical assistance.

njclimateresourcecenter.rutgers.edu

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The Coastal Research Center

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NEW JERSEY'S DISTINCTIVE PUBLIC UNIVERSITY

August 1, 2024

Re: Remarks to the NJ Assembly Environment, Natural Resources, and Solid Waste and Senate Environment and Energy Committees with focus on the Benefits of Beach Nourishment to the State's Ocean Shoreline

The Coastal Research Center at Stockton University (CRC) was founded in 1981 by Dr. Stewart Farrell (former Stockton marine science professor) to provide technical assistance to coastal communities, state and federal agencies, and non-governmental organizations with coastal management issues resulting from storms and includes studies of shorelines, beaches and dunes, island flooding, and coastal processes.

In 1986, following the passage of Hurricane Gloria which caused extensive structural damage and beach volume losses along the New Jersey shore, the NJDEP and CRC established the New Jersey Beach Profile Network (NJBPN) for the purpose of monitoring beach, dune, and shoreline conditions. Today, there are 171 sites that the CRC measures twice a year. The NJDEP continues to support the CRC and, this fall, we will start our 38th year of surveys. The NJBPN dataset of the state's beaches and dunes has been invaluable in determining long-term shoreline and beach profile volume trends, impacts from storms, and the influence of beach nourishment in protecting coastal communities and infrastructure. This dataset represents a consistent assessment of the entire New Jersey coastline that is routinely cited as the best basis for interpretation of coastal changes in the nation.

The two elements of climate change that are expected to increase and impact the New Jersey coast are sea level rise and storms. From the tide gauge records at Sandy Hook and Atlantic City, relative sea level has risen 0.49 ft since we started collecting NJBPN data in 1986. And the New Jersey coast has experienced some significant damaging storms (e.g. Halloween 1991, Northeasters 1992, 1998, 2015, and 2016, Mother's Day 2008, Veteran's Day 2009, H. Irene 2011, and H. Sandy 2012). Except for coastal erosion hotspots, the use of beach nourishment appears to hold off the rising seas and storms.

Hurricane Sandy's sand losses at the NJBPN locations were significant (above datum over 14 million cubic yards). Even with the sand losses we found that the beaches with federally designed coastal risk reduction projects (beach nourishment and engineered dunes) were extremely effective in protecting infrastructure and homes, mostly due to the wide beaches and high dunes (22 feet). Structures adjacent to narrow beach widths and low dunes suffered greater damage.

Post-Sandy beach nourishment was funded by Congress via PL 113-2 Hurricane Sandy Relief Bill. This allowed the US Army Corps of Engineers to fund the placement of 39,281,741cubic yards of sand along 113 miles of authorized project shorelines (2013-2019). Continued maintenance of these projects occurs at four-to-seven-year cycles depending on the project specifications and the state and local governments are cost-share partners. As a result, between 1986 and 2021, sand volumes increased, and the shoreline position moved seaward from the baseline conditions at all NJBPN locations within the federal projects. Note that The Wildwoods are not (at present) located within a federal project.

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However, federal funding for these projects is not always guaranteed and must be appropriated. In addition, permitted offshore sediment resources are being depleted, and securing new borrow areas further offshore will take years and will increase costs for moving sand onto the shoreline.

From our observations, the natural beaches and dunes within state and federal parks have had varied dune elevations and beach widths. Recovery following storms relies on the amount of sand in the littoral current and cross-shore processes to move the sand to the beaches.

The NJDEP REAL rules appear to support the use of nature-based solutions such as beach nourishment for coastal storm risk reduction. We find that large (federal level) beach nourishment projects can help maintain New Jersey's shorelines and protect landward structures. The state of New Jersey should prepare for rising costs in obtaining new sand sources and placement activities to maintain present-day shoreline positions.

Kimberly K. McKenna, MS PG
Interim Executive Director
Coastal Research Center

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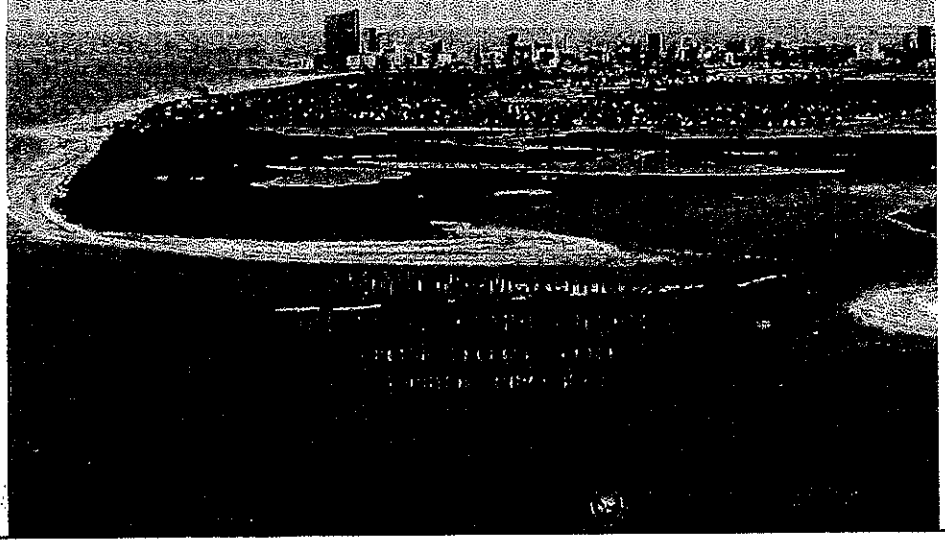
Summary of Changes at New Jersey Beach Profile Network (NJBPN) Sites



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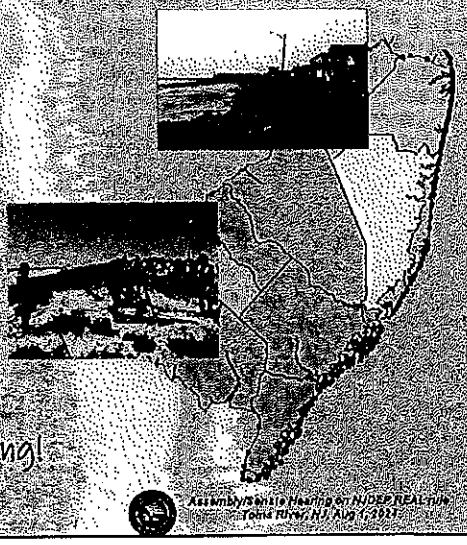
New Jersey Beach Profile Network (NJBPN)

Project Funder – New Jersey Dept. of Environmental Protection Office of Coastal Engineering
Project Objective – Survey Atlantic Ocean, Raritan Bay, and Delaware Bay Shorelines

- Project established in 1986 in response to Hurricane Gloria (1985)
- 171 beach profile sites
  - At least 1 site in every oceanfront municipality (representative feature near inlet)
  - Measured twice annually (Spring & Fall)
  - 7 sites located in Delaware Bay and Raritan Bay
  - Topographic/bathymetric survey from backdune to ~14ft depth



Beginning 38th yr of shoreline monitoring!

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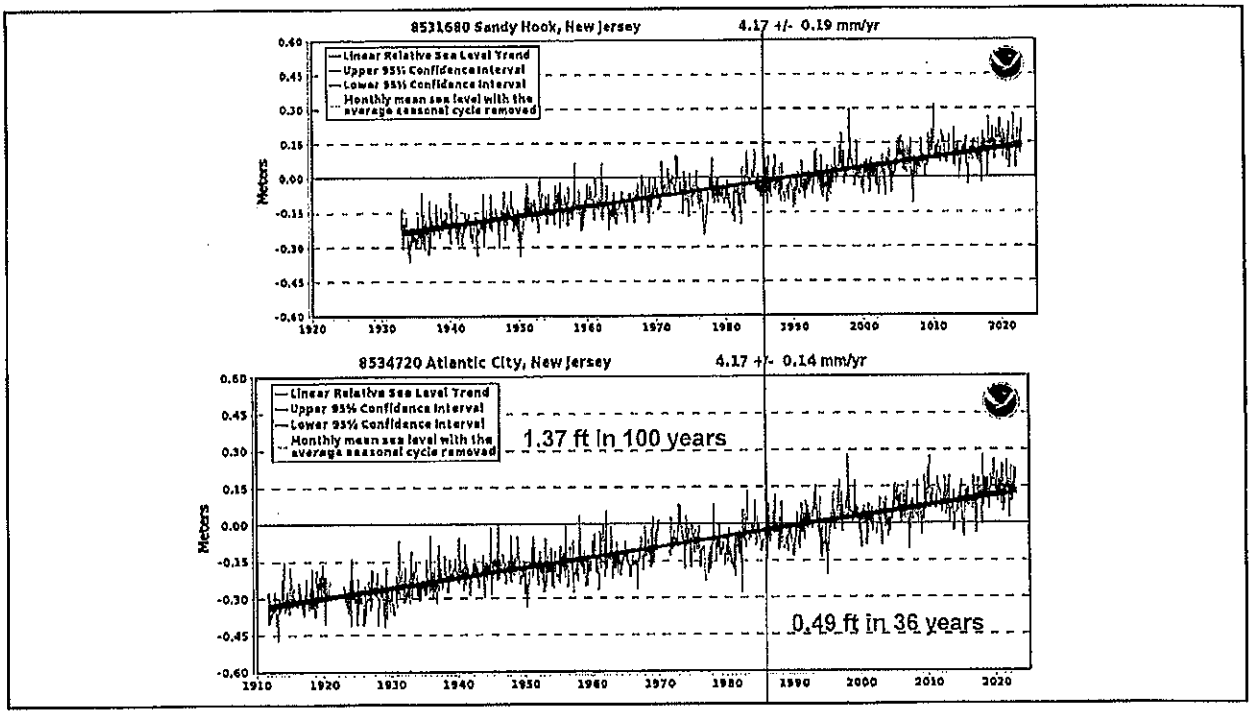
8531680 Sandy Hook, New Jersey
4.17 +/- 0.19 mm/yr
Linear Relative Sea Level Trend
Upper 95% Confidence Interval
Lower 95% Confidence Interval
Monthly mean sea level with the average seasonal cycle removed
Meters
8534720 Atlantic City, New Jersey
4.17 +/- 0.14 mm/yr
1.37 ft in 100 years
0.49 ft in 36 years

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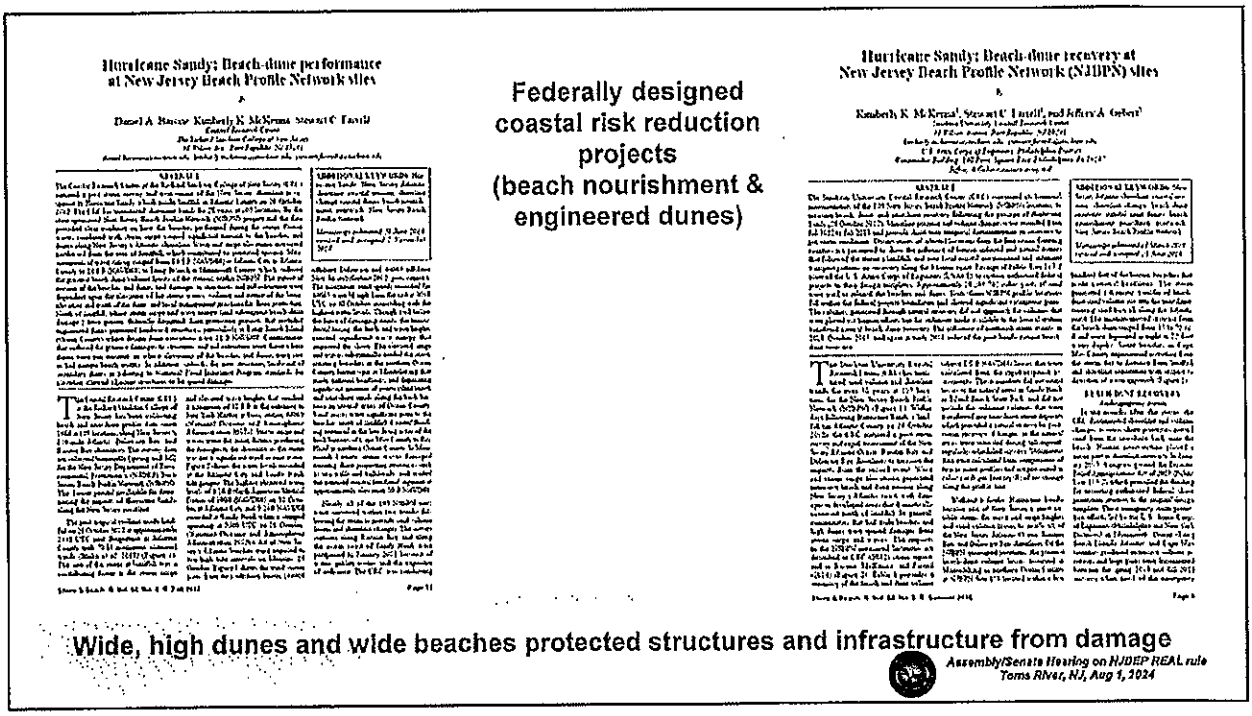
Hurricane Sandy: Beach-dune performance at New Jersey Beach Profile Network sites
Hurricane Sandy: Beach-dune recovery at New Jersey Beach Profile Network (NJBPN) sites
Federally designed coastal risk reduction projects (beach nourishment & engineered dunes)
Wide, high dunes and wide beaches protected structures and infrastructure from damage
Assembly/Senate Hearing on HJDEP REAL rule
Toms River, NJ, Aug 1, 2024

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rishment PL 113-2

Hurricane Sandy Relief Bill

Post-Sandy Coastal Storm Risk Management Project	County	Date Completed	Project length (miles)	Amount Placed (cubic yards)
Sandy Hook to Barnegat Inlet - Sea Bright and Monmouth Beach	Monmouth	November 2013	6	2,133,584
Sandy Hook to Barnegat Inlet - Long Branch	Monmouth	August 2014	3	3,125,694
Sandy Hook to Barnegat Inlet - Elberon to Loch Arbor*	Monmouth	August 2015	3	1,380,900
Sandy Hook to Barnegat Inlet - Asbury Park to Avon	Monmouth	April 2014	3	1,048,000
Sandy Hook to Barnegat Inlet - Belmar to Manasquan	Monmouth	April 2014	6	1,332,463
Manasquan Inlet to Barnegat Inlet	Ocean	July 2019	14	11,000,000
Barnegat Inlet to Little Egg - Long Beach Island (Harvey Cedars, Surf City, Brant Beach)	Ocean	August 2013	17	2,400,000
Barnegat Inlet to Little Egg Inlet - Long Beach Island (Ship Bottom, Beach Haven, Long Beach Twp)	Ocean	Summer 2016	17	3,900,000
Brigantine Inlet to Great Egg Inlet - Brigantine Island	Atlantic	February 2013	2	927,000
Brigantine Inlet to Great Egg Inlet - Absecon Island	Atlantic	December 2013	6	1,600,000
Great Egg Harbor Inlet to Peck Beach - Ocean City	Cape May	May 2013 and December 2015	6	2,700,000
Great Egg Harbor Inlet to Townsends Inlet	Cape May	May 2016	16	6,600,000
Townsends Inlet to Cape May Inlet (Avalon, Stone Harbor)	Cape May	July 2013	12	650,000
Cape May Inlet to Lower Township	Cape May	January 2014	3.6	585,000

November 2013 – July 2019

Total = 39,281,741 cy

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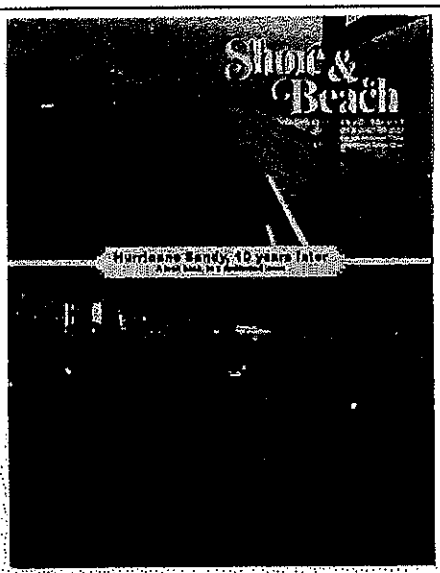

State of the shoreline since Hurricane Sandy: Summary of changes at New Jersey Beach Profile Network (NJBPN) sites

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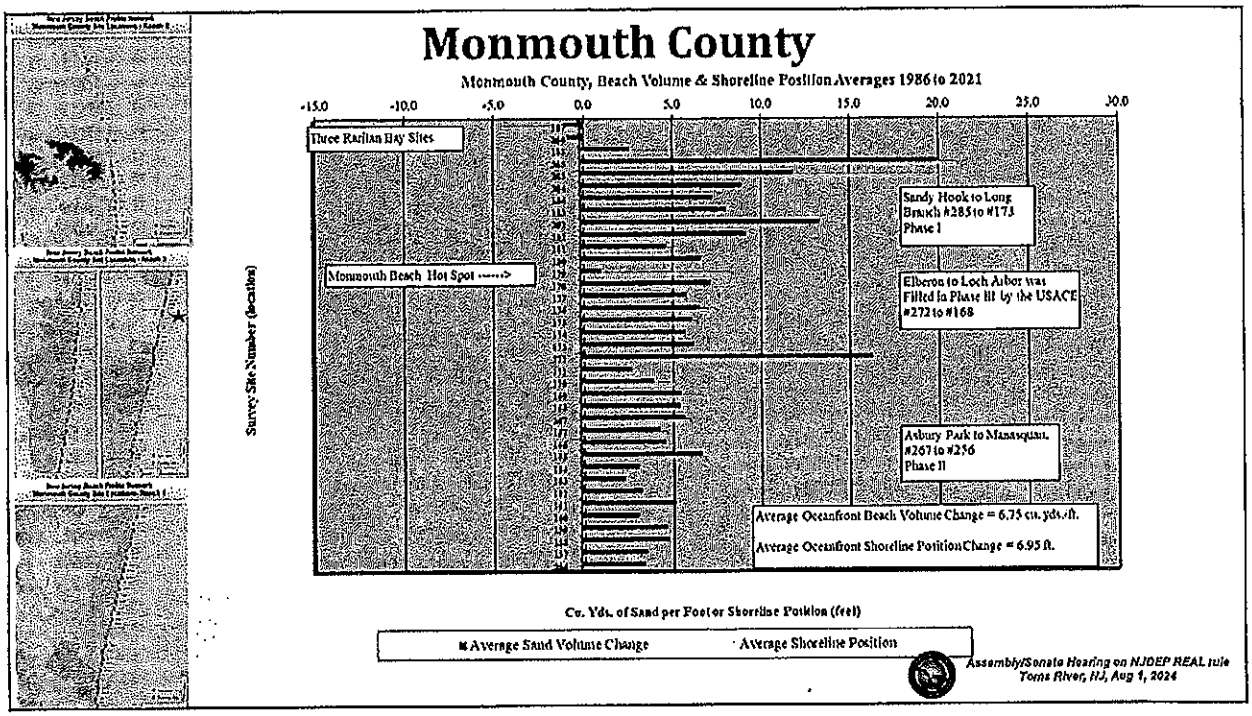
Monmouth County
Monmouth County, Beach Volume & Shoreline Position Averages 1986 to 2021
-15.0
-10.0
-5.0
0.0
5.0
10.0
15.0
20.0
25.0
30.0
Three Raritan Bay Sites
Monmouth Beach Hot Spot ------>
Sandy Hook to Long Branch #285 to #173 Phase I
Elberon to Loch Arbor was Filled in Phase III by the USACE #272 to #168
Asbury Park to Manasquan #267 to #256 Phase II
Average Oceanfront Beach Volume Change = 6.75 cu. yds./ft.
Average Oceanfront Shoreline Position Change = 6.95 ft.
Survey Site Number (location)
Cu. Yds. of Sand per Foot or Shoreline Position (feet)
Average Sand Volume Change
Average Shoreline Position
Assembly/Senate Hearing on NJDEP REAL rule
Toms River, NJ, Aug 1, 2024

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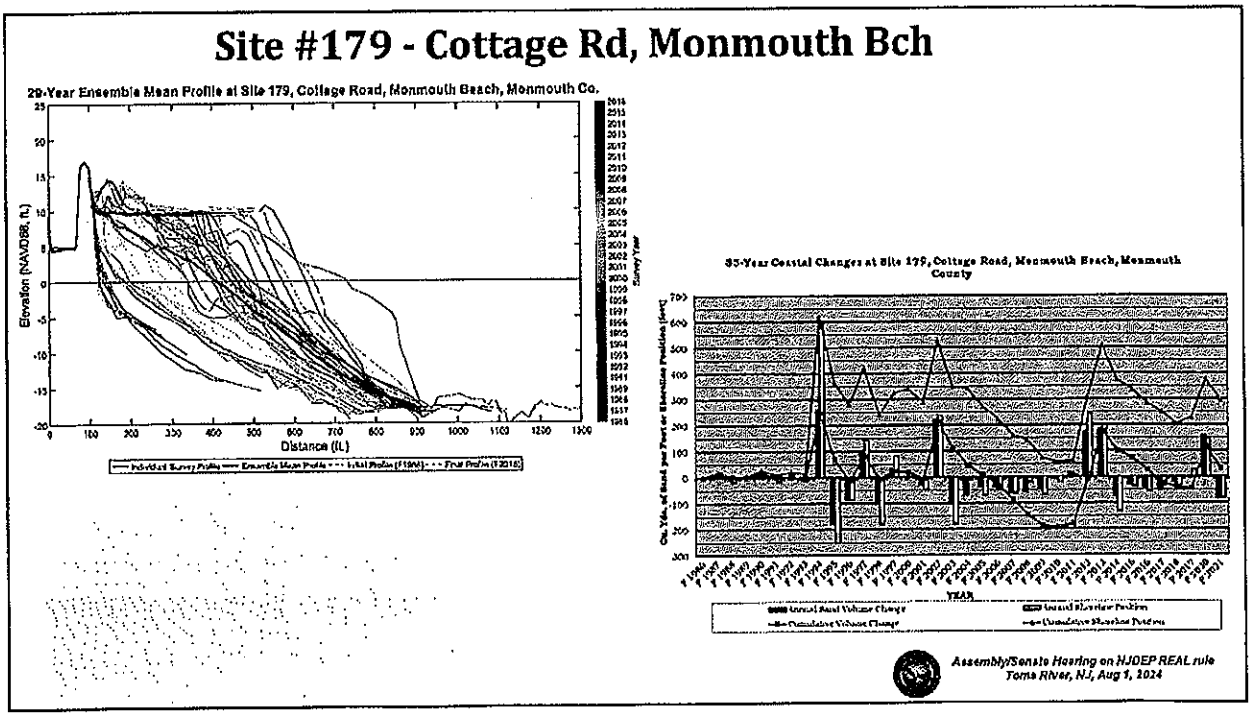
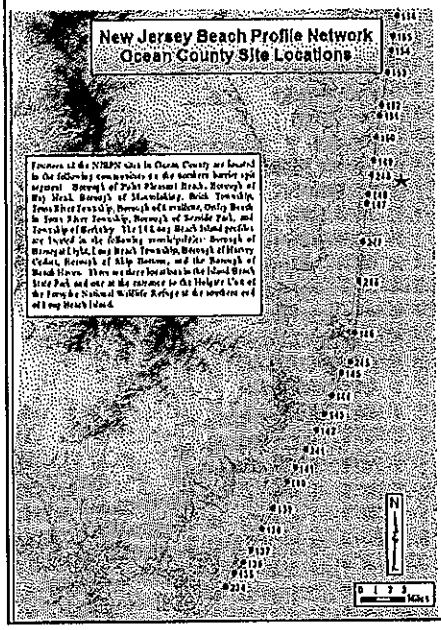
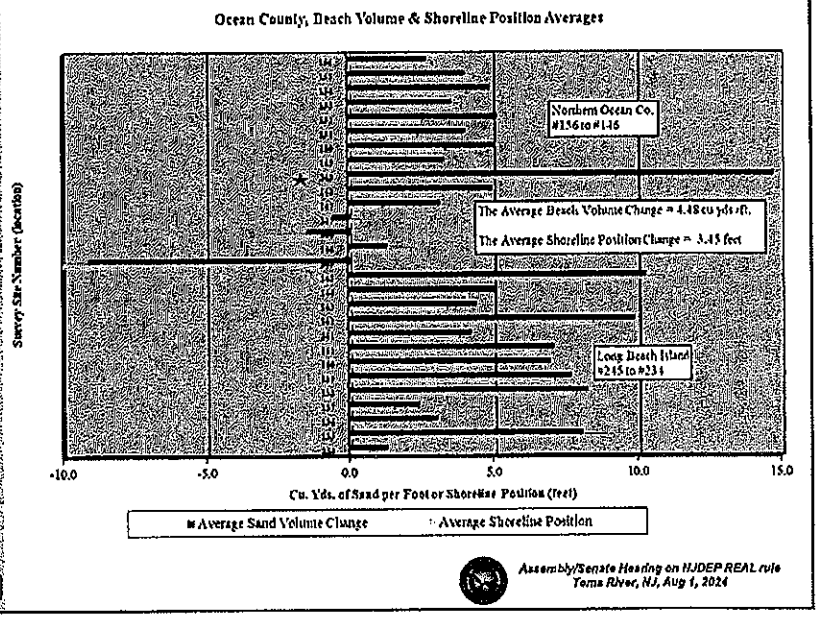

Site #179 - Cottage Rd, Monmouth Bch
29-Year Ensemble Mean Profile at Site 179, Cottage Road, Monmouth Beach, Monmouth Co.
Elevation (NAVD88, ft.)
Distance (ft.)
35-Year Coastal Changes at Site 179, Cottage Road, Monmouth Beach, Monmouth County
Cu. Yds. of Sand per Foot or Shoreline Position (feet)
YEAR
Annual Sand Volume Change
Annual Shoreline Position
Cumulative Volume Change
Cumulative Shoreline Position
Assembly/Senate Hearing on NJDEP REAL rule
Toms River, NJ, Aug 1, 2024

8

14x

Ocean County

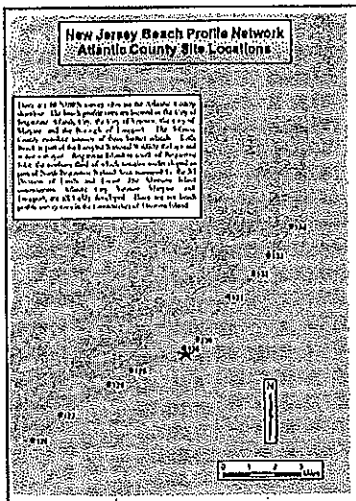


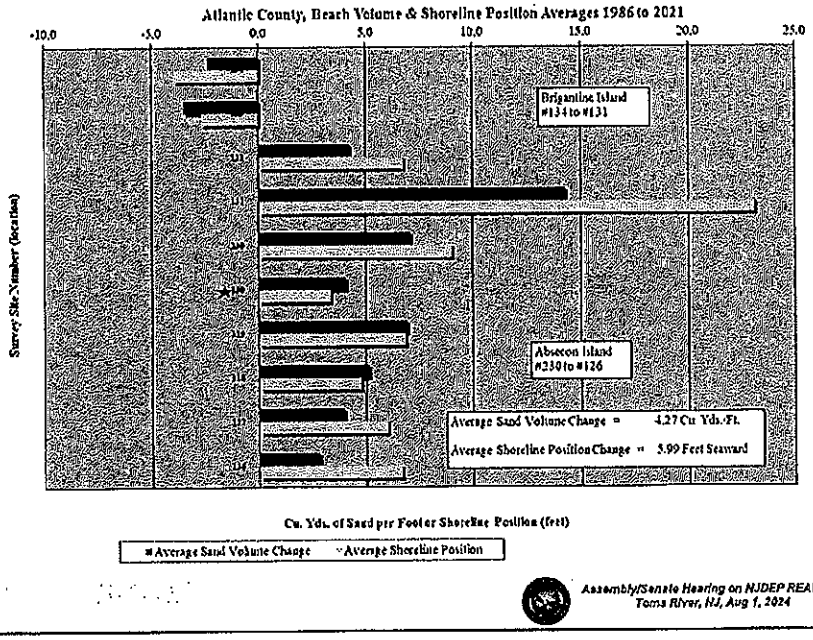


Assembly/Senate Hearing on NJDEP REAL rule
Toms River, NJ, Aug 1, 2024

9

Atlantic County





Assembly/Senate Hearing on NJDEP REAL rule
Toms River, NJ, Aug 1, 2024

10

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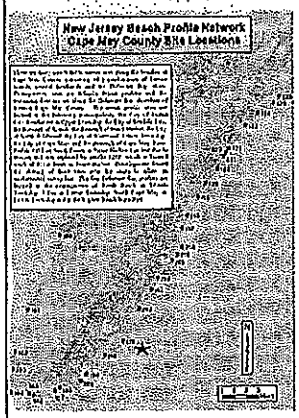
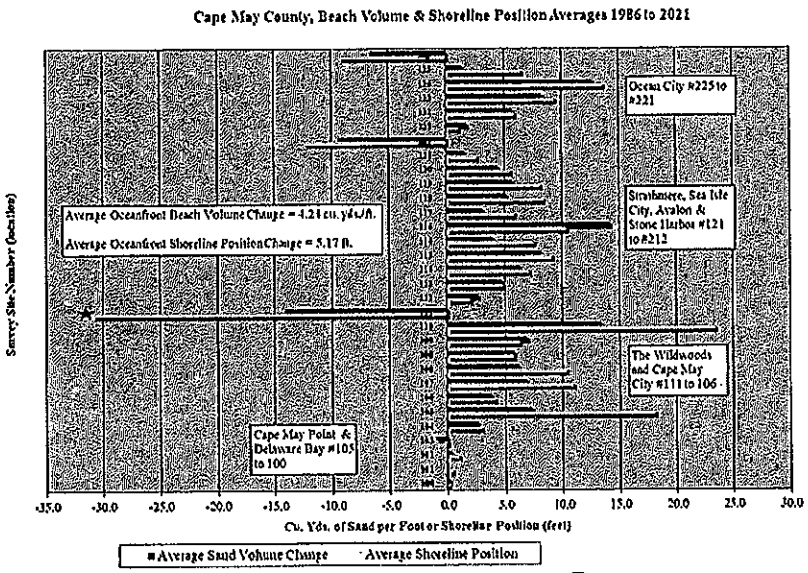
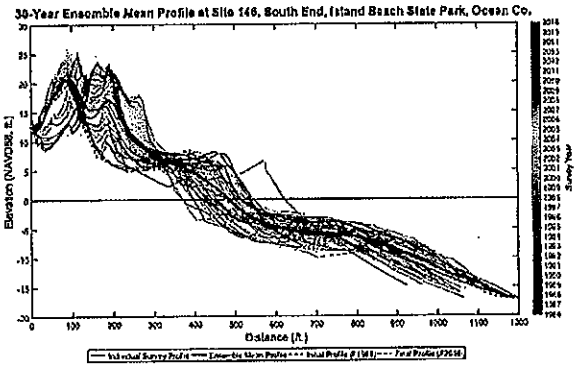
Cape May County

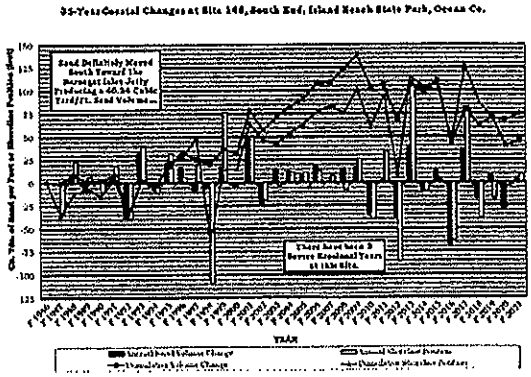




11

Site #146 – Island Beach State Park (South End)





12

16x

AMERICAN LITTORAL SOCIETY
18 Hartshorne Drive, Suite 1, Highlands, NJ 07732

Coastal Resilience and Habitat Restoration Projects
Of
The American Littoral Society
Along the New Jersey Coast

PhotoLog

Presented to

The Assembly Environment and Solid Waste Committee
Assemblyman James J. Kennedy, Chair

The Assembly Special Committee on Infrastructure and Natural Resources
Assemblyman Robert J. Karabinchak, Chair

October 6, 2022

(732) 291-0055 www.littoralsociety.org

17x

American Littoral Society Project Photolog
Monmouth County and Barnegat Bay

Wreck Pond, Spring Lake and Sea Girt, Monmouth County, NJ

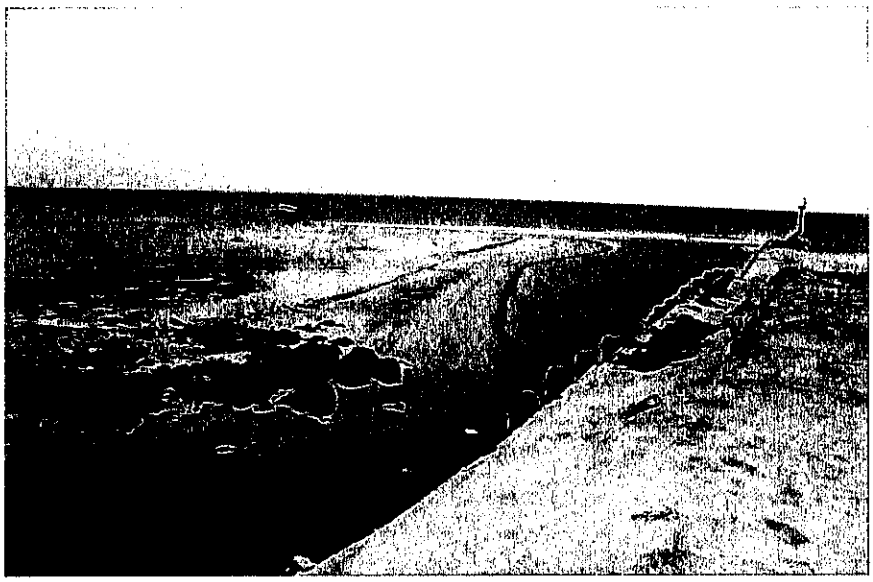


Figure 1: BEFORE - Wreck Pond Inlet facing East showing original outfall pipe

Figure 2: AFTER – Aerial view looking west showing the installation of the fish passage culvert adjacent to original outfall pipe

18x

Old Mill Dam Fish Ladder, Spring Lake Heights, Monmouth County, NJ

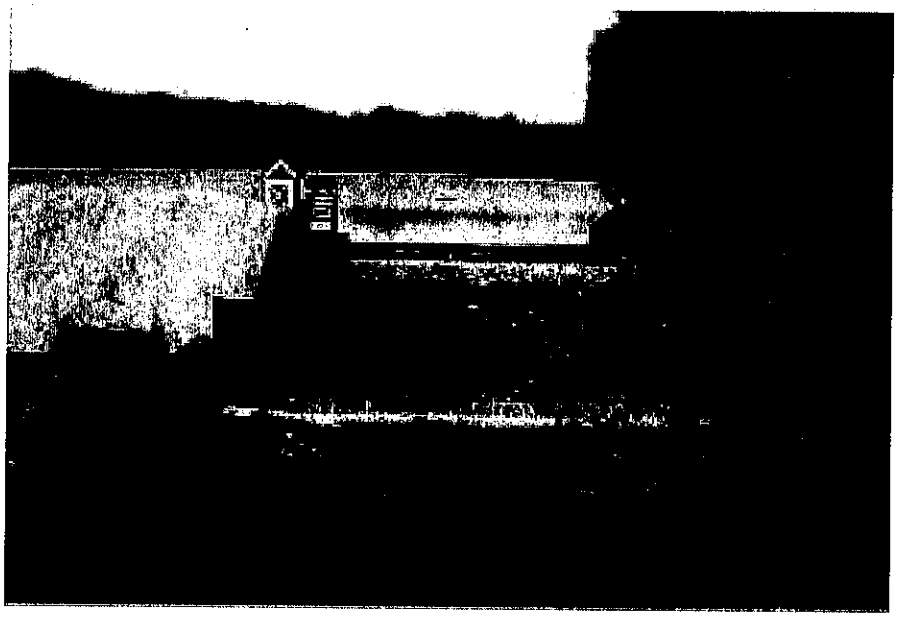


Figure 3: BEFORE – Old Mill Dam facing West

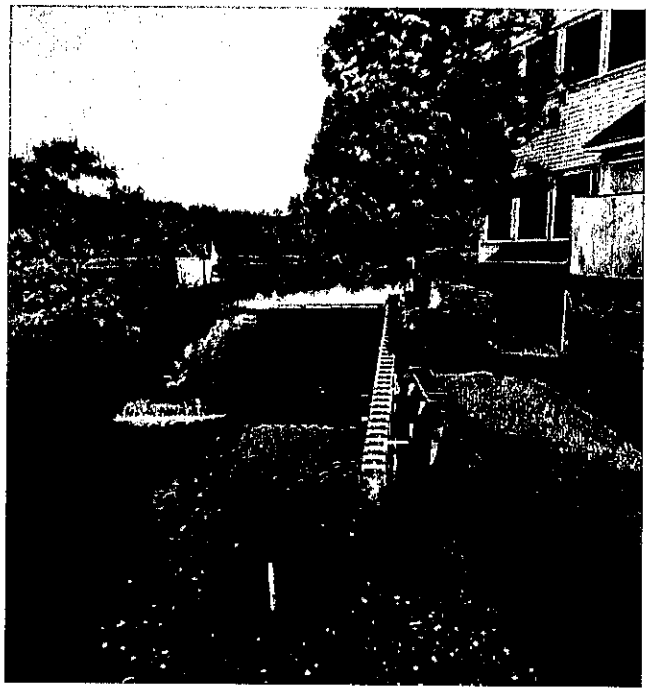


Figure 4: AFTER – Installed Alaska Steeppass fish ladder on the north side of Old Mill Dam facing West

Slade Dale Sanctuary, Point Pleasant, Monmouth County, NJ

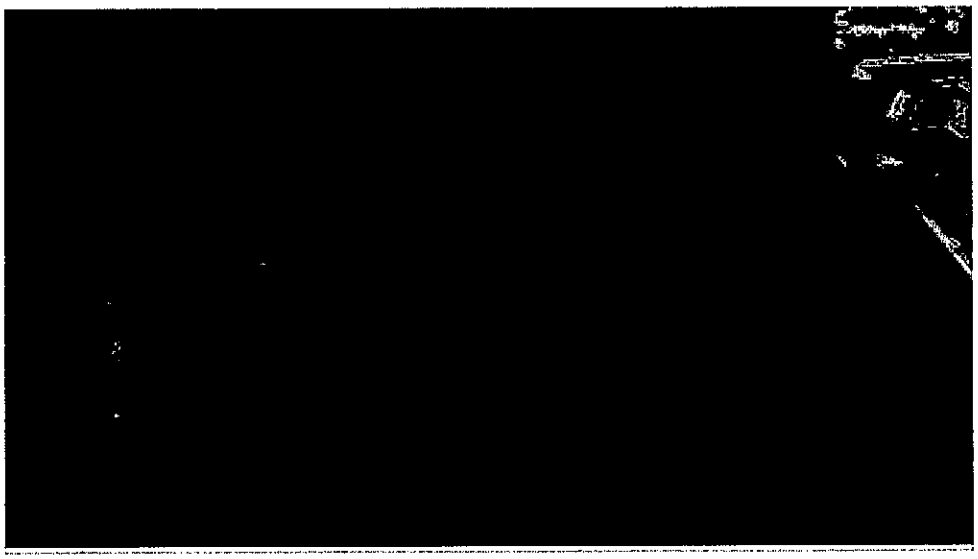


Figure 5: BEOFRE – Slade Dale Sanctuary facing North

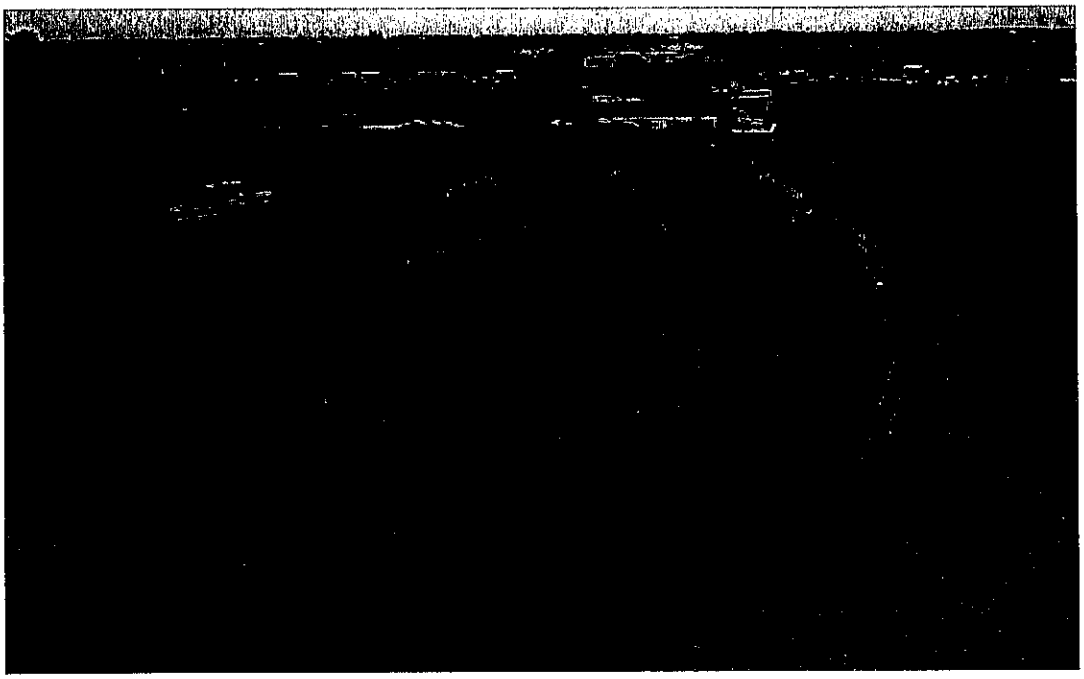


Figure 6: AFTER – Tree branch box breakwaters at Slade Dale Sanctuary. View facing East

20x

Bradley Beach Maritime Forest, Bradley Beach, Monmouth County, NJ

Figure 7: BEFORE – Aerial view showing Bradley Beach DPW storage parking lot

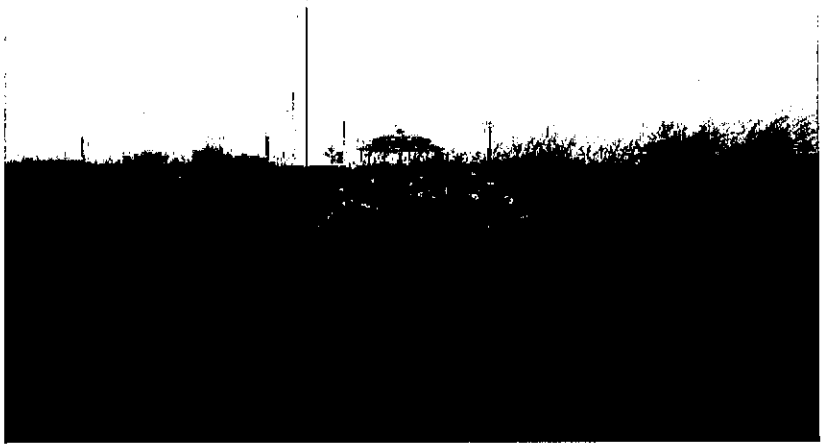


Figure 8: AFTER – Fully planted maritime forest with walking path facing East

Shark River Island, Neptune City, Monmouth County, NJ

Figure 9 (left): BEFORE – Aerial view of Seaview Condo Association and eroding shoreline and marsh
Figure 10 (right): BEFORE – Shark River Island shoreline facing South

Figure 11 (left): AFTER – Vegetated berm and eco blocks stabilizing shoreline facing West
Figure 12 (right): AFTER – Vegetated marsh with rip-rap breakwater facing North

Forked River Beach, Forked River, Ocean County, NJ

Figure 13: BEFORE – Erosion along Forked River Beach. The red arrow indicates a portion of beach where property owners have now faced property damage. The red circle indicates where shuffle board courts once existed

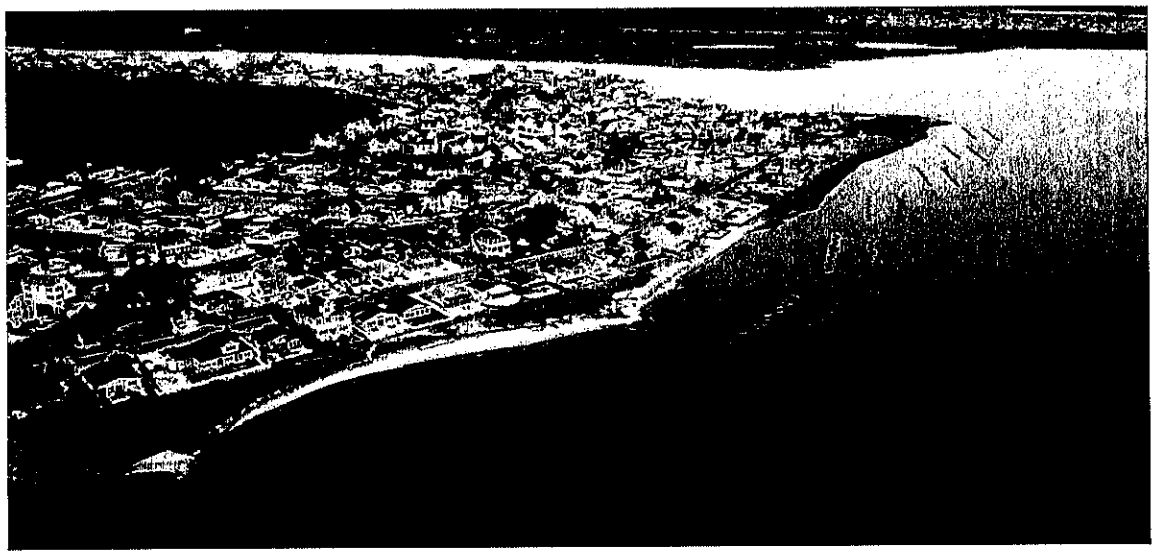
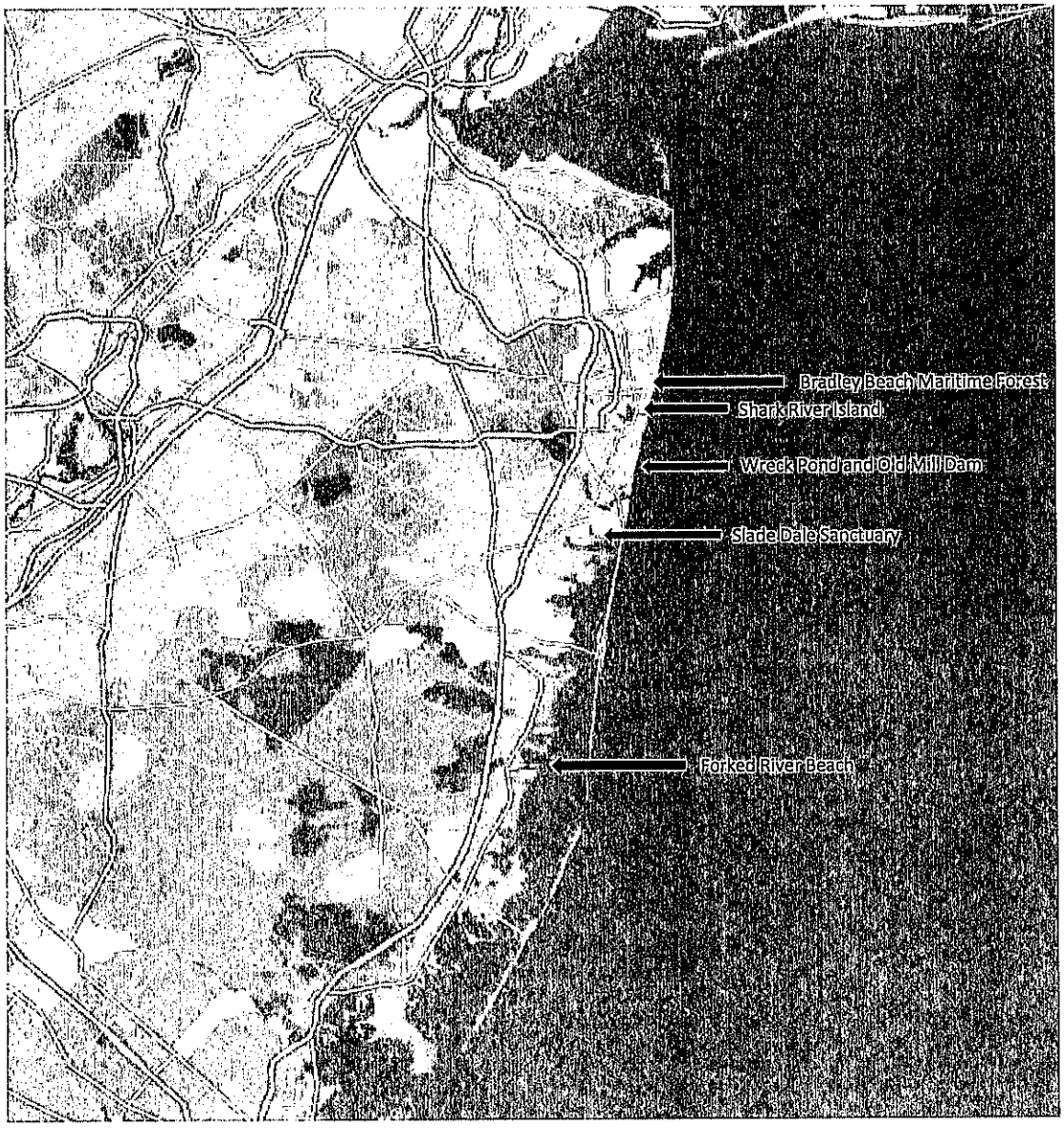


Figure 14: AFTER – Seven (7) implemented breakwater oyster reefs, double rowed, facing North

Project Site Locations, Monmouth and Ocean County, NJ



Cumberland & Cape May County, Delaware Bay

Maurice River, Commercial & Maurice River Townships, Cumberland County, NJ

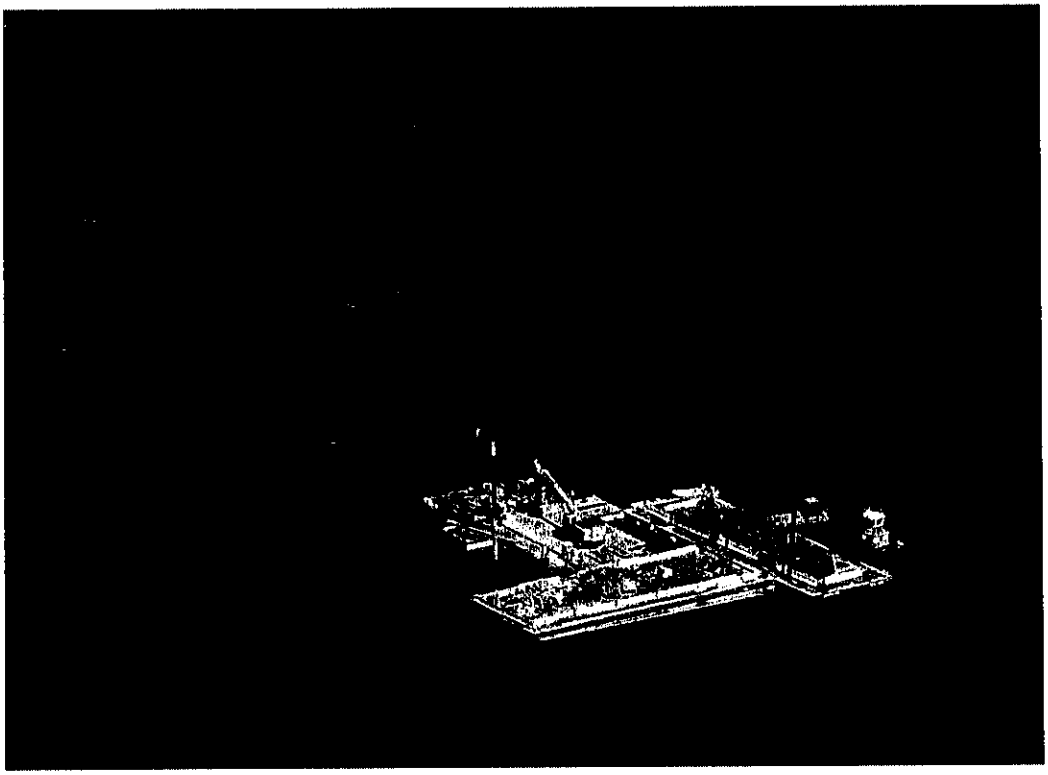


Figure 15: Beginning stages of revetment construction and restoration at the tip of Basket Flats at the mouth of the Maurice River. August 2022. Project in progress.

Thompsons Marsh, Maurice River Township, Cumberland County, NJ

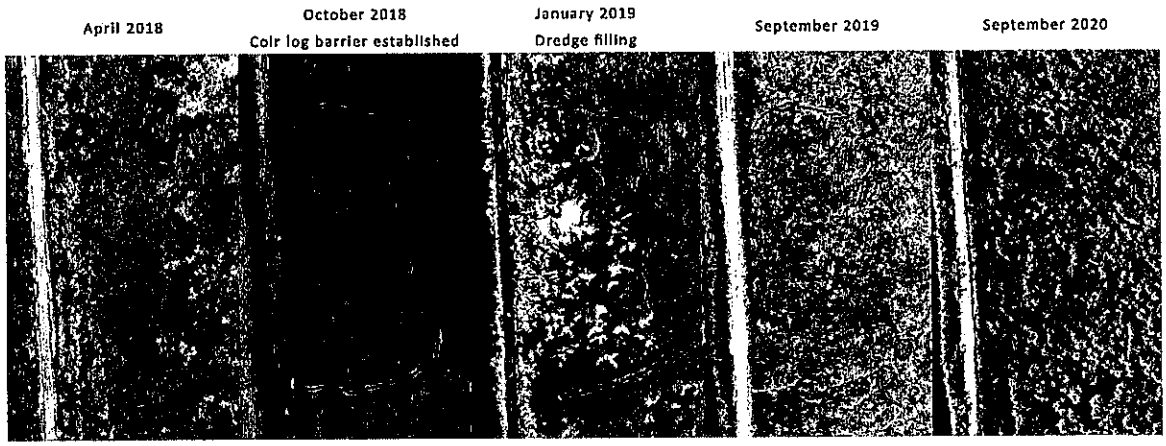


Figure 20: Thompsons Marsh timeline series depicting prior conditions through two years after coir log barrier placement and dredge fill.

25x

Fortescue, Downe Township, Cumberland County, NJ

Figure 16: BEFORE – Exposed rubble and concrete core dune at Fortescue. 2014.

Figure 17: AFTER – Rubble removal and sand placement at Fortescue. 2014.

Thompsons Beach, Maurice River Township, Cumberland County, NJ

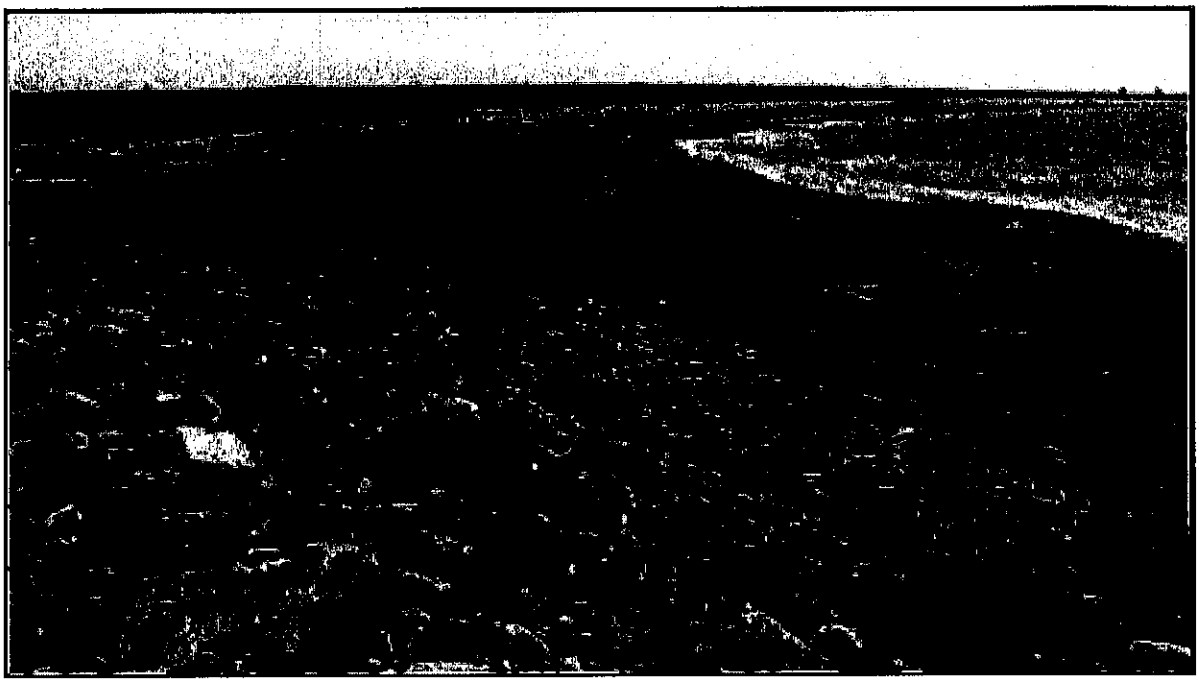


Figure 18: BEFORE – Rubble and eroded beach face at Thompsons Beach. April 2014.

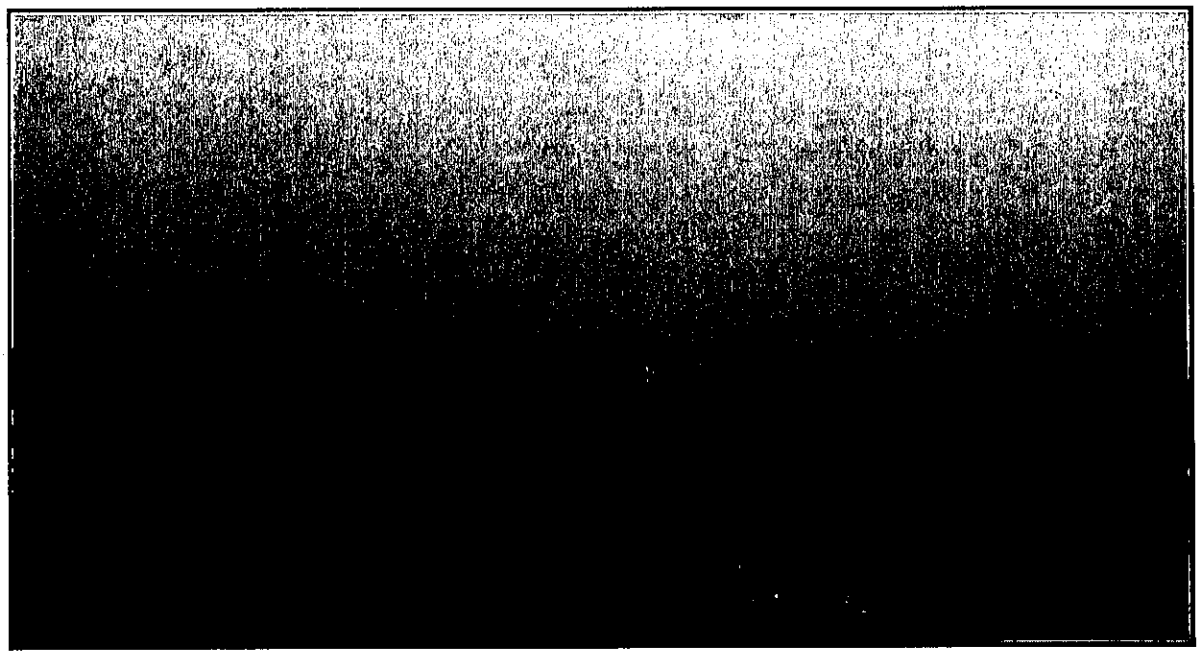


Figure 19: AFTER – Thompsons Beach after rubble removal and sand placement. April 2014.

Reed's Beach, Middle Township, Cape May County, NJ

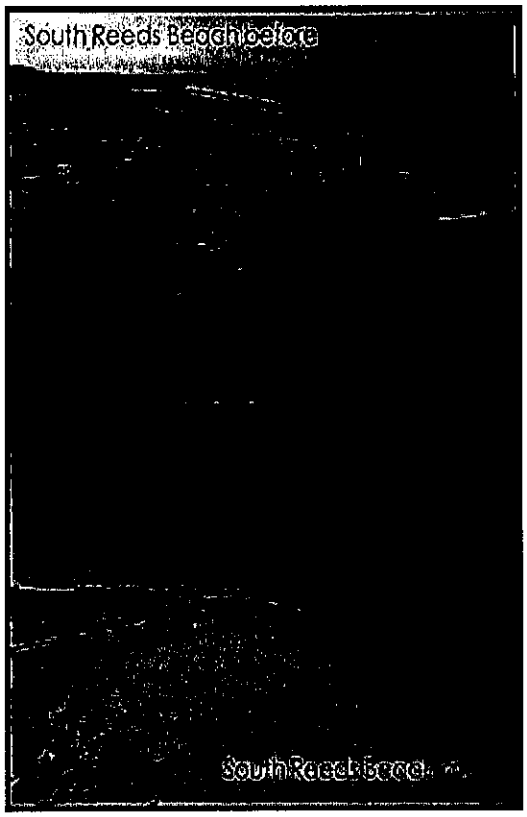


Figure 21: Before and after rubble removal and sand placement at Reed's Beach. 2014.

Figure 22: Intertidal shell bag reef pictured shortly after construction in at Reed's Beach. April 2014.

Cook's Beach, Middle Township, Cape May County, NJ

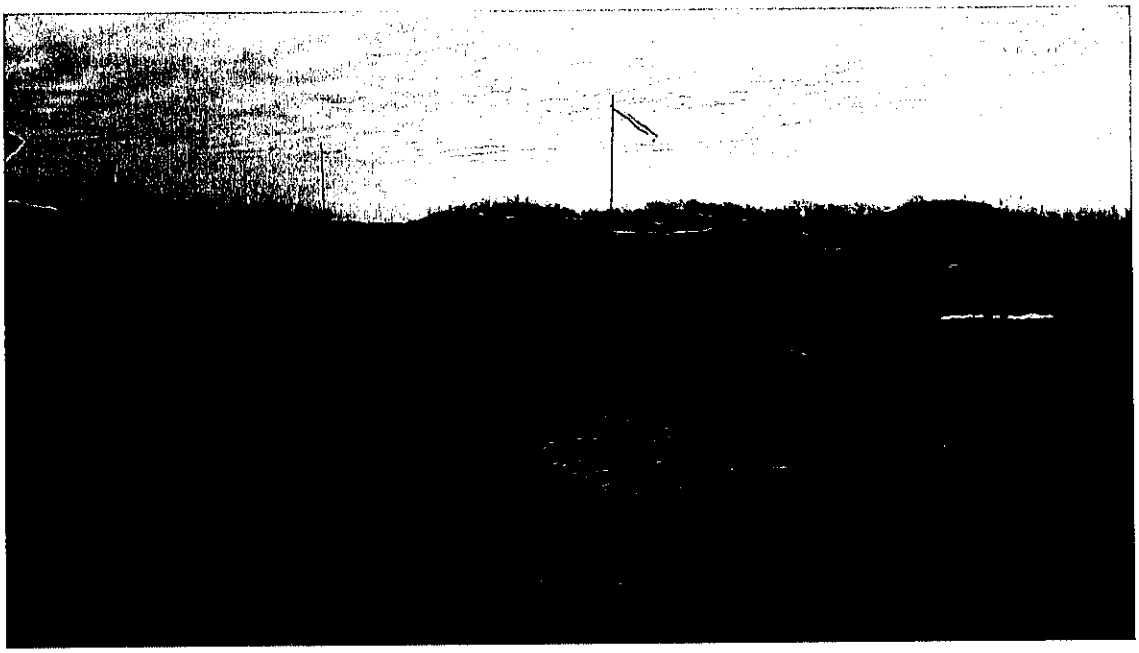


Figure 23: BEFORE – Eroded beach face prior to sand placement at Cook's Beach. April 2019.

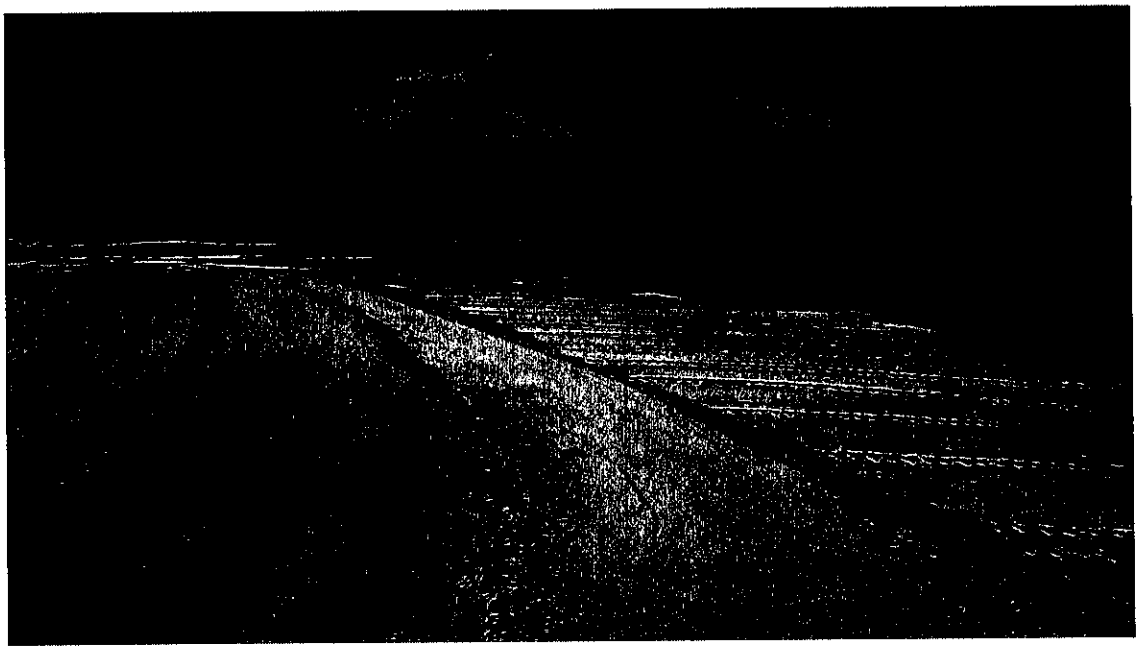


Figure 24: AFTER – Beach face after sand placement at Cook's Beach. April 2019.

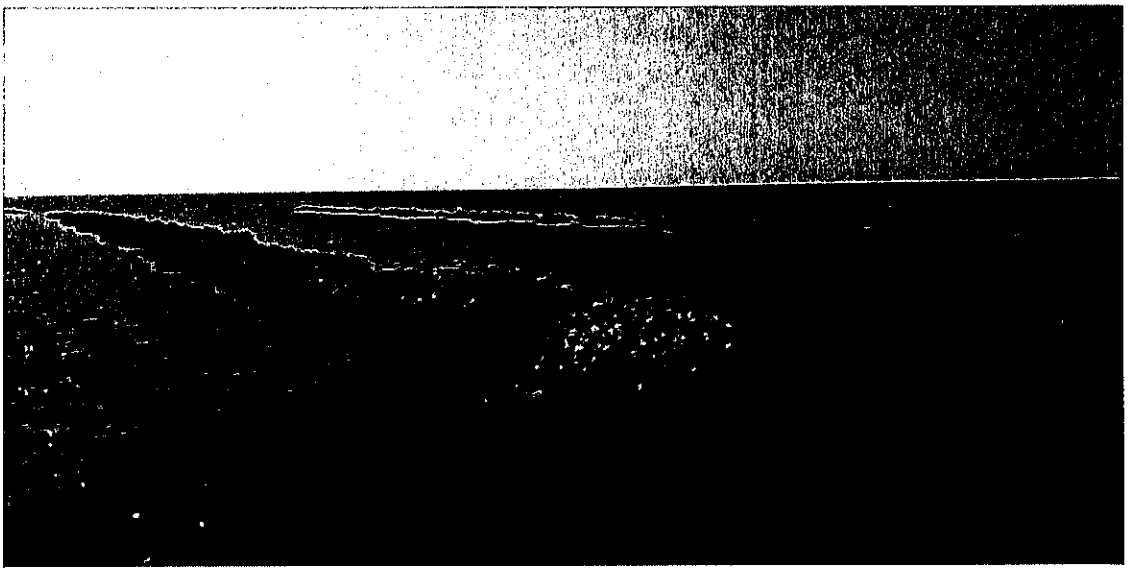


Figure 25: Cooks Beach intertidal shellbag reef shortly after installation. 2019.

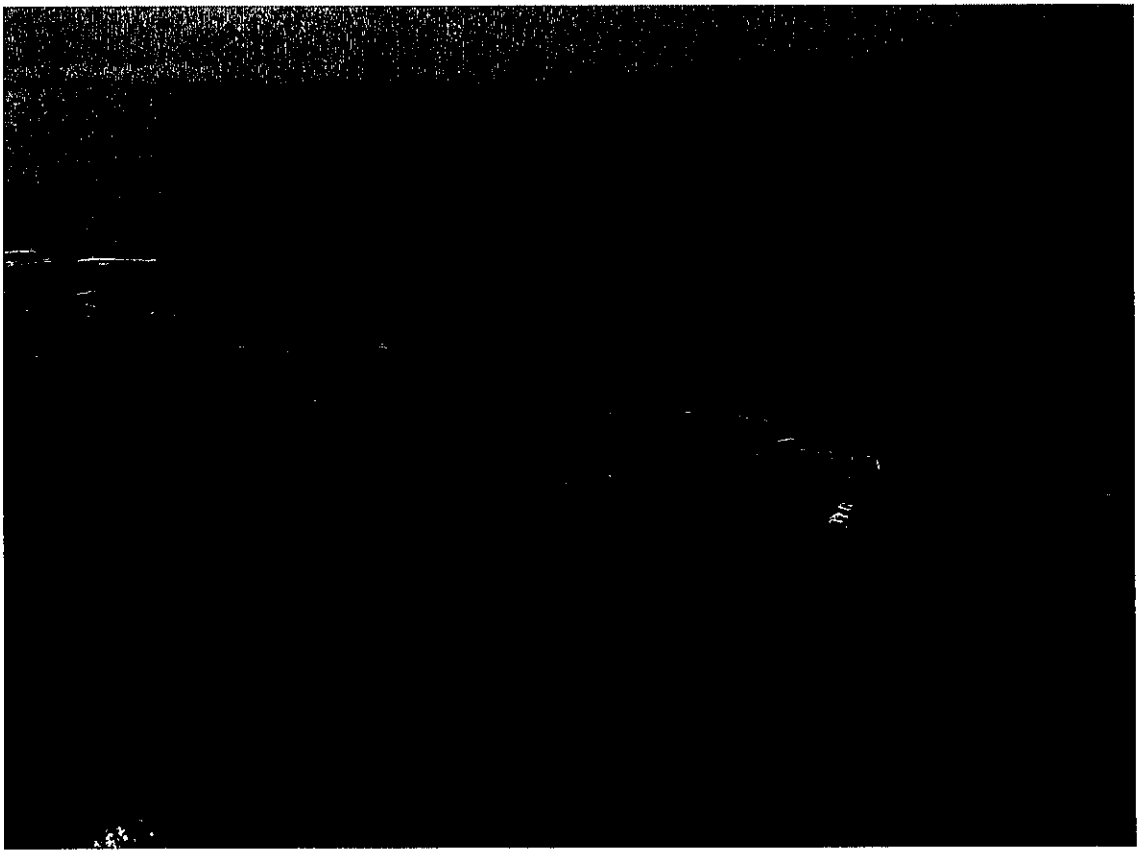


Figure 26: AFTER – Aerial view of Cook's Beach after reef installation and in the final stages of sand berm construction. April 2020.

Pierce's Point, Middle Township, Cape May County, NJ

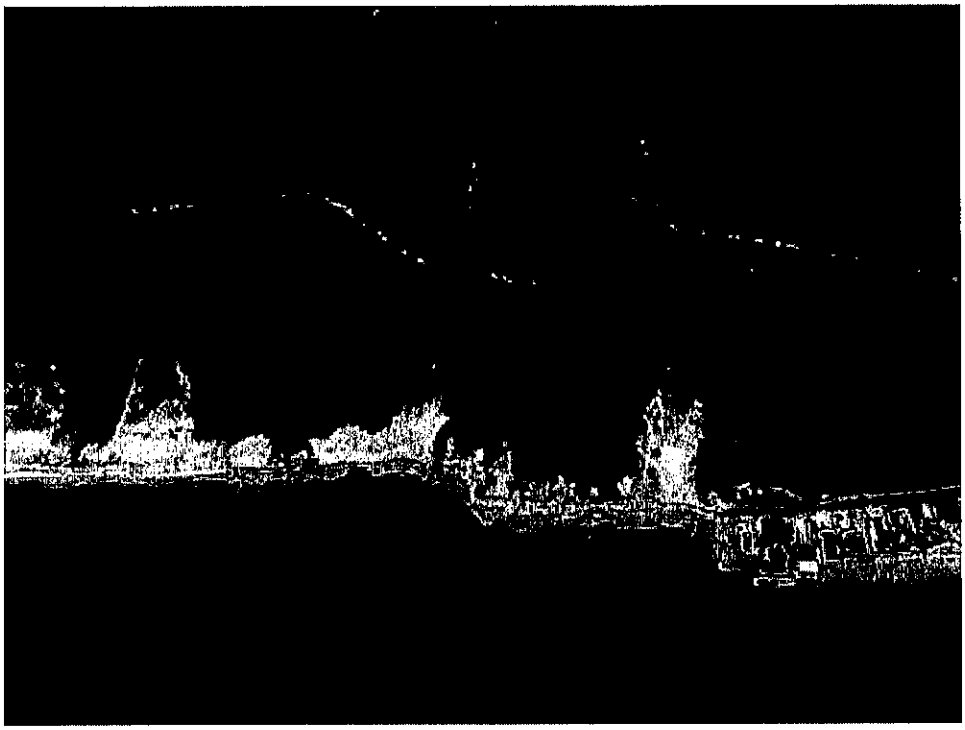


Figure 27: BEFORE – Aerial view of two overwash areas at Pierce's Point. March 2021.

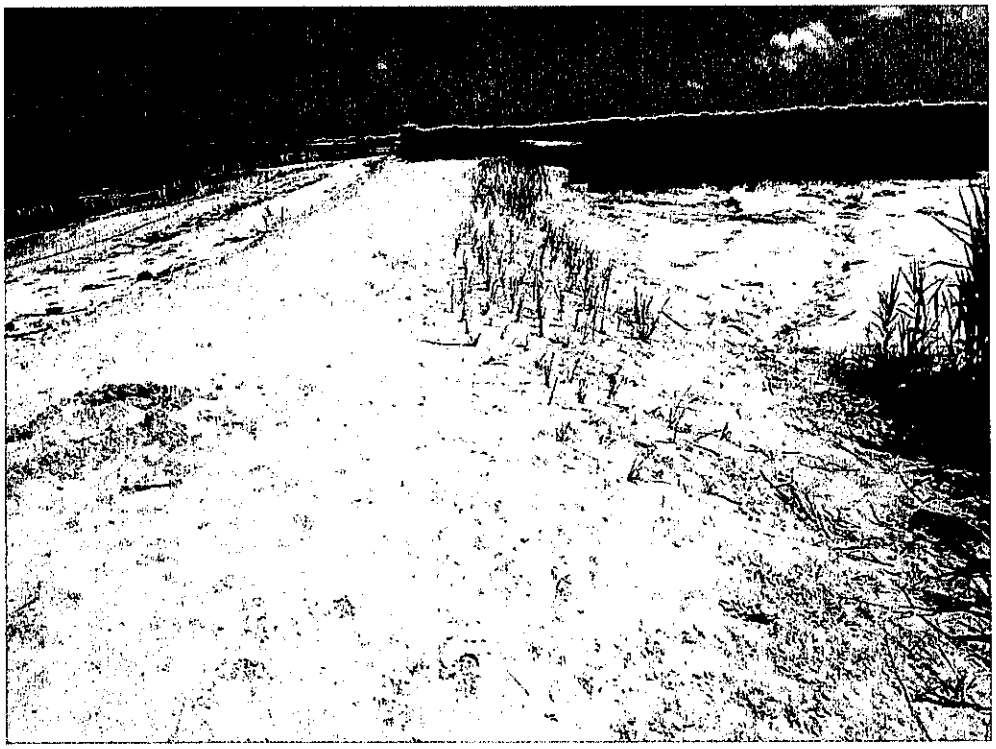


Figure 28: AFTER – Completed berm and planting in progress. April 2021.

Barrett's Run, Hopewell Township, Cumberland County, NJ

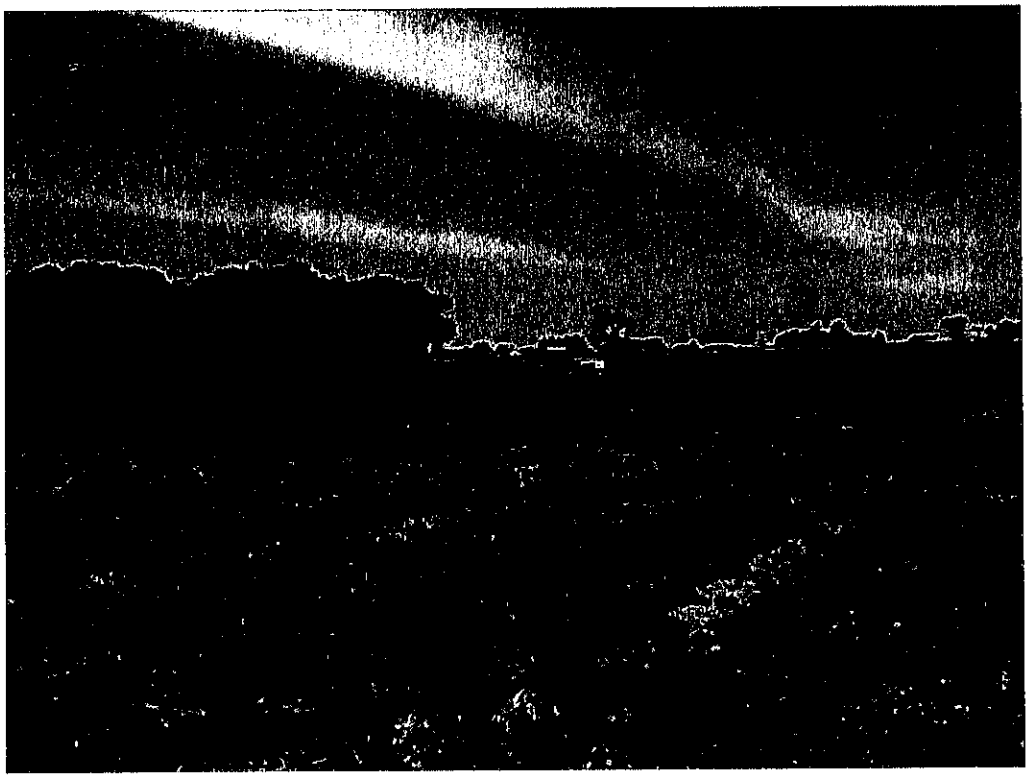


Figure 29: BEFORE – Barrett's Run Grassland as a former farm field prior to restoration and plantings. 2015.

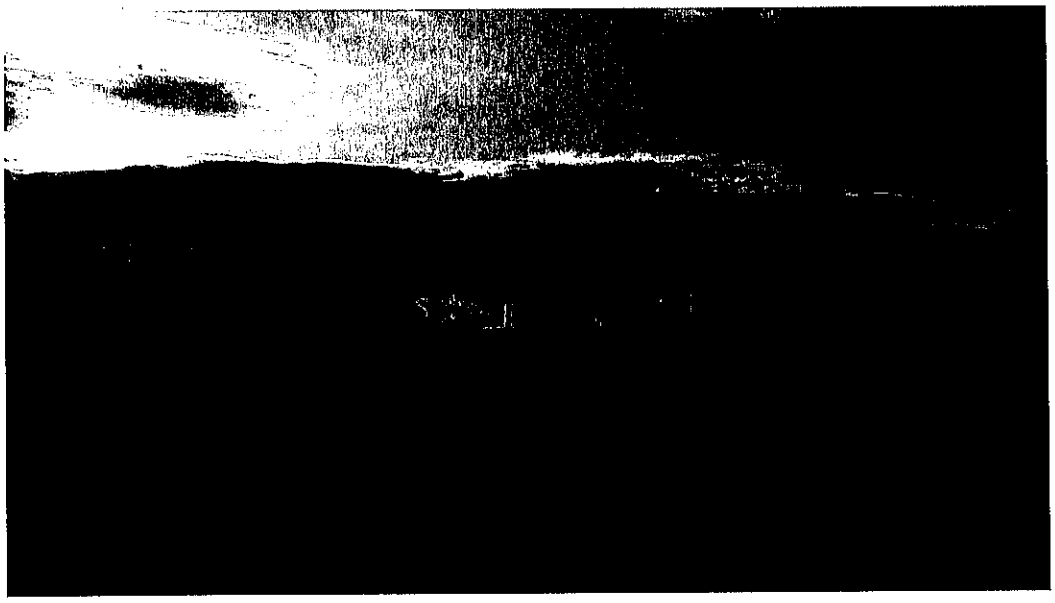


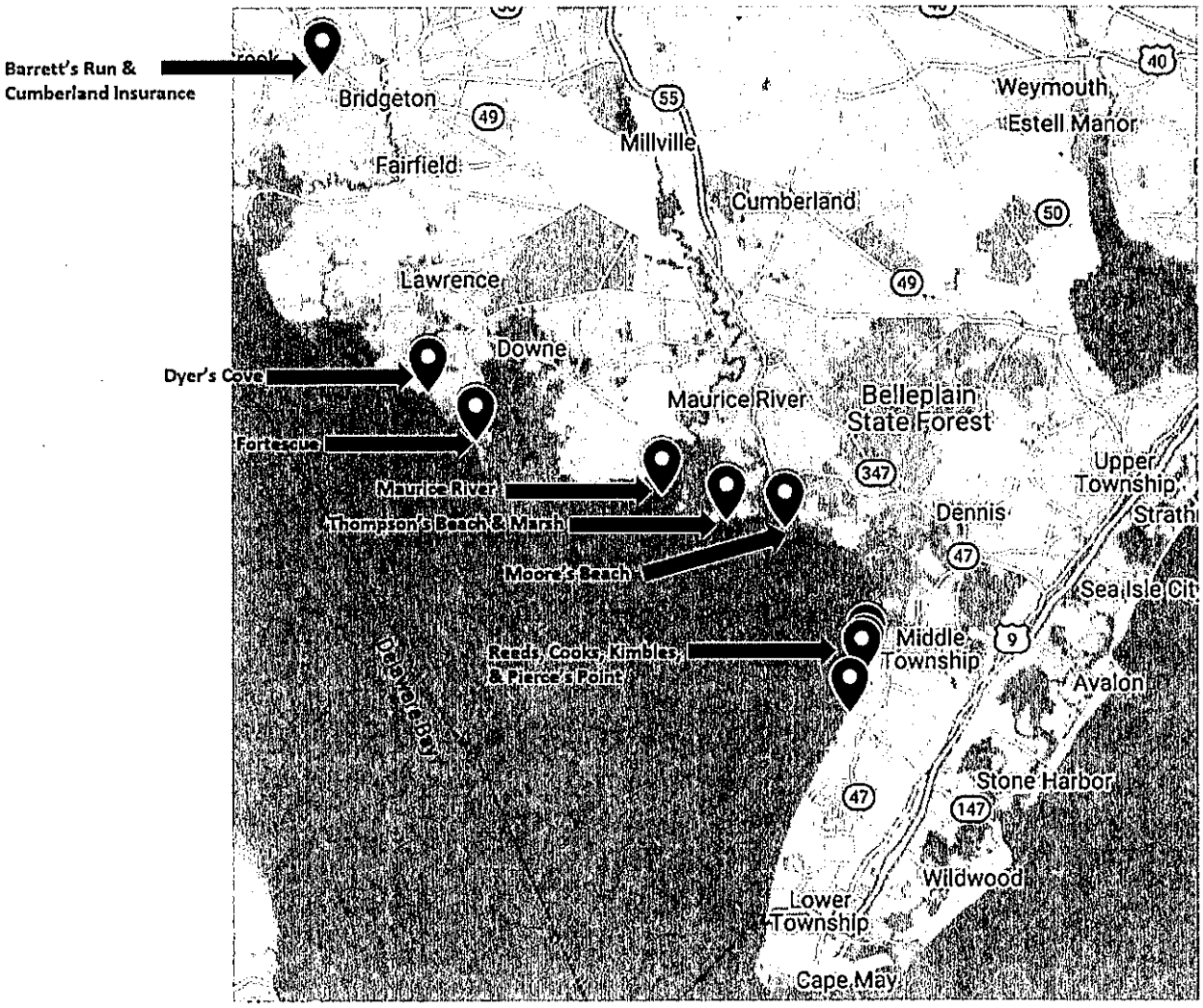
Figure 30: AFTER – Native grasses, trees, and pollinator garden complete after a few years of plantings. In addition, several educational signs and shade pergolas place. April 2019.

Cumberland Insurance, Hopewell Township, Cumberland County, NJ

Figure 31: BEFORE – Severe erosion and runoff from adjacent farm field next to Barrett's Run stream. April 2017.

Figure 32: AFTER – check dams and grass mats after restoration to slow runoff into Barrett's Run. April 2019

Project Site Locations, Cumberland and Cape May County, NJ



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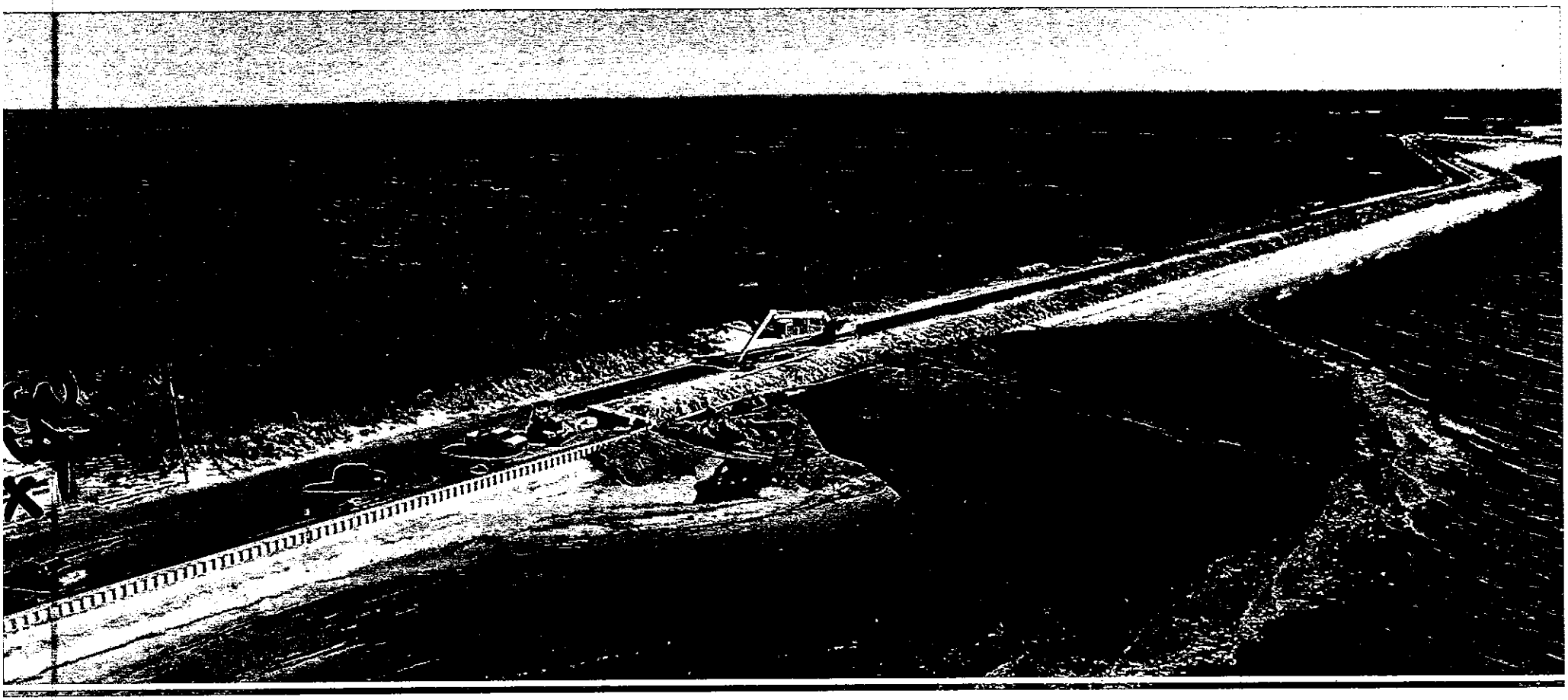


Fortescue Beach 2022 – 35,000 cy – NJDOT/Society

Fortescue Beach Most Recent Restoration

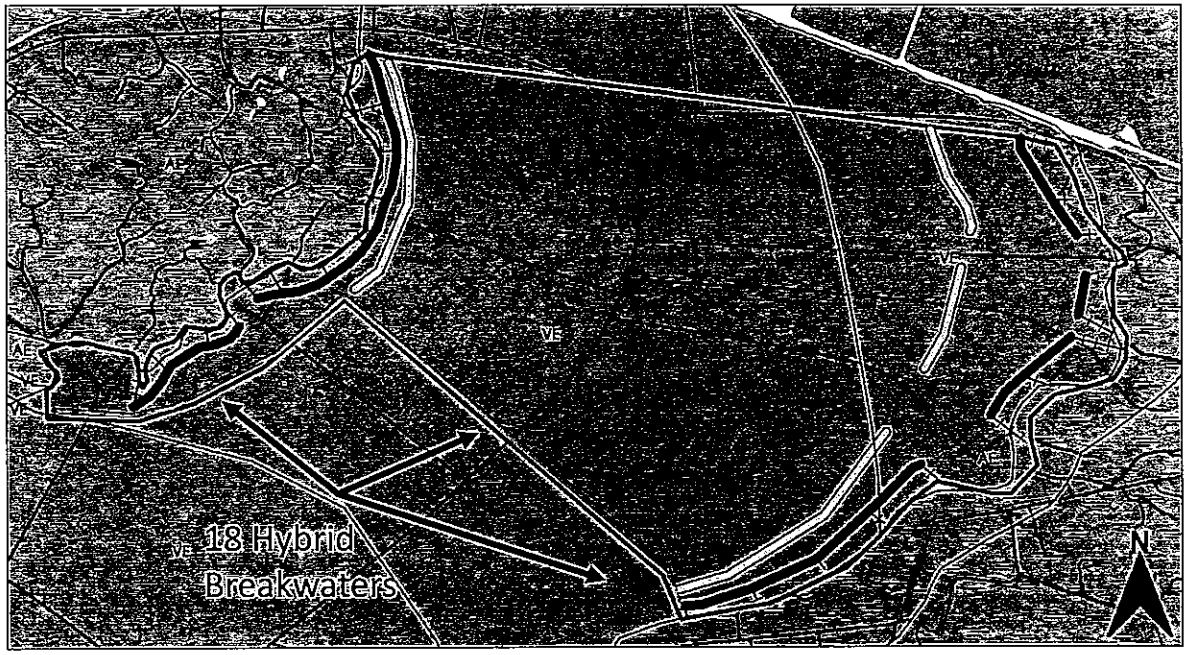
- February 2024 - Trucked-in sand was 13,141 tons
- NJDOT dredged sand placement was approximately 35,000 cubic yards (2022)
- March 2024 - 800 tons of rock placed

https://drive.google.com/file/d/1X9EmKBj-Fc4v_9E9QezlYXGupGR7WMZr/view

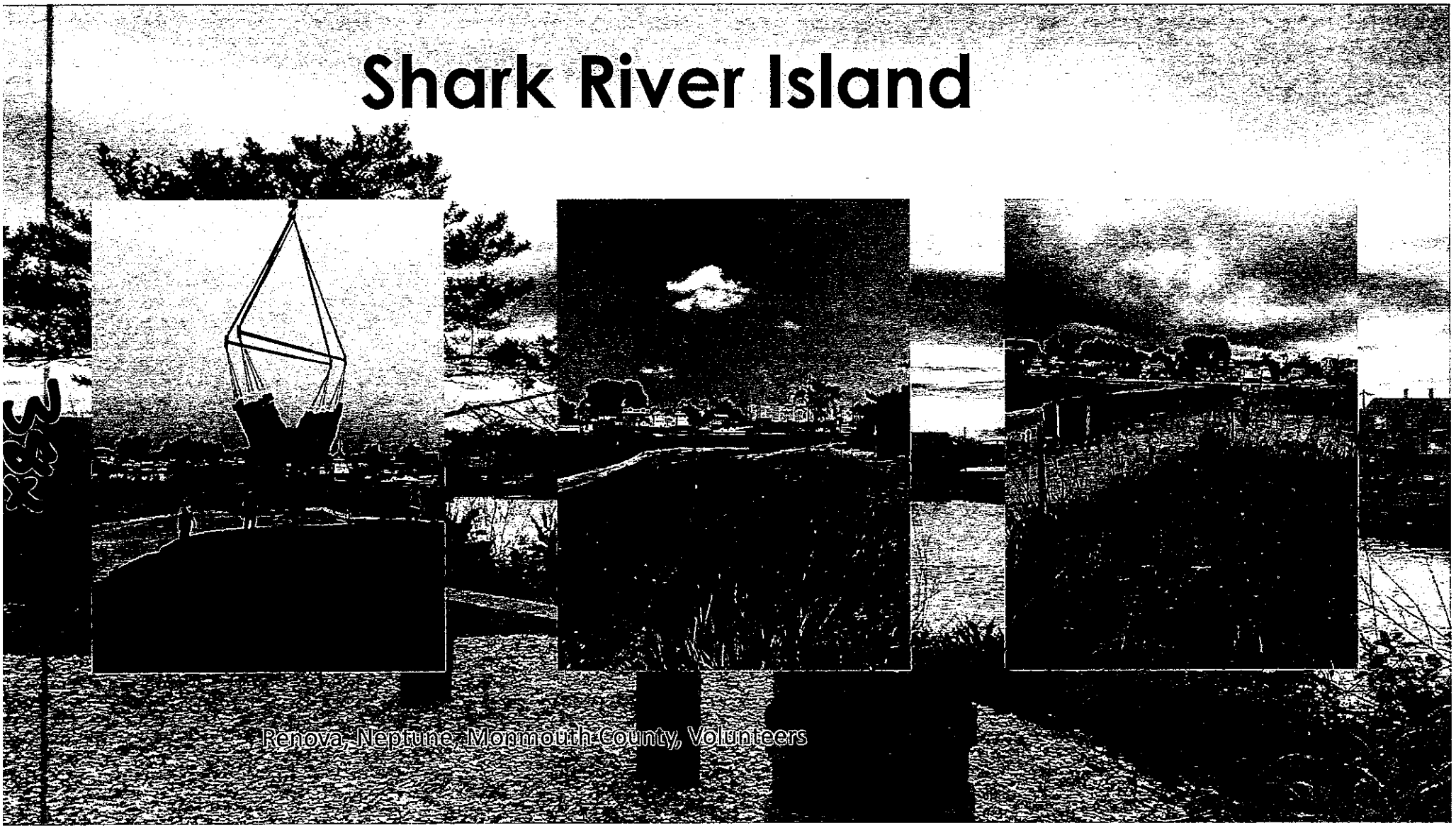
Mouth of the Maurice River NJDEP Natural Climate Solutions Grant

20+ Acres

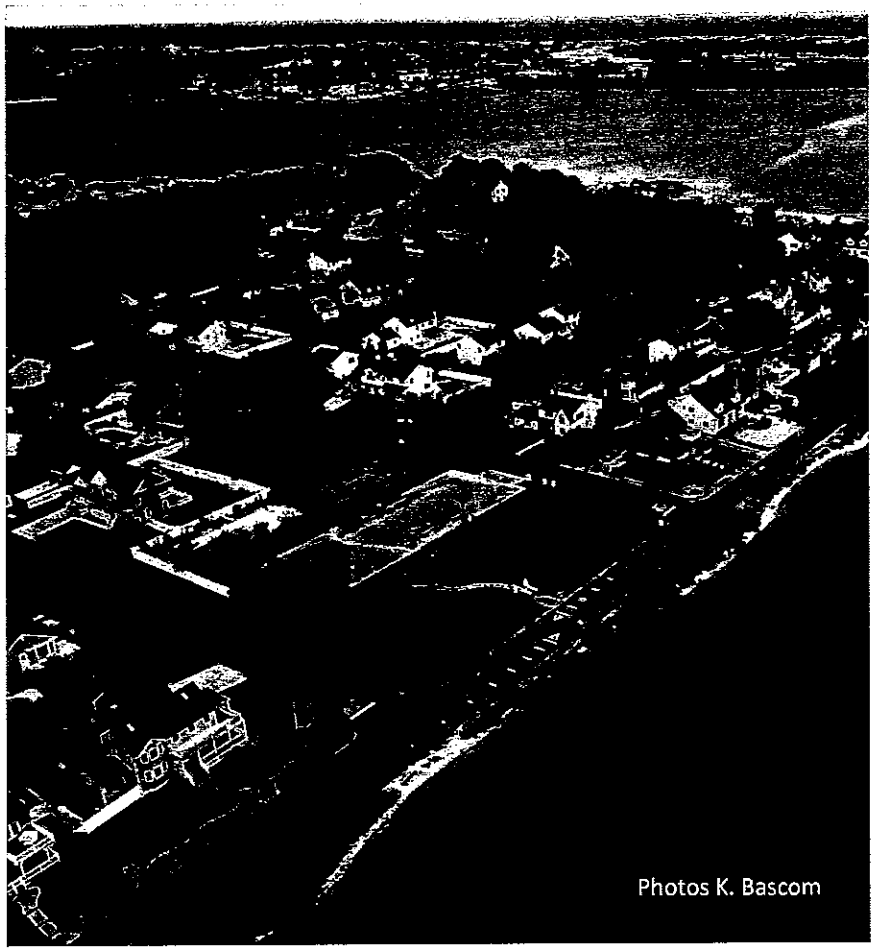
Northwest Reach Project Area Plan



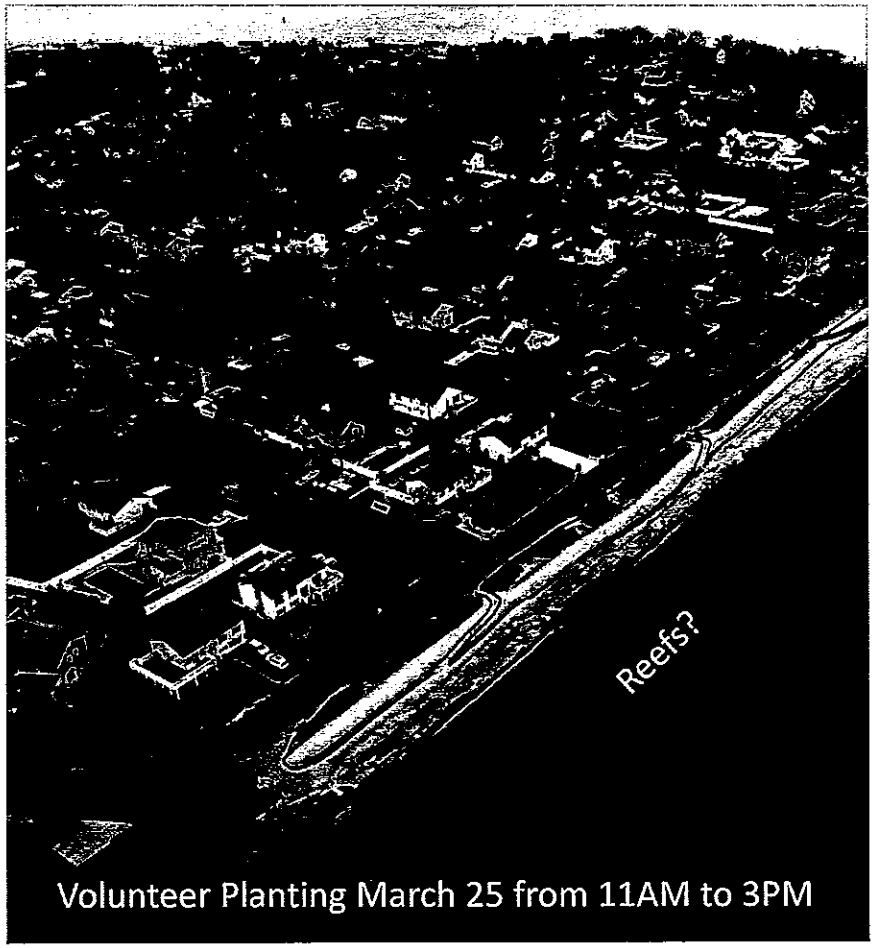
Shark River Island



Renova, Neptune, Monmouth County, Volunteers



Photos K. Bascom



Volunteer Planting March 25 from 11AM to 3PM

NJBIA
New Jersey Business & Industry Association

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Trenton, NJ 08608-2002

609-393-7707
www.njbia.org

Michele N. Siekerka, Esq.
President and CEO

Christopher Emigholz
Chief Government Affairs Officer

Raymond Cantor
Deputy Chief Government Affairs Officer

Althea Ford
Vice President

Elissa Frank
Vice President

Kyle Sullender
Director of Economic Policy Research

Testimony Before the Senate Environment and Energy Committee and the Assembly Environment, Natural Resources and Solid Waste Committee

Presented by Ray Cantor, New Jersey Business & Industry Association

August 1, 2024

On behalf of the New Jersey Business & Industry Association, thank you for the opportunity to provide written testimony on the proposed New Jersey Department of Environmental Protection rules entitled PACT REAL. This proposal seeks to establish new standards for certain coastal development in anticipation of changes to sea level rise over the next 76 years. While this rule also contains significant changes to land use rules in general, and its applicability covers the entire state, we will focus our comments on how these rules will impact the New Jersey coast, from the Hudson River to the Raritan, along the Atlantic Ocean, our bays, and up the Delaware River to Trenton.

At the outset, NJBIA understands the very real risk of sea level rise and the historic problem of coastal storms. We can and must address these issues in a comprehensive manner. NJBIA believes we must plan for these eventualities and build structures and ecosystems that are resilient. We do not support, as these rules promote, the massive managed retreat from the Jersey Shore and our coastal communities.

We strongly object to this rule proposal because it will significantly harm the economy of our shore and river communities and is premised on the policy that people and businesses should be forced to retreat from coast. Whether we choose a "managed retreat" or not should be a matter of open public debate, and ultimately decided by the Legislature, not hidden, or not so hidden, in a long, complicated rule proposal that makes it nearly impossible for these communities to continue as viable economic entities.

While this rule is long, detailed, and complex, and touches on land use standards throughout the entire state, and thus worthy of a much longer analysis, this testimony will focus on the key impacts to the shore and river communities, and their residents, should it be adopted in its current form.

The rule proposal contains the following fundamental flaws:

Drives a Managed Retreat from the Shore and Coastal Communities – The rule seeks to prevent new, expanded, reconstructed, and even improved development in a newly created "inundation risk zone" (IRZ). The goal of the rule is to force existing residents and businesses from these vast areas and to prevent new development from occurring. The rule does this in several ways:

- Using an outdated and flawed study, assumes a 5-foot sea level rise with a 17% probability by the year 2100 and applies those standards today to create the IRZ;

40x

- Eliminates coastal centers on barrier islands resulting in a 3% impervious cover limit for development in all barrier islands;
- Provides that the IRZ is a critical environmental site and subjecting any development in the IRZs to 3% impervious cover;
- Apply the IRZ standards to commercial and residential development that is new, redeveloped, and reconstructed, as well as substantially improved. Thus, even improvements to an existing building without a footprint expansion can trigger the IRZ requirements.

Impact on Property Values and Property Taxes Collected – If a building needs any DEP permit, even for minor activities such as a bulkhead replacement, the permittee will be required to place a deed notice on the property informing future purchasers that the property will be subject to being flooded on a continual basis.

- This deed notice will have the impact of reducing property values and maybe even the ability to be financed;
- The impervious cover requirements will limit development potential on site, and even imperial existing development, thus lowering property values;
- If property values are decreased, tax appeals will follow thus depriving revenues from the relevant municipalities, counties, and school districts.

Creates Vast "No Build Zones" – By placing stringent building standards, deed notices, and limiting the impervious cover requirements to 3% in the IRZ, the rules will effectively create "no build zones." While the total land covered by the IRZ may be low in comparison to the whole state, they can be significant in coastal areas and counties. For instance, 43% of Cape May will be in an IRZ and thus a "no build zone."

Impacts Affordable Housing – By removing significant areas of coastal communities from being developed, either because they are in the IRZ or the vastly expanded flood hazard areas, less affordable housing will be built.

Flawed Science – The creation of the IRZ and expanded flood hazard areas (Climate Affected Flood Elevations or CAFE) is based on a 2019 report out of Rutgers (STAP report) that is now outdated and based on flawed assumptions. No other jurisdiction in this or any other country regulates development with a presumption of a 5-foot sea level rise. All the scientific reports released after the STAP report all predict a sea level rise in New Jersey of between 1-3 feet by the turn of the century. We recommend adopting a 2-foot SLR standard as it is both protective, consistent with the latest scientific studies, and can be adjusted in decades to come if actual measurements of SLR show an increased level.

No Planning for Resiliency – Despite claiming that this rule is being proposed to enhance resiliency, there are no provisions that seek to plan or implement resiliency measures. In fact, even if resiliency measures are put in place to protect against flooding (*e.g.* Hoboken) the rule does not recognize those measures when establishing the IRZ or CAFE maps.

Impacts on Urban Redevelopment – The rules would limit urban development and redevelopment by:

- Removing IRZs from centers and other areas of denser development thus subjecting those areas to 3% impervious cover. This means that even developed areas like Jersey City, Hoboken, Long Branch, and Asbury Park will have large IRZs and thus no build zones contained within them;
- Imposing stringent stormwater requirements in urban areas that previously only applied to greenfields, thus limiting how much redevelopment can occur and making many projects economically infeasible.

NJBIA strongly believes that the state should adopt policies of coastal resilience so that the vast majority of coastal communities can continue to exist and economically thrive.

This rule would do the opposite. We believe that we need to consider sea level rise in our planning efforts. However, this rule will force a retreat from the Jersey Shore and coastal communities. It is also based on flawed scientific assumptions. We ask that the Legislature perform its oversight functions and reject this rule proposal. Instead, the Legislature should promote policies on coastal resilience.

THE JERSEY SHORE PARTNERSHIP
The Sand on the Beach People

August 1, 2024

Dear Senator Smith, Assemblyman Kennedy, and Esteemed Members of the Senate Environment and Energy Committee and the Assembly Environment, Natural Resources, and Solid Waste Committee:

Thank you for allowing me to submit my testimony today.

My name is Grace Hanlon, and I am the Executive Director of the Jersey Shore Partnership, the state's leading advocacy organization for the Jersey Shore for over 30 years. Our board comprises more than 40 dedicated professionals, including shore stakeholders, industry leaders, academics, environmentalists, and members of the tourism and hospitality sectors.

I am honored to present my testimony today. Having served as the Director of Tourism for New Jersey during Super Storm Sandy, I have seen firsthand the critical importance of protecting our shorelines and coastal communities.

First and foremost, I want to extend my gratitude to Governor Murphy, the Senate and Assembly Committees, and the New Jersey Legislature for including $50 million for the Shore Protection Fund in the Fiscal Year 2025 Budget. This funding is a crucial step in ensuring the resilience and sustainability of our beloved Jersey Shore. The Shore Protection Fund has been instrumental in fortifying our coast against the increasing threats of climate change, sea level rise, and severe weather events.

New Jersey's coastline is not just a stretch of sand and surf; it's a vital economic and ecological asset that needs our attention and protection. According to the New Jersey Division of Travel & Tourism, tourism generates over $49 billion in revenue annually, with $29 billion attributable to the state's coastline communities. However, this economic lifeline is constantly threatened by erosion and storm damage. We risk losing not only our beaches but also the livelihoods of those who contribute to the economic vitality of our state.

Recognizing the vulnerability of our shoreline, New Jersey legislators wisely, with bipartisan support, created the Shore Protection Fund in 1992 to provide a dedicated source of funding to address the state's ability to respond to natural disasters and leverage federal resources for coastal resilience projects.

The Jersey Shore Partnership, Inc. c/o John E. Gagliano EPS Corporation
78 Apple Street, Tinton Falls, NJ 07724 ~ jerseyshorepartnershipnj@gmail.com

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Today, I am here to urge your continued support for this critical initiative by backing **Senate Bill S2011** and **Assembly Bill A2253,** sponsored by Senators Vin Gopal and Vincent J. Polistina in the Senate and Assemblywoman Yvonne Lopez in the Assembly. These bills propose **to increase the amount annually credited to the Shore Protection Fund to $50 million**. This bipartisan legislation seeks to further bolster our shore protection efforts by ensuring a stable and consistent funding mechanism for the Shore Protection Fund. By codifying this commitment, we can provide a long-term safeguard for our coastal communities and natural habitats.

Senate Bill S2011 and **Assembly Bill A2253** are forward-thinking measures that recognize the ongoing and evolving challenges faced by our coastal areas. They propose to secure dedicated funding for beach replenishment, dune restoration, and other vital coastal defense projects. These initiatives are not only essential for protecting lives, property, and infrastructure but also for preserving the unique environmental and recreational value of the Jersey Shore.

Moreover, beach replenishment has proven to be a great investment. For every $1 spent on beach nourishment annually, beach tourists generate an additional $3,000 in economic output, $1,400 in direct spending, and $200 in taxes. However, this economic lifeline is constantly threatened by erosion and storm damage. We risk losing not only our beaches but also the livelihoods of those who contribute to our state's economic vitality.

In conclusion, I request that the members of these Committees support **Senate Bill S2011** and **Assembly Bill A2253.** Your backing will demonstrate a steadfast commitment to the protection and enhancement of New Jersey's coastline. Together, we can ensure that future generations continue to enjoy the beauty, vitality, and safety of our shore.

Thank you for your time and consideration. I am happy to answer any questions you may have.

Respectfully,

Grace Hanlon

Grace Hanlon
Executive Director, Jersey Shore Partnership
Former Director of Division of Travel & Tourism, New Jersey

cc: Senator Vin Gopal
Senator Vincent J. Polistina
Assemblywoman Yvonne Lopez