Microplastics in Southeastern North Carolina

A monitoring and recommendations report prepared by the

North Carolina Coastal Federation

2022-2023



North Carolina Coastal Federation
Working Together for a Healthy Coast

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What are Microplastics?

Microplastics are a category of plastic pollution defined as small pieces of plastic that are **less than 5 mm in size**. Fishing lines, broken down plastic bottle caps, and pieces of beach toys are a few common sources. Large plastic pollution will deteriorate through ocean wave energy and exposure to the elements. Through watershed functions, microplastics accumulate on shorelines usually near other debris at the high tide line or "wrack line." During flooding and king tide events, accumulated microplastics can be carried into larger waterways and the open ocean to join the hefty impact of marine debris.

Foam beads accumulate among wrack line debris

What are Microplastics?

The **five categories** of microplastics:

Fragments
- Rigid plastics
- Firm and brittle pieces

Pellets
- Plastic beads
- Nurdles

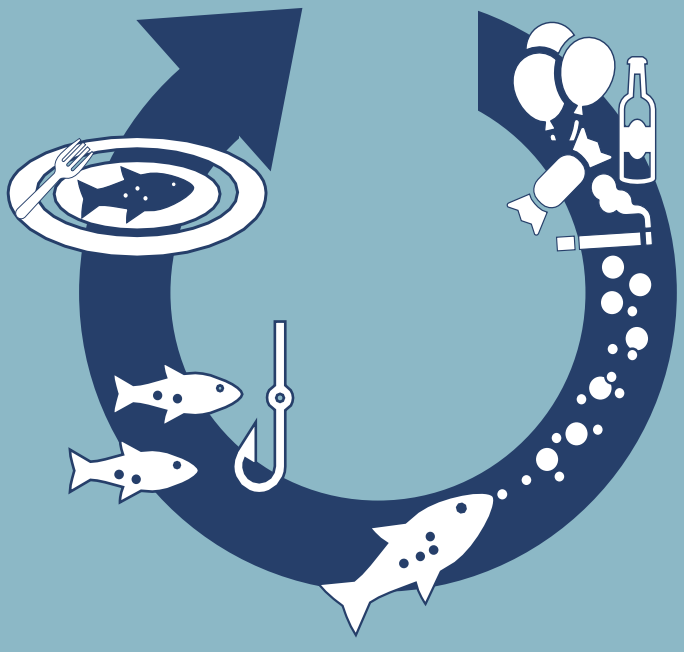
Lines
- Fishing lines
- Plastic ropes

Films
- Balloons
- Shopping bags

Foams
- Styrofoam ™ cups
- Take-out containers

While general marine debris creates many problems for the marine environment, microplastics have a wide-reaching and multi-trophic impact due to their size. Small pieces of plastic float in the water column and follow currents through the world's oceans. Fish and marine life involuntarily ingest microplastics, eventually accumulating in the marine food web. Microplastics are observed in all coastal waters and have been documented in one-third of the seafood species sought after in North Carolina.

The microplastics process



Why Sample for Microplastics?

In response to structural and ecological damage caused by Hurricane Florence, the Coastal Federation began assessing types and sources of marine debris newly introduced to marshes and waterways. Roughly 85% of the debris removed was former components of residential docks and piers, including large bricks of unencapsulated polystyrene used for floatation. These exposed and fragile bricks are prone to disintegrating into small foam beads which are categorized as microplastics.

Discovery of abundant microplastics associated with large-scale marine debris led the Coastal Federation to **examine the extent and impact of microplastics on beaches** in the Southeast region. The microplastics sampling program began in April 2022 with the help of dedicated volunteer citizen scientists.

Marine debris removal crews locate large polystyrene bricks

Polystyrene bricks break down into small foam beads

How Does Sampling Work?

The North Carolina Coastal Federation developed sampling methods modeled after the EPA's "Microplastic Beach Protocol." The methods were designed for citizen scientists to collect data regarding the extent of microplastic pollution on marine beaches and shorelines which informs local, regional, and global marine debris trends.

Volunteers use tools to sieve microplastics from the sand

To sample beach sand for microplastics, citizen scientists use basic tools like buckets, brushes, and hand shovels to sieve sand through 5 mm mesh. The standard sample area is a 1 x 1m quadrat anywhere between the wet sand and the high tide line.

How Does Sampling Work?

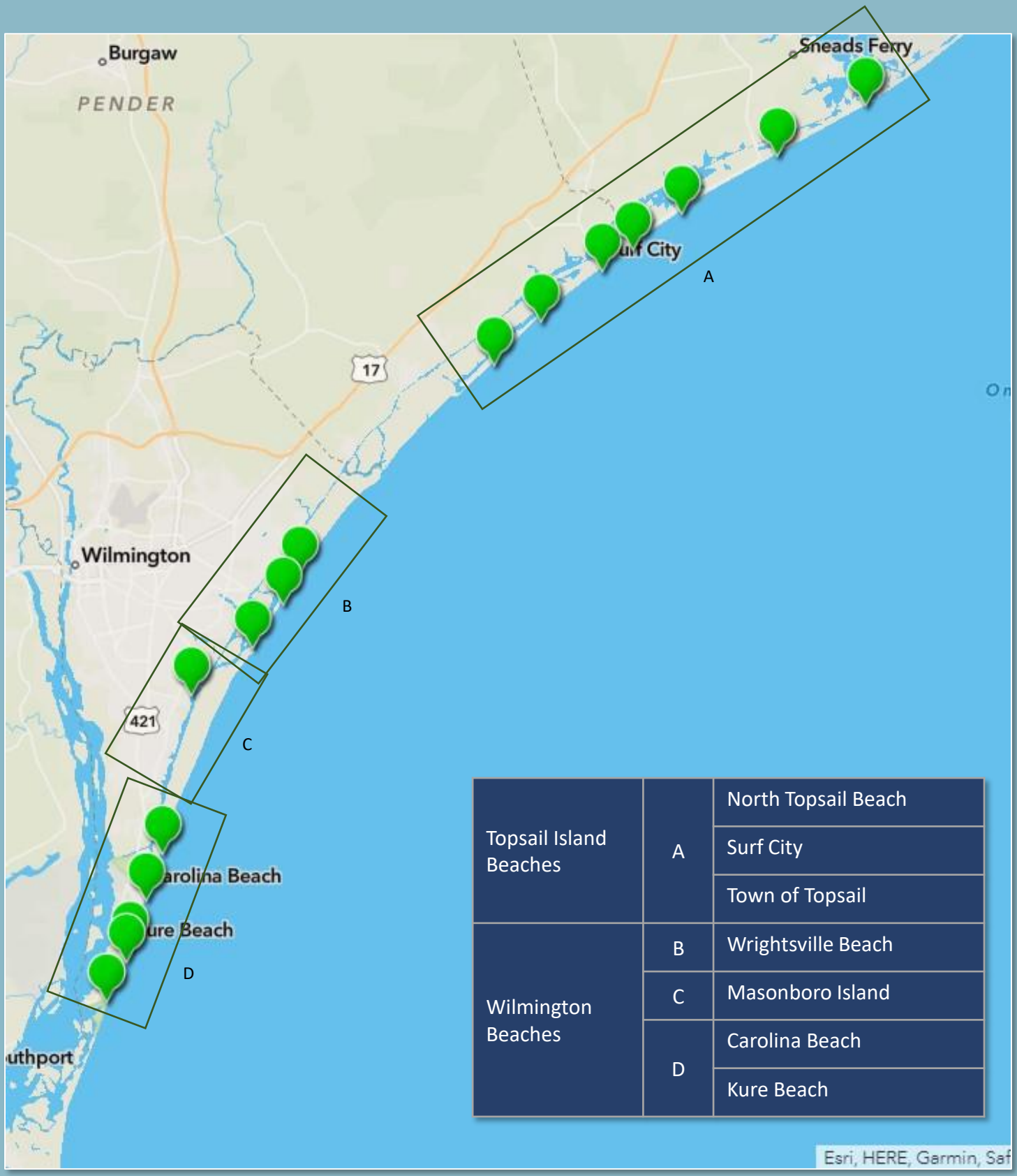
Line (Microfibers) 	• Plastic fibers from synthetic textiles and synthetic ropes • Occur in many colors • May fray over time due to weathering • May be larger than 5 mm in length, but are smaller than 5 mm in width
Film 	• Pieces of plastic bags and wrappers • Usually flexible • Occur in many colors, but white/clear particles are common • May become brittle over time due to weathering
Foam 	• Pieces of expanded or extruded polystyrene (one example is Styrofoam™ insulation) • Generally have a softer texture, but may also be brittle

Using identification guidance from the EPA, citizen scientists analyze their samples by categorizing microplastics into one of five divisions: fragments, pellets, lines, films, and foams. Analysis can lead to testing pieces for flotation or further breakage because microplastics are often confused with small, brittle pieces of shell.

Tallied samples are documented through an online data submission form in real time. The data form includes additional sampling information like tides, weather, and beach usage for the time of the sample.

Fragment 	• Result from the break up of larger plastic items • Represent many types of plastic • Generally rigid • Occur in many colors and shapes • May become brittle over time due to weathering
Pellets (Nurdles) 	• Used in the production of plastics • Can be made in many colors, but white pellets are common Usually have a round, smooth, manufactured appearance and feel

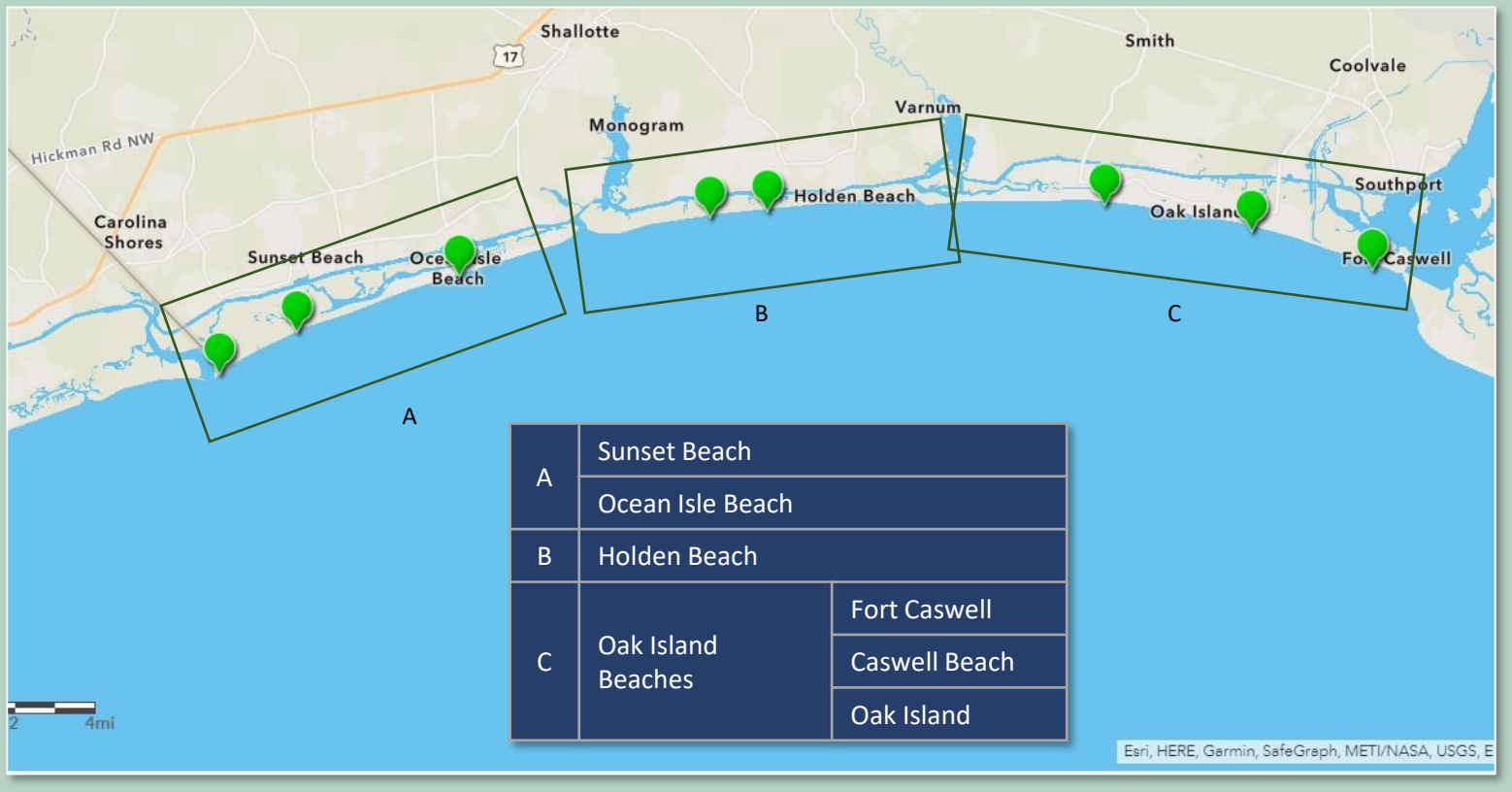
What beaches were sampled?



Topsail Island Beaches	A	North Topsail Beach
		Surf City
		Town of Topsail
Wilmington Beaches	B	Wrightsville Beach
	C	Masonboro Island
	D	Carolina Beach
		Kure Beach

Map 1: Topsail Island and Wilmington-area Beaches

What beaches were sampled?

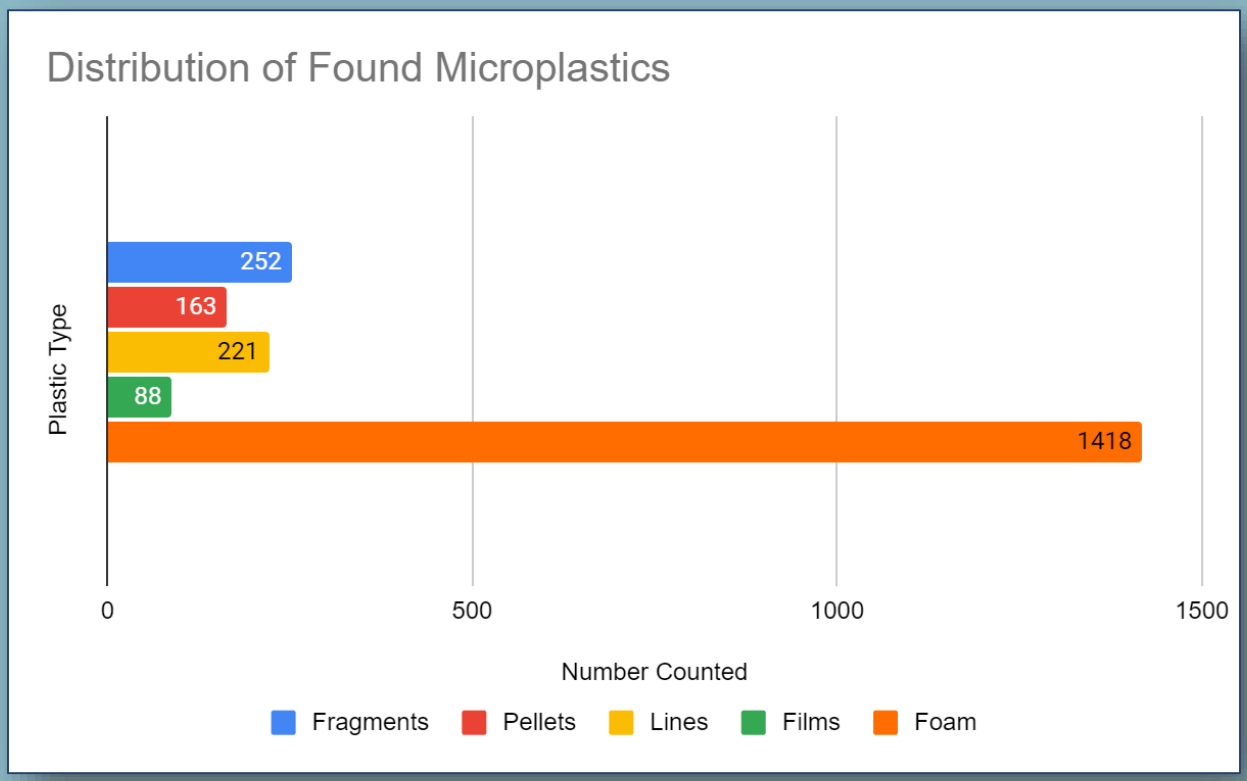


A	Sunset Beach	
	Ocean Isle Beach	
B	Holden Beach	
C	Oak Island Beaches	Fort Caswell
		Caswell Beach
		Oak Island

Map 2: Brunswick County Beaches

Program Findings

Microplastics by the numbers:

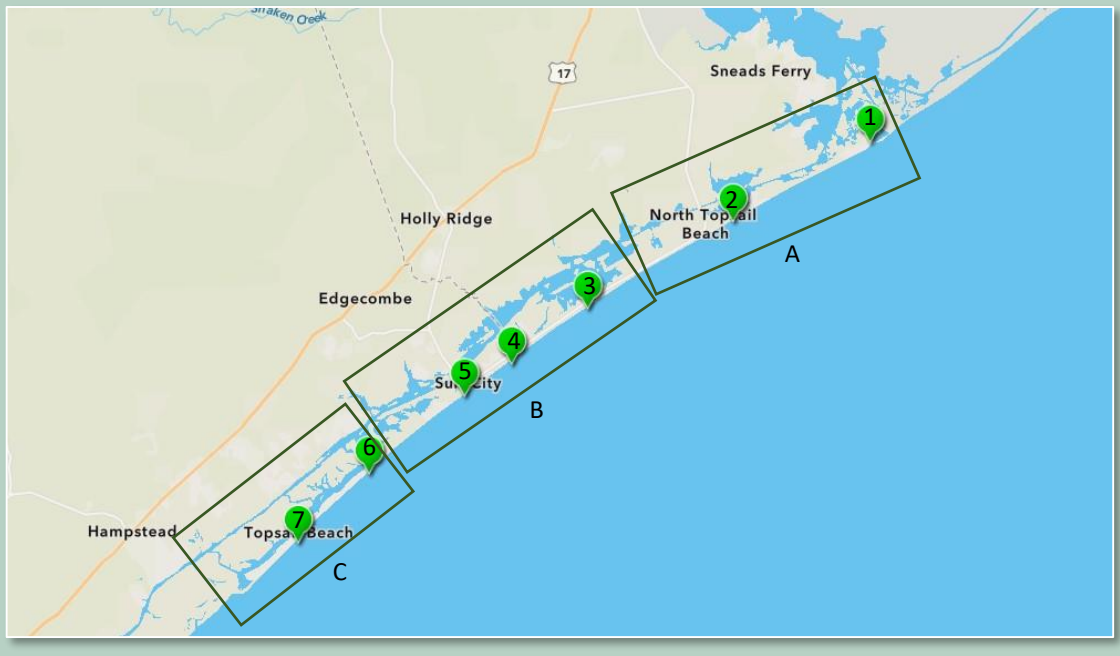


Volunteers contributed **295 sample sets** from May to October 2022. Sample tallies show foam pieces leading the distribution of found microplastics. Through the sampling season, some volunteers determined more microplastics were accumulating on the inland side of barrier islands, on either inlet, sound, or Intracoastal Waterway shorelines.

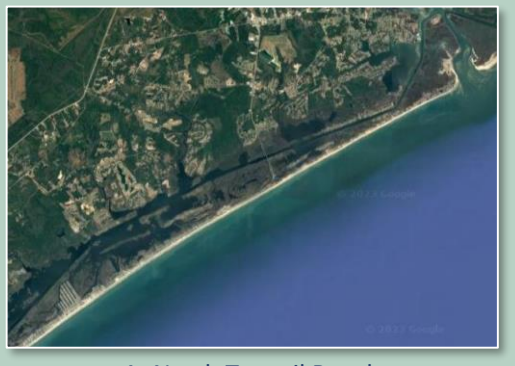
Fragments	252
Pellets	163
Lines	221
Films	88
Foams	1418

In addition to the counted and categorized microplastics, reports of pollution on the beaches included all parts of plastic bottles (screw caps, rings, labels), cigarette butts, whole and partial plastic utensils, and large fragments of polystyrene.

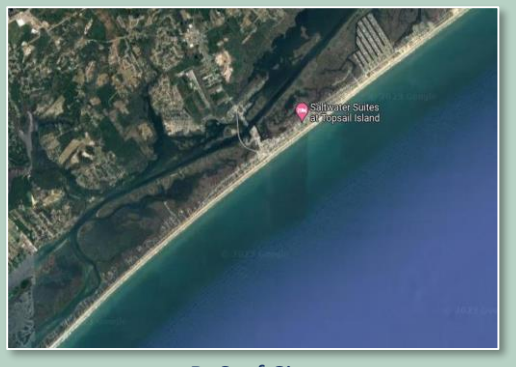
Topsail Island Beaches



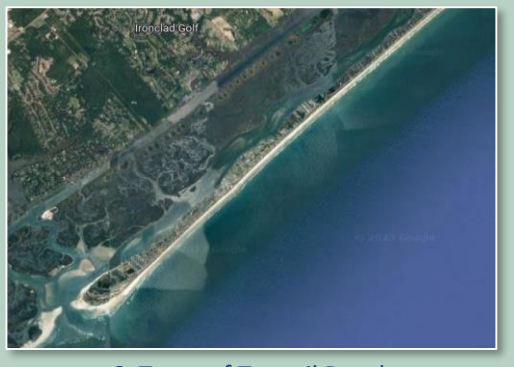
1	North End NTB	34.52892	-77.34470
2	NTB Town Park	34.49673	-77.41229
3	Lanterna Drive	34.46082	-77.48488
4	Surf City Ocean Pier	34.42508	-77.54551
5	Lenoir Avenue	34.43847	-77.52252
6	Hispaniola Lane	34.39322	-77.59311
7	Jolly Roger Pier	34.36548	-77.62812



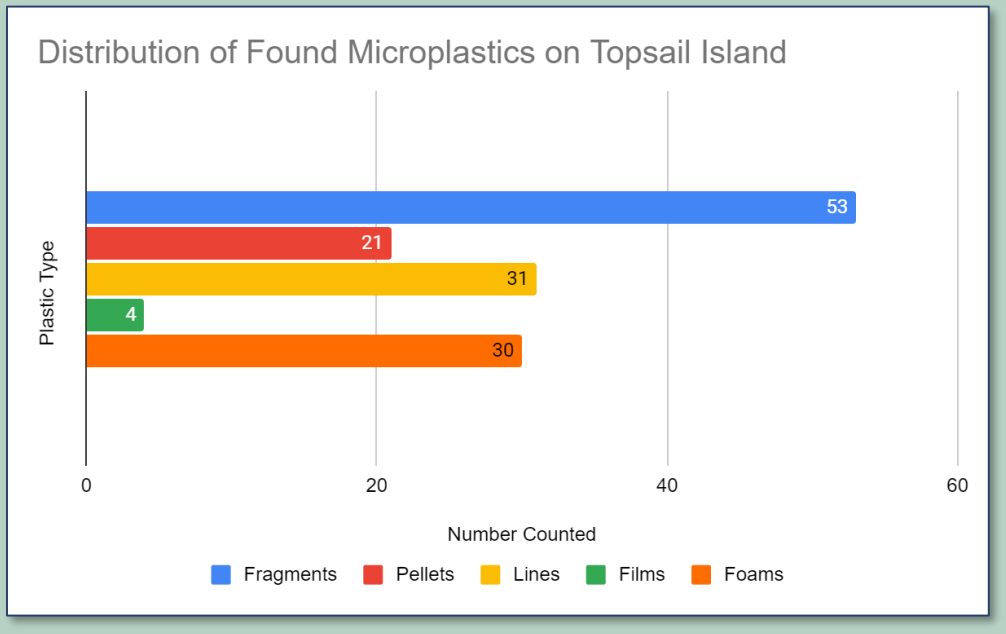
A. North Topsail Beach



B. Surf City

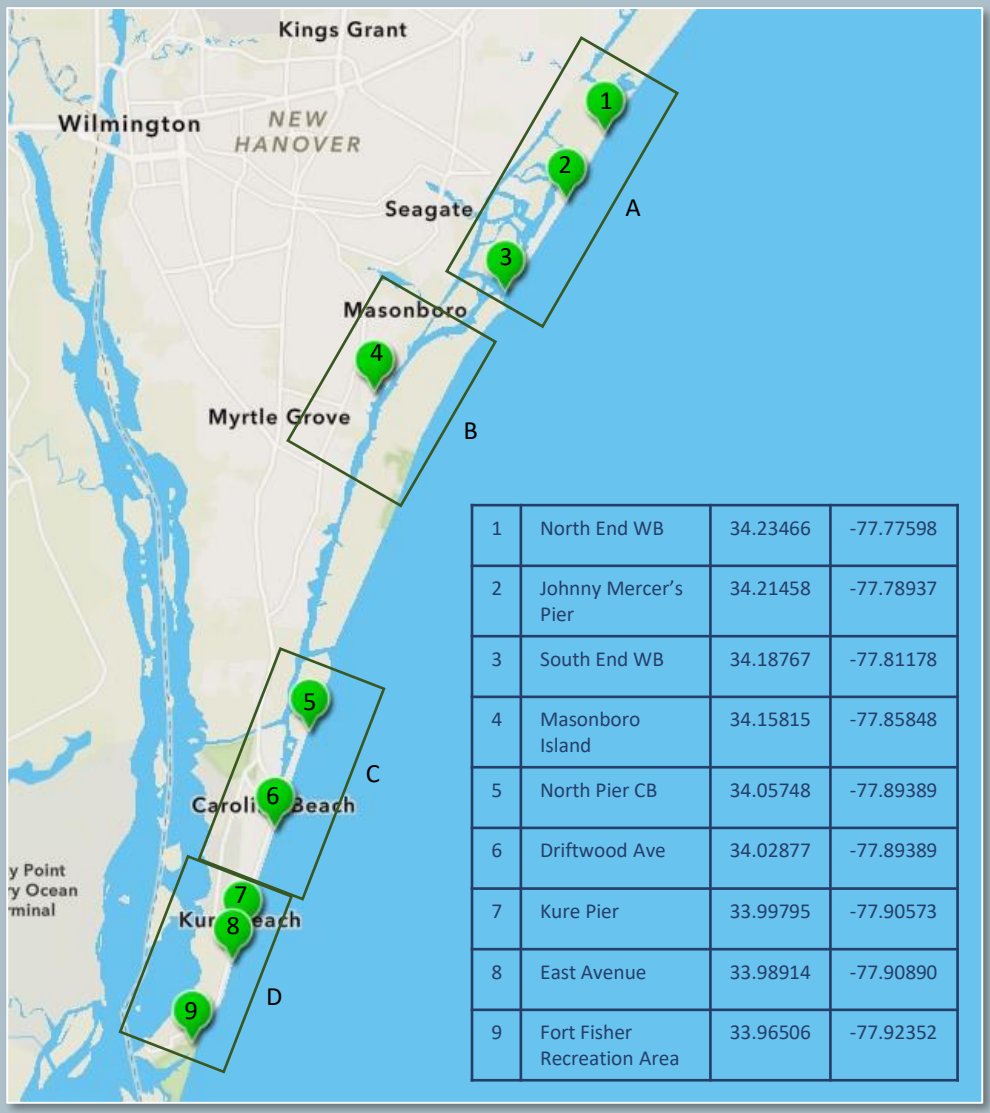


C. Town of Topsail Beach



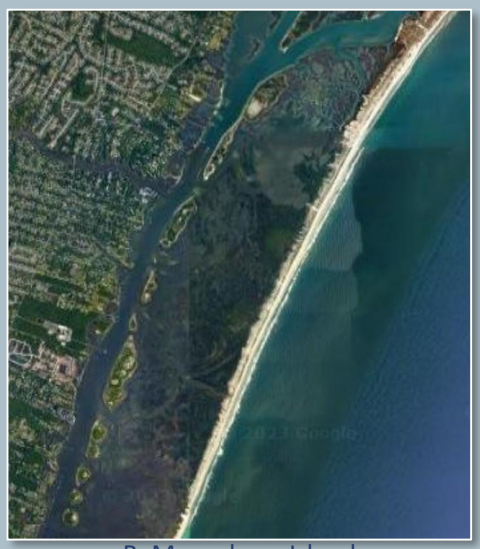
The data represents 40 sample sets conducted by 9 volunteers. Samples were collected around beach accesses (listed above) in North Topsail Beach, Surf City, and Town of Topsail Beach. Volunteers report medium to high levels of beach use during sample sessions and additional debris collected and removed included plastic bottle caps, cigarette butts, and plastic wrappers.

Wilmington Beaches

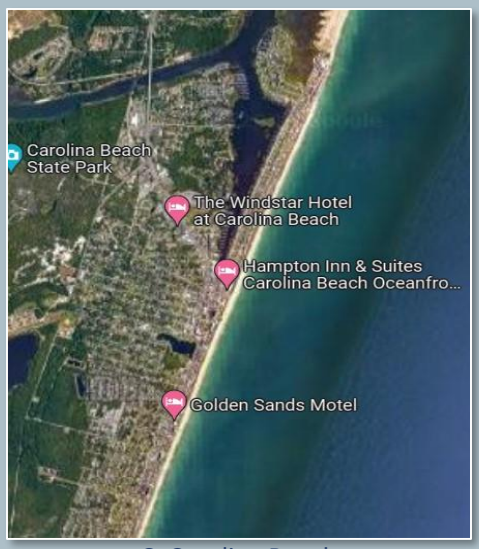


1	North End WB	34.23466	-77.77598
2	Johnny Mercer's Pier	34.21458	-77.78937
3	South End WB	34.18767	-77.81178
4	Masonboro Island	34.15815	-77.85848
5	North Pier CB	34.05748	-77.89389
6	Driftwood Ave	34.02877	-77.89389
7	Kure Pier	33.99795	-77.90573
8	East Avenue	33.98914	-77.90890
9	Fort Fisher Recreation Area	33.96506	-77.92352

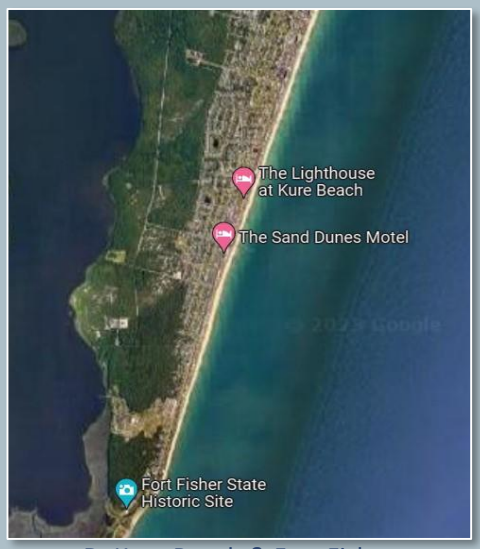
A. Wrightsville Beach



B. Masonboro Island

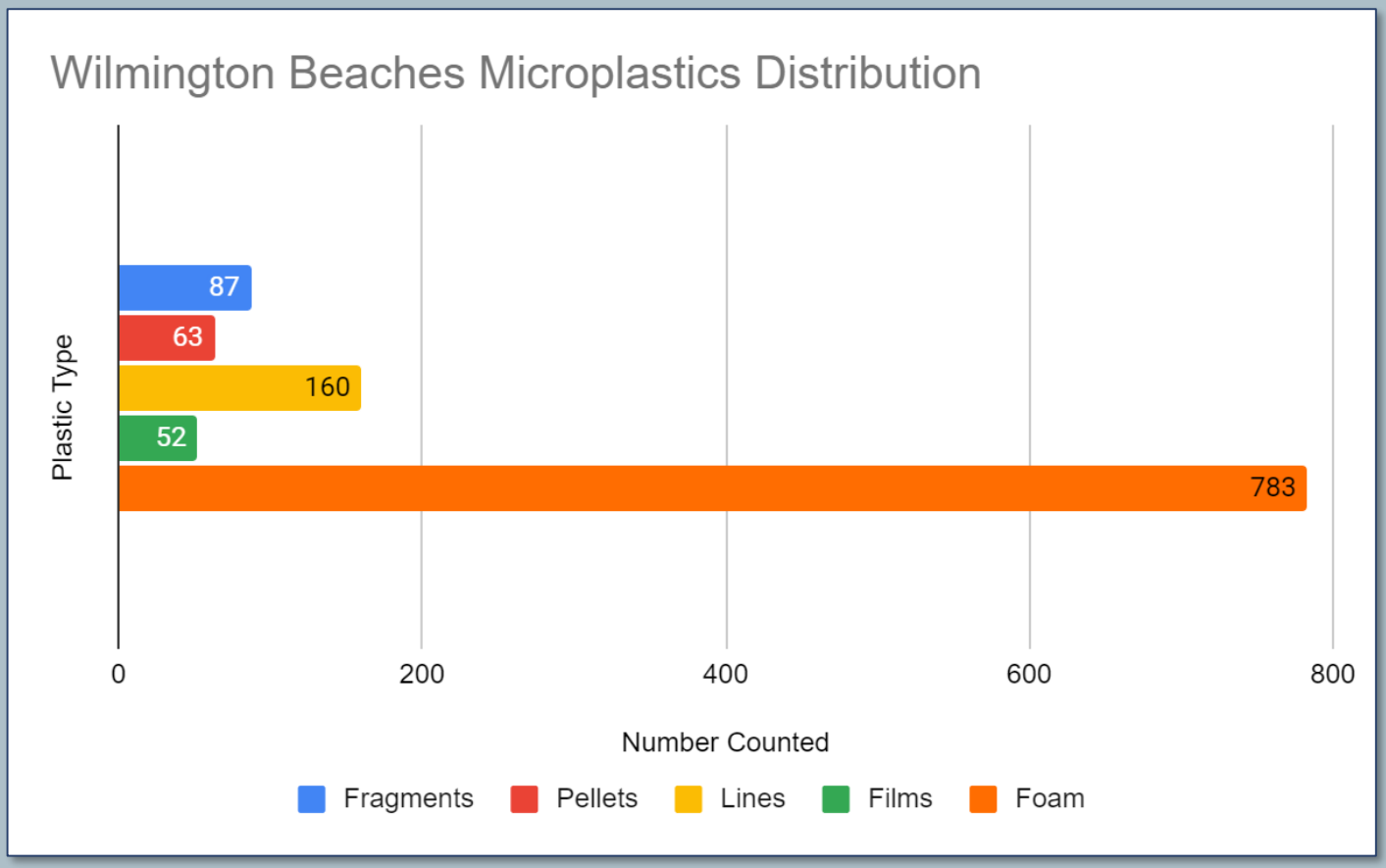


C. Carolina Beach



D. Kure Beach & Fort Fisher

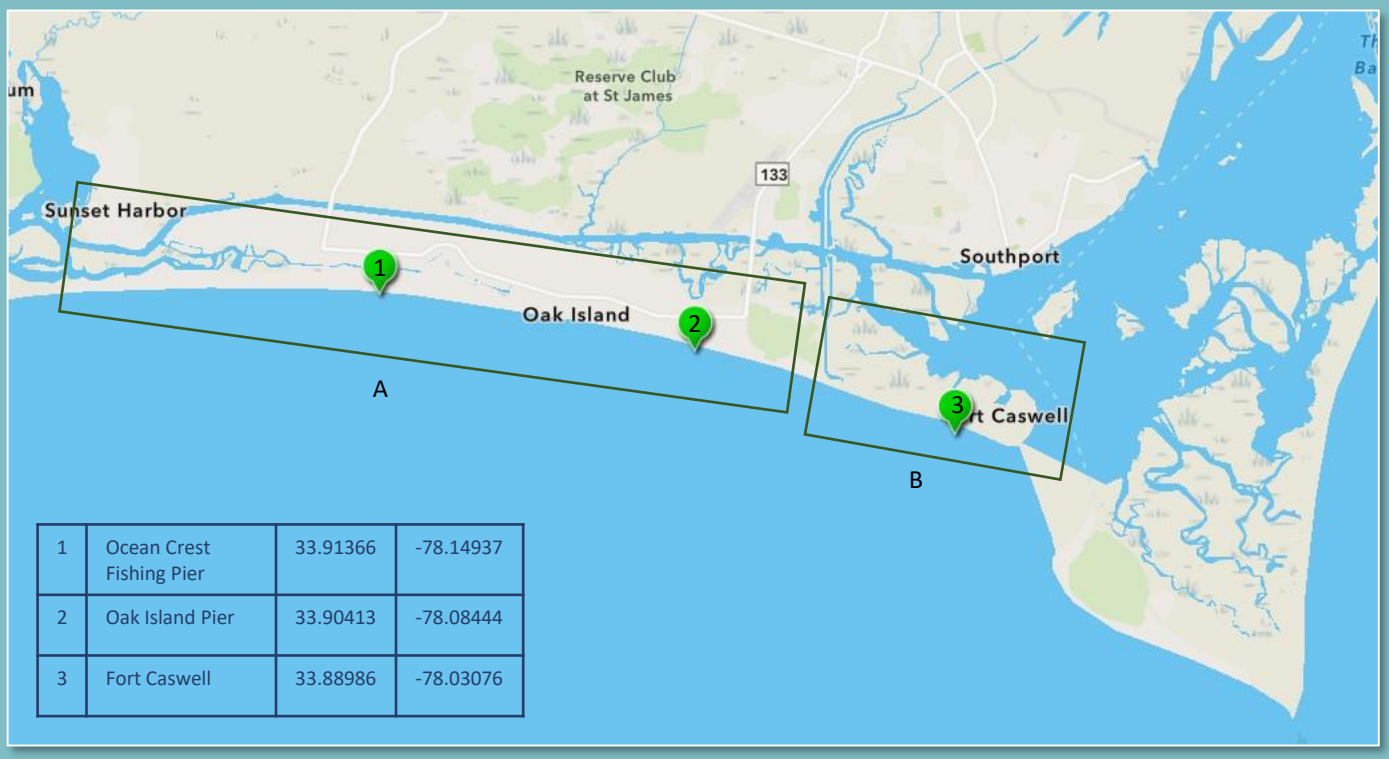
Wilmington Beaches



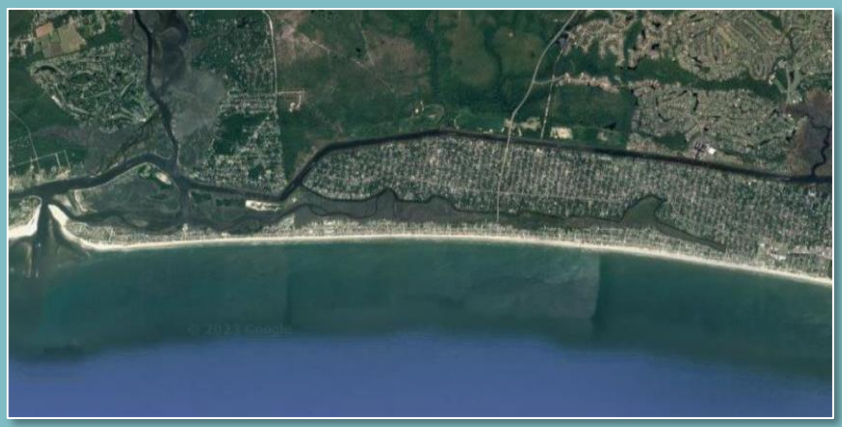
The data represents 153 sample sets conducted by 10 volunteers. Samples were collected around beach accesses (listed on page 10) in Wrightsville Beach, Masonboro Island, Carolina Beach, and Kure Beach. Volunteers noted that king tides in June and July delivered heavy amounts of polystyrene beads to beaches in this region. Among microplastics and collected debris, cigarette butts were a common item.

Microplastics sample jar at Johnny Mercer's pier in Wrightsville Beach

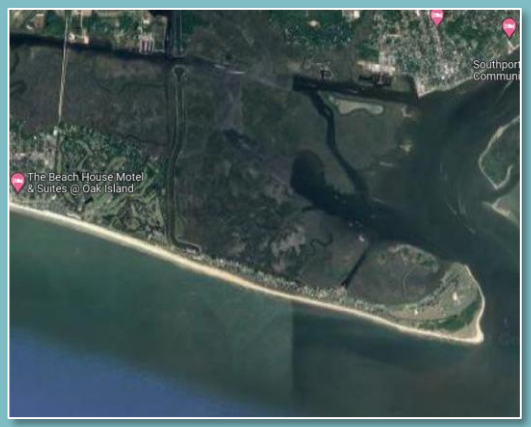
Oak Island & Fort Caswell



1	Ocean Crest Fishing Pier	33.91366	-78.14937
2	Oak Island Pier	33.90413	-78.08444
3	Fort Caswell	33.88986	-78.03076

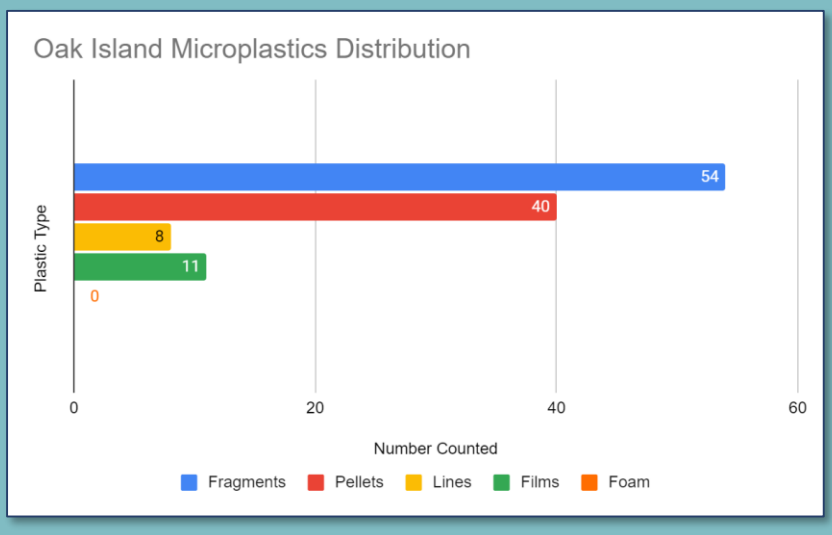


A. Oak Island Beach

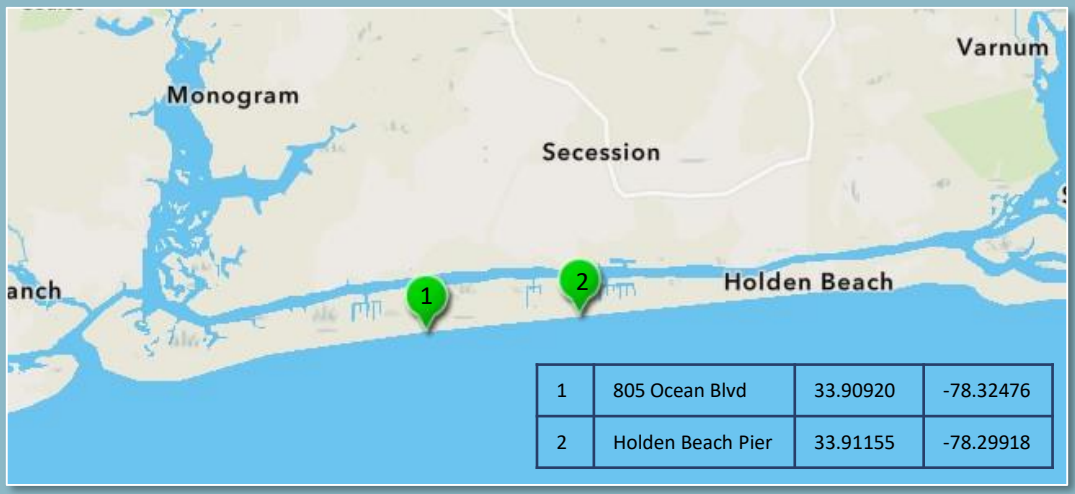


B. Caswell Beach & Fort Caswell

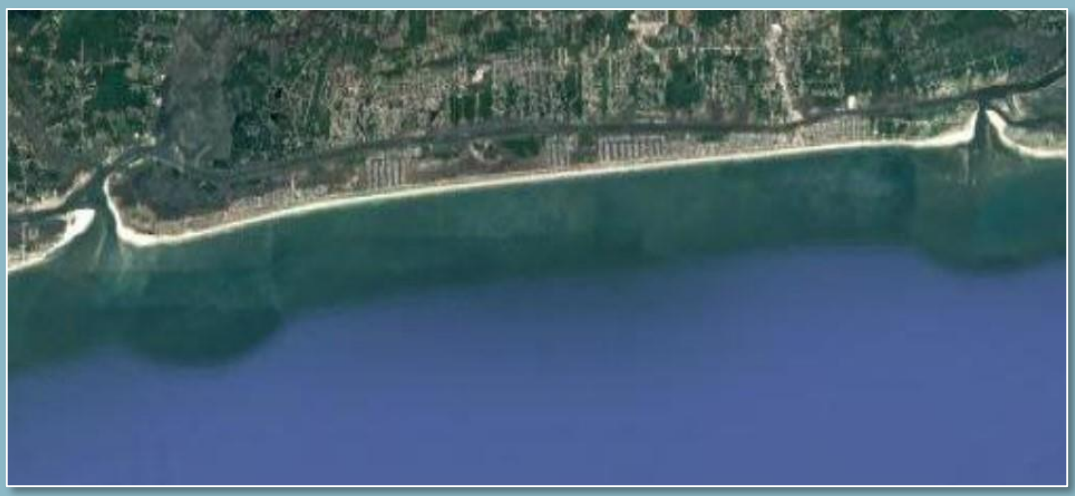
The data represents 62 sample sets conducted by 6 volunteers. Samples were collected around beach accesses (listed above) in Fort Caswell, Caswell Beach, and Oak Island. In July, a makeshift boat made mostly of polystyrene bricks washed onto Caswell Beach and foam beads persisted for the remainder of the sampling season.

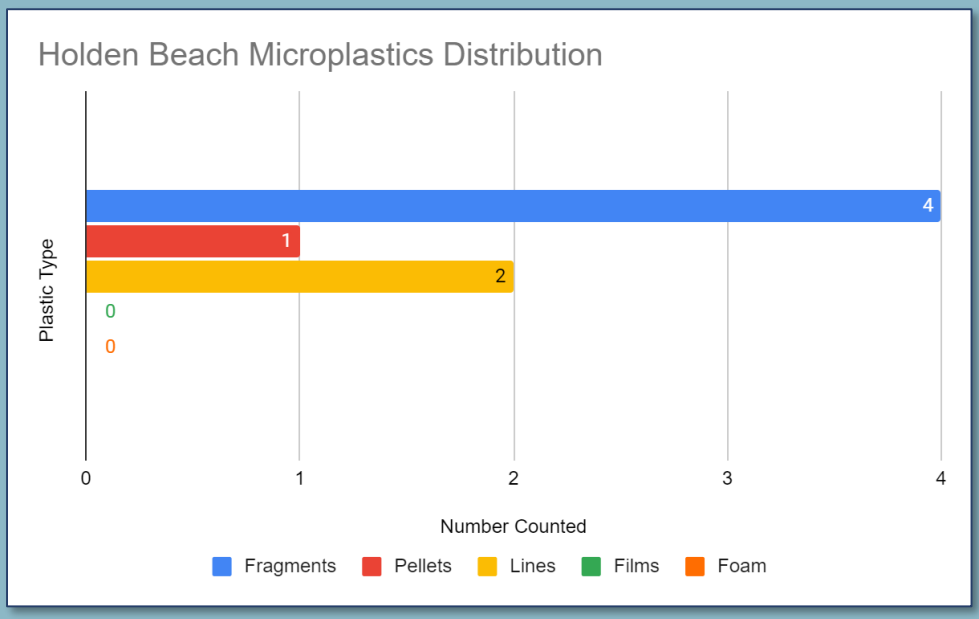


Holden Beach



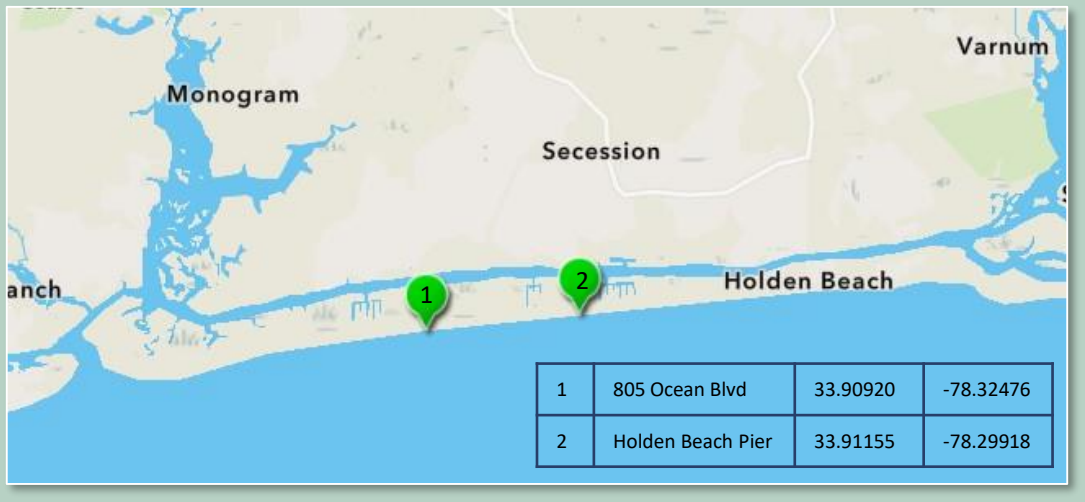
1	805 Ocean Blvd	33.90920	-78.32476
2	Holden Beach Pier	33.91155	-78.29918





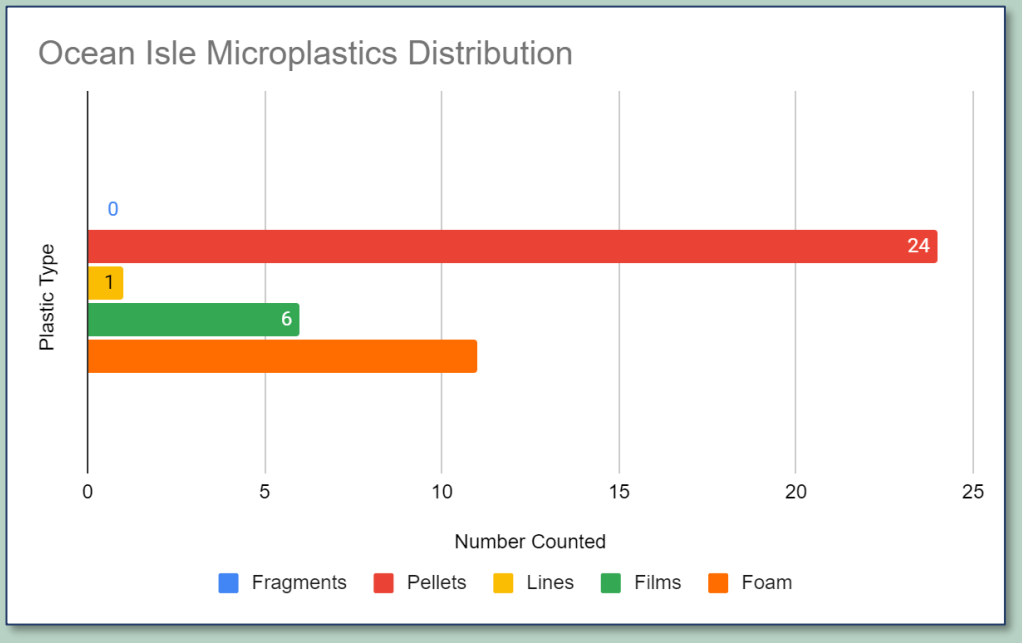
The data represents 20 sample sets conducted by 8 volunteers. Samples were collected from just 2 accesses on Holden Beach. While the sample set is comparatively small, volunteers noted mostly clean beaches throughout the sampling season.

Ocean Isle Beach



1	805 Ocean Blvd	33.90920	-78.32476
2	Holden Beach Pier	33.91155	-78.29918

The data represents 15 sample sets conducted by 1 volunteer. Samples were collected entirely in the month of July during heavy beach-use season. The single Ocean Isle volunteer noted many types of other plastic pollution during each sample session which was also removed and counted for supplemental data.



Recommendations

Evidence-based action to prevent microplastic pollution and marine debris was the central goal of the microplastic sampling program. Backed by valuable data, the first step to preventing microplastic pollution is providing **education and outreach** for communities and local governments to aim for solutions.

Microplastics originating from known sources, like unencapsulated polystyrene bricks and floating docks, can be addressed on a local scale. **Collaborating with municipalities and local governments** to find the best solutions for their communities can provide models for action on all levels.

Considering citizen scientists' anecdotal data, volunteers will **target marsh intertidal zones** in future sampling seasons where more microplastics accumulate. Their weekly sampling assignments will include accessible sound side and Intracoastal Waterway shorelines.

Acknowledgements

The North Carolina Coastal Federation would like to thank the **sampling volunteers** (microplastics "ambassadors") who are dedicated to monitoring beaches of the Southeast. Data analysis and recommendations for action would not be possible without the effort from these citizen scientists.

The inception of this project was made possible by student volunteer, **Brooks Ford**, who was awarded his Eagle Scout status for sourcing donated materials, assembling the microplastics sampling kits, and presenting his project to recruit volunteers.

Organizations supporting this project include Ecological Marine Adventures, Eugene Ashley High School, the North Carolina Baptist Assembly at Fort Caswell, Oak Island Beach Preservation Society, and Ocean Isle Beach Sea Turtle Protection Organization.

North Topsail Beach, Surf City, Topsail Beach, and Wrightsville Beach municipalities are recognized for taking action to prevent microplastics pollution. Each town successfully implemented new ordinances that discontinue the use of unencapsulated polystyrene as structural components for floating docks, which is a common source of foam beads.

For more information on these ordinances, including how your municipality can draft its own ordinance to reduce microplastics through regulating the use of unencapsulated polystyrene, please see the enclosed packet.

Questions about this report or the microplastics sampling program?
Contact Georgia Busch, Coastal Specialist
georgiab@nccoast.org · 910.509.2838 ext. 206

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North Carolina Coastal Federation
40 YEARS
Working Together for a Healthy Coast

Resilient Docks & Piers

Enclosed:

1. Fact sheet, "Floating Docks & Marine Debris"
2. An Ordinance of The Town Board of Commissioners of The Town of Topsail Beach, North Carolina, Amending the Town Code of Ordinances, Chapter 6, Buildings and Building Regulations, Article III Piers and Docks, Definitions and Sections 98 and 100, to Prohibit Unencapsulated Polystyrene Docks
3. Article III. Piers and Docks (code of ordinances, Topsail Beach)
4. An Ordinance Amending Section 1-2, Definitions and Section 5-11, No Use of Unencapsulated Polystyrene Material - Surf City, North Carolina
5. An Ordinance of the Board of Aldermen of the Town of North Topsail Beach, North Carolina, Amending the Unified Development Ordinance Table 4-1 and 4.03.23 Docks, Piers and Floating Walkways and Amending the CAMA Land Use Plan Adopting a Policy Statement to Prohibit Unencapsulated Polystyrene Docks.

Additional resources:

Recommendations for Improved Marine Construction to reduce damage, losses, and marine debris resulting from storms in North Carolina

Report: www.nccoast.org/wp-content/uploads/2022/04/Resilient-Docks-Piers.pdf

Contact information:

Kerri Allen, Coastal Advocate and Southeast Regional Manager
910.509.2838 x203 / kerria@nccoast.org

North Carolina Coastal Federation
Working Together for a Healthy Coast

Floating Docks & Marine Debris

Storm damage and general wear and tear can impact floating docks made from **polystyrene foam**.

This foam material breaks into small beads that can spread through our waterways into our beaches, marshes, wetlands and seafood. The good news is that it can be prevented!

Read on to learn what YOU can do to prevent foam pollution in our community.

What is unencapsulated polystyrene?

- Traditional dock floats composed of polystyrene foam are light, inexpensive, and wrapped in filter cloth which offers limited protection from the elements.
- This **unencapsulated** foam becomes brittle and breaks apart when exposed to wave energy, sunlight, and temperature fluctuations.
- Free-floating foam fragments and beads pollute critical coastal habitats like wetlands and beaches.

How do we manage polystyrene pollution?

- It is nearly impossible to remove pea-sized polystyrene beads, and the material is non-biodegradable, meaning it never goes away.
- Recycling and waste management facilities do not accept this kind of material.
- The only preventative solution for issues with pre-existing polystyrene foam is to remove larger foam fragments from waterways by hand.

Photos courtesy of Joe Huie

➢ Wildlife

33% of microplastics found in marine wildlife – including a number of commercially important seafood species – contain polystyrene beads.

➢ Toxicity

Foam materials contain chemicals including benzene, styrene, and ethylene, which can pose serious health risks when leached into water.

➢ Physical Environment

Foam debris has been found in every single debris removal location surveyed by Federation staff and crews. Most of it cannot be removed, and impacts persist.

Since August 2019, The Coastal Federation has removed over
2 MILLION POUNDS of marine debris from our Southeast coast

What is Encapsulated Polystyrene?

To prevent foam deterioration and pollution, a process known as **encapsulation** secures the floating foam material, protecting it from the elements.

A thick, plastic shell is thermally formed around the foam bricks, making them more resistant to impacts, impermeable to water, and a more rugged component for the floating dock system.

Benefits of Encapsulated Polystyrene

- ✓ Defends against foam breakdown and pollution
- ✓ Lasts longer and is more durable
- ✓ Saves dock owners replacement and repair costs in the long run
- ✓ Works with multiple dock styles and materials, including concrete and wood
- ✓ Prevents damage to the coastal environment and wildlife
- ✓ Compliant with potential new ordinances aimed to prevent pollution

Encapsulated Polystyrene Foam

Unencapsulated Polystyrene Foam

Learn more at nccoast.org/marinedebris

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ORDINANCE NO. 2022-002

AN ORDINANCE OF THE TOWN BOARD OF COMMISSIONERS OF THE TOWN OF TOPSAIL BEACH, NORTH CAROLINA, AMENDING THE TOWN CODE OF ORDINANCES, CHAPTER 6, BUILDINGS AND BUILDING REGULATIONS, ARTICLE III PIERS AND DOCKS, DEFINITIONS AND SECTIONS 98 AND 100, TO PROHIBIT UNENCAPSULATED POLYSTYRENE DOCKS.

WHEREAS, during a coastal debris cleanup sponsored by the Coastal Federation, large quantities of Polystyrene were found in all areas of our waters and marshlands along our coast. Polystyrene is a petroleum product, commonly known as Styrofoam. It is often used in dock floats because of its buoyancy; and

WHEREAS, polystyrene is neither readily recyclable nor biodegradable and takes hundreds of years to degrade in the environment. When exposed to the elements, it fragments into unsightly, small, nonbiodegradable pieces that may be ingested by marine life, wild and domestic water birds and other wildlife blocking the digestive system and killing them through starvation.; and

WHEREAS, the deterioration of larger polystyrene floats into beads and smaller pieces create a pollution line along shorelines, intertidal land and other places where buoyant debris collects. Such pollution must be picked up and removed at the expense of the public and private citizens.

WHEREAS, to prevent such degradation, pollution and hazard to water dependent mammals and birds, polystyrene floats should be encapsulated in a hard polyethylene shell, which prevents the deterioration and spread of beads and smaller sections of polystyrene floats.

NOW, THEREFORE, BE IT ORDAINED by the Topsail Beach Town Board of Commissioners that Chapter 6 of the Land Development Code, Article III – Piers and Docks, Definitions and Section 98 and 100 is hereby amended subsequent to read as follows:

1. Section 16-33. Definitions. *(by adding the following definitions to be inserted according to alphabetical order)*

Polystyrene is a thermoplastic polymer or copolymer comprised of at least 80 percent styrene or para-methyl styrene by weight. (Commonly known as Styrofoam)

Unencapsulated polystyrene means polystyrene that is not completely encased within a polyethylene shell or within other comparable materials that protects against cracking, peeling, sloughing, and deterioration from ultraviolet exposure and physical trauma.

2. Section 6-98. General construction, repair, etc., requirements. *(by adding the following new subsection:)*

(6) Using unencapsulated polystyrene material. This includes new construction as well as repair or modification of an existing structure.

3. Section 6-100(6). Structural specifications. *(by adding the following new subsection:)*

(f) The use of unencapsulated polystyrene on any floating docks, piers, and walkways is prohibited.

This ordinance is effective upon its adoption.

Adopted this the 13th day of April 2022.

_____
Steven G. Smith
Mayor

ATTEST:

_____
Rochelle Jagst
Deputy Clerk

ARTICLE III. PIERS AND DOCKS

Sec. 6-91. Definitions.

The following words, terms and phrases, when used in this article, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

Bulkhead means a revetment or retaining wall sunk into hard ground and designed to prevent slippage or water erosion of the shoreline.

Commercial pier means a pier for the use of which a fee is charged, as for fishing, mooring, loading and unloading, etc. It must be located in or extended from a business zone.

Dock means a structure, usually supported by piles, extending over the water and equipped for mooring boats.

Dolphin means a cluster of piles, buoys, or other devices, made fast, for the mooring of boats.

Fender means a padded or somewhat flexible piling placed to protect boats and docks from collisions.

Floating dock means a platform supported by floats and secured in a permanent location equipped for mooring boats.

Pier means a structure supported by piles and extending over the water.

Pierhead means the extreme extension from the shore reached by a pier or dock. It may be extended parallel to the shore in a T or L.

Pierhead line means the furthest extension of a pierhead allowed by the U.S. Army Corps of Engineers and the town and recorded on an official map.

Polystyrene is a thermoplastic polymer or copolymer comprised of at least 80 percent styrene or para-methyl styrene by weight. (Commonly known as Styrofoam)

Public pier. See *Commercial pier.*

Ramp or *boat ramp* means a paved inclined passageway extending from dry land into the water so as to provide for safe launching and removal of boats into or from the water. It will normally be associated with dolphins, piles, fenders, rocks, or other structures for safety and convenience.

Unencapsulated polystyrene means polystyrene that is not completely encased within a polyethylene shell or within other comparable materials warranted by the manufacturer for 8 years or more against cracking, peeling, sloughing, and deterioration from ultraviolet exposure and physical trauma.

(Code 1979, § 9-6001; Code 1990, § 4-76)

Sec. 6-92. Litter control.

(a) It shall be unlawful for the owner or proprietor of any commercial (public) fishing pier originating within the corporate limits of the town to fail to provide a litter barrel or basket every 100 feet on such piers for patrons to deposit trash and garbage. Such barrels shall begin on the seaward side of the pier tackle shop. Litter barrels shall also be placed on the approach ramp thereto.

(b) It shall be unlawful for the owner or proprietor of any commercial fishing pier within the corporate limits of the town to fail to provide signs every 100 feet along both sides of the pier notifying patrons of the penalty for littering, including the depositing of litter in the water.

(c) It shall be the duty and responsibility of any commercial fishing pier owner or proprietor to have all litter from the barrels mentioned in subsection (a) of this section deposited in the regular refuse receptacle from which refuse is collected.

(d) It shall be the duty of any commercial fishing pier owner or proprietor to police and remove litter along the shoreline and beach strand for 250 feet in both directions from the pier so as to maintain the area in a clean, safe, and sanitary condition.

(e) Each violation of this article subjects the owner or proprietor to a civil charge as provided by section 1-6(f) and table 1 in section 1-7.

(f) Nothing herein precludes enforcement of the littering statutes in this state.

(Code 1979, § 9-6002; Code 1990, § 4-77; Ord. No. 2012-001, § 1(6), 3-14-2012)

State law reference(s)—Littering, G.S. 14-399.

Sec. 6-93. Damaging piers prohibited.

No person shall tamper with or intentionally damage any private or commercial pier in the town.

(Code 1979, § 9-6003; Code 1990, § 4-78)

Sec. 6-94. Boat ramps.

No boat ramp shall be built along the shores of or within the town unless it is constructed so as not to divert or impede the natural flow of the waters about and within the town.

(Code 1979, § 9-6004; Code 1990, § 4-79)

Sec. 6-95. Construction permit required.

No pier, dock, bulkhead or boat lift shall be constructed within the limits of the town without an approved permit issued by the building inspector in accordance with the requirements of this chapter.

(Code 1979, § 9-6011; Code 1990, § 4-80; Ord. No. 94-001, § 1, 3-9-1994)

Sec. 6-96. Application for permit.

(a) Any property owner fronting upon the inland waters of the sounds and channels within the town who desires to construct or extend an existing pier, dock or similar structure and who has riparian rights, including the right of using the water frontage for the construction of a pier or dock, shall present his federal and state authorization and then apply in writing to the building inspector requesting a permit to construct such pier or dock. All requests for the construction, maintenance, or extension of such structures shall be submitted in writing in accordance with the requirements of this article.

(b) The building inspector shall require the applicant to submit, as a part of the written application, such information, plans and other data necessary to determine adequately the complete conformity of the construction to this and other chapters and ordinances applicable to such structures.

(c) An application shall include a drawing or map to scale, which shows the applicant's land limits and land lines, and all existing piers, structures, bulkheads, or other construction within 25 feet of the high-water line.

(d) The building inspector shall have prepared forms which shall be available to persons wishing to apply at the town hall during normal office hours. All applicants shall procure such forms and submit to the building inspector the completed forms, properly signed by the property owner. The applicant shall attach thereto suitable plans satisfactory to the building inspector which shall include a map showing the area where the pier or dock is to be constructed and existing facilities, and which shall show thereon the dimensions of various components of the new and existing structures.

(e) There shall be on display in the town hall or thereabouts the pierhead line map which provides dimension control for the outward limits of pier extensions.

(f) Plans shall include:

(1) A complete floor plan of the pier, dock or other structure;

(2) Detailed cross-sections through the access pier and pierhead or T at its end;

(3) information as to the size, length and treatment of piling to be used and its penetration into hard ground;

(4) The methods of fastening and connecting all members of the pier; and

(5) Sufficient detailing of appurtenant structures to the pier, such as floats, stairs, handrailings, all types of boxes and lockers or other facilities to be placed thereon.

(Code 1979, § 9-6012; Code 1990, § 4-81)

Sec. 6-97. Accoutrements to pier or dock.

The placing of a mooring pile or piling, dolphin of any type, fender, ramp, floating dock or other structure occupying the area beyond the high-water line shall be considered to be constructing a pier or dock under the terms of this article.

(Code 1979, § 9-6013; Code 1990, § 4-82)

Sec. 6-98. General construction, repair, etc., requirements.

All construction, repair or modification of any pier or dock shall be governed by the following regulations. No pier, dock or other structure shall be constructed:

(1) Which is not within the applicant's property lines projected. An exception may be made in unusual cases where notarized written approval by adjacent property owners allows such construction or where joint ownership of a facility to be constructed exists.

(2) Closer than 15 feet to the owner's property lines extended, except as provided above; and all pilings or dolphins, single or multiple, used in any way for mooring, shall conform to this setback requirement.

(3) To extend beyond the pier line as shown on the official pier line map, which map, duly adopted, after a public hearing, shall be kept in the town hall.

(4) Within 15 feet of any other pier other than one which is a part of the same mooring system.

(5) Where there would be more than one pier of dock projection from the shore for any single lot of 100 feet or less. A pier shall not be constructed on a lot which does not provide for the clearance herein required from adjacent lot lines. Owners having frontages greater than 100 feet shall be allowed an

additional projecting pier or dock for each additional 50 feet of shore frontage in addition to the basic 100 feet.

(6) Using unencapsulated polystyrene material. This includes new construction as well as repair or modification of an existing structure.

(Code 1979, § 9-6014; Code 1990, § 4-83)

Sec. 6-99. Minimum dimensions.

All piers or docks constructed hereafter shall have dimensions which conform to the following:

(1) The length of all piers or docks extending from the shoreline shall be limited to the pier line as established and shown on the pier line map.

(2) The height of the deck of all fixed piers shall be not less than the mean high (spring tide) water line which, for the purposes of this chapter, shall be established at 3½ feet above mean sea level.

(3) All walkway projections from the shore outward shall have a minimum width of three feet and a handrail on at least one side of such projection.

(4) The width of all T-heads, pierheads or projections running parallel to the shoreline shall be not less than four feet and shall have a handrail on at least one side of such pierhead. Public piers shall have handrails on all sides. Every pierhead shall be of an elevation no lower than that stated for the access walkway; provided that the use of multiple elevation platforms or attached floating platforms shall not be denied.

(5) No pier, dock or structure shall have a diving board or other projections supported by the main pier frame, which shall project within five feet of the outermost portion of the pier. Boat hoists and davits shall be allowed, provided they are movable and can be moved to a position in which they do not overhang the pier when not in use.

(Code 1979, § 9-6015; Code 1990, § 4-84)

Sec. 6-100. Structural specifications.

All structures shall conform to the following requirements:

(1) Every pier or dock shall be designed to withstand a live load of 50 pounds per square foot applied on all flat areas of the structure.

(2) The structural requirements for the coastal sea of the state building code shall govern the general design and strength requirements of all piers and docks; provided that additional requirements as set out herein shall take precedence.

(3) Piling having a diameter of less than six inches shall not be used on any pier or dock. All piling shall penetrate the ground below hard bottom a distance of not less than six feet. No concrete pile of less than eight inches in its smallest cross-sectional dimension shall be used. The wood pile shall be pressure treated with creosote or equivalent preservatives as required by current state standards.

(4) The deck of all piers shall be constructed of planks having a thickness of not less than four-fifths inch of optional width, and shall be supported by joists not less than 24 inches on centers. No stringer, joist or rafter shall be used having a dimension of less than nominal two by six inches. Concrete, metal or plastic materials may be used, if in conformity with subsection (2) of this section.

(5) All construction above the deck of any pier or dock shall be in conformity with the building code of the town and shall be open on all sides. Dock and gear boxes not over four feet in total height shall be allowed on docks; provided that they are securely fastened to the deck in such a manner as to prevent their being removed by wind or water.

(6) Floating docks, piers and walkways shall meet the following additional requirements:

a. All floating structures shall be no less than four feet in width. No horizontal dimensions shall be greater than two times the other horizontal dimension. Floating access piers shall be an exception; provided that a suitable method of providing stability is used, such as finger projections of a minimum width of five feet for all access piers longer than eight feet is maintained.

b. All floating piers shall have a freeboard (distance from water to top of deck) of not less than 16 inches.

c. All fasteners shall be sufficient to withstand all movements anticipated in storm periods of hurricane force winds. The building inspector shall have the right to disapprove any fastenings which do not appear to be sufficient. All metal fastenings shall be galvanized or of metals resistant to corrosion.

d. All floating piers shall be secured with pilings. There shall be not less than one pile for each 80 square feet of pier surface.

e. No houses or structures other than deck or gear boxes shall be placed on floating piers. All such boxes shall be securely fastened to the pier. No box shall be higher than four feet above the pier surface nor occupy more than two-fifths of the surface.

f. The use of unencapsulated polystyrene on any floating docks, piers, and walkways is prohibited.

(Code 1979, § 9-6016; Code 1990, § 4-85; Ord. No. 2021-04-19, 6-17-2021)

Sec. 6-101. Safety features.

(a) All docks constructed within the town, with the exception of floating docks, shall have handrails on at least one side of access walkways, T's or L's. Handrails shall be not less than three feet above the deck and shall be substantially constructed so as to ensure a safe and permanent support for persons using such facilities. Public piers shall have handrails on all sides.

(b) It is recommended that all piers are to have a ladder or stairway at their outer end extending down sufficiently to allow persons in the water to gain access to the pier. All stairways shall have handrails.

(c) Owners of private piers may erect gates or barricades at the landward end of access walkways denying the use of the pier to others than their guests. Such barricades of gates should be clearly marked to define the pier as a private structure.

(d) No cross-bracing or structural members beneath the pier shall be erected in that zone between high and low waters so as to obstruct the use of this area by the public.

(e) No vessel may be moored at any pier, dock, pilings or dolphins so that it extends farther than its width beyond the pierhead line or the lot line setback.

(Code 1979, § 9-6017; Code 1990, § 4-86)

Sec. 6-102. Maintenance of structures.

(a) Each owner shall be responsible for the proper and satisfactory maintenance of any pier, dock or other structure which he erects within the town. All such structures shall be subject to inspection at any time by the building inspector, and where faulty maintenance is found, the building inspector shall notify the owner in writing as to the maintenance required. The owner shall promptly apply for a permit to accomplish such maintenance and shall, within 90 days of such written notice, proceed with the accomplishment of such maintenance.

(b) Failure to maintain properly a pier, dock or other structure in accordance with this article may result in its removal as provided for in this article.

(Code 1979, § 9-6018; Code 1990, § 4-87)

Sec. 6-103. Town authorized to remove hazardous structures.

(a) In the event that an improperly maintained pier, dock or other structure now exists or will exist in the future, after the owner of such pier, dock or other structure has been notified by the building inspector and has failed to repair and bring the structure into a safe condition, the town may remove entirely this structure and its appurtenances and dispose of all materials, refuse and wreckage therefrom. The town may assess against the property owner the cost of such removal which shall become a lien upon his property payable immediately. After a period of 60 days, there shall be assessed an additional interest rate of six percent until the cost is paid.

(b) Any structure, pier, dock, piling, dolphin, fender or other structure which now exists and is found by the building inspector to be in bad condition may be removed by the town after notification of the owner by the building inspector, in the manner described in this section, and the cost thereof assessed against the property.

(Code 1979, § 9-6019; Code 1990, § 4-88)

Sec. 6-104. Renting prohibited.

(a) The renting of piers, docks or dock spaces or moorings for any purpose whatsoever is prohibited in residential zones.

(b) No commercial services or activities of any kind may be carried on incidental to the ownership or use of any pier or dock in any residential zone.

(Code 1979, § 9-6020; Code 1990, § 4-89)

Sec. 6-105. Additional regulations of governmental agencies.

(a) Nothing in this chapter shall preclude or deny the requirements of any other governmental agency relevant to the construction of pier facilities within the town. Where navigational jurisdiction exists, the requirements of the federal government shall be met.

(b) The acquisition of permits for pier construction from other governmental agencies shall be essential for consideration of a permit for the construction of a pier or dock under the requirements of this chapter. Pier or dock construction not conforming to this article shall be denied and prevented under penalty of law.

(Code 1979, § 9-6021; Code 1990, § 4-90)

Sec. 6-106. Exceptions and variances.

The standard requirements of this article may be modified where, because of topographical or other conditions peculiar to the site or proposed construction, strict adherence to the provision of the regulations of this chapter would cause an unnecessary hardship, the planning board may recommend and the board of commissioner authorize a variance, if such variance can be made without destroying the intent of this chapter. Any variance thus authorized is required to be entered in writing in the minutes of the planning board and of the board of commissioner and the reasoning on which the departure was justified set forth.

(Code 1979, § 9-6022; Code 1990, § 4-91)

Secs. 6-107—6-125. Reserved.

Town of Surf City

ORDINANCE NO. 2022-07

AN ORDINANCE AMENDING SECTION 1-2, DEFINITIONS AND SECTION 5-11, NO USE OF UNENCAPSULATED POLYSTYRENE MATERIAL

NOW, THEREFORE, BE IT ORDAINED BY THE TOWN COUNCIL OF THE TOWN OF SURF CITY, NORTH CAROLINA, THAT:

SECTION I. The Code of Ordinances, Chapter 5 is hereby amended to read as follows:

Sec. 1-2. Definitions and rules of construction.

Polystyrene is a thermoplastic polymer or copolymer comprised of at least 80 percent styrene or para-methyl styrene by weight. (Commonly known as Styrofoam)

Unencapsulated polystyrene means polystyrene that is not completely encased within a polyethylene shell or within other comparable materials that protects against cracking, peeling, sloughing, and deterioration from ultraviolet exposure and physical trauma.

Sec. 5-11 Unencapsulated polystyrene material

(1) The use of unencapsulated polystyrene on any flotation device in prohibited. This includes new construction as well as repair or modification of an existing structure.

SECTION II. SEVERABILITY CLAUSE. If any section, part of this Ordinance is declared unconstitutional or invalid by a court of competent jurisdiction, then it is expressly provided and it is the intention of the Town Council in passing this Ordinance that its parts shall be severable an all-other parts of this Ordinance shall not be affected thereby and they shall remain in full force and effect.

SECTION III. PUBLICATION AND EFFECTIVE DATE. This Ordinance shall take effect immediately upon its passage and publication according to law.

READ, CONSIDERED, PASSED AND APPROVED at a regular meeting of the Town Council of Surf City, North Carolina, at which a quorum was present, and which was held on the 5th day of July 2022.

Adopted the 5th day of July 2022.

TOWN OF SURF CITY

Douglas C. Medlin, Mayor

ATTEST:

Carla P. Citarelli, Town Clerk

APPROVED AS TO FORM:

Crossley, McIntosh, Collier, Hanley & Edes, PLLC

Brian Edes

ORDINANCE NO. 2022-0001

AN ORDINANCE OF THE BOARD OF ALDERMEN OF THE TOWN OF NORTH TOPSAIL BEACH, NORTH CAROLINA, AMENDING THE UNIFIED DEVELOPMENT ORDINANCE TABLE 4-1 AND § 4.03.23 DOCKS, PIERS AND FLOATING WALKWAYS AND AMENDING THE CAMA LAND USE PLAN ADOPTING A POLICY STATEMENT TO PROHIBIT UNENCAPSULATED POLYSTYRENE DOCKS.

WHEREAS, during a coastal debris cleanup sponsored by the Coastal Federation, large quantities of polystyrene were found in all areas of our waters and marshlands along our coast. Polystyrene is a petroleum product, commonly known as Styrofoam. It is often used in dock floats because of its buoyancy; and

WHEREAS, polystyrene is neither readily recyclable nor biodegradable and takes hundreds of years to degrade in the environment. When exposed to the elements, it fragments into unsightly, small, nonbiodegradable pieces that may be ingested by marine life, wild and domestic water birds and other wildlife blocking the digestive system and killing them through starvation; and

WHEREAS, the deterioration of larger polystyrene floats into beads and smaller pieces create a pollution line along shorelines, intertidal land and other places where buoyant debris collects. Such pollution must be picked up and removed at the expense of the public and private citizens; and

WHEREAS, to prevent such degradation, pollution and hazard to water dependent mammals and birds, polystyrene floats should be encapsulated in a hard polyethylene shell, which prevents the deterioration and spread of beads and smaller sections of polystyrene floats.

NOW, THEREFORE, BE IT ORDAINED by the North Topsail Beach Board of Aldermen that the Unified Development Ordinance Table 4-1 and § 4.03.23 Docks, Piers And Floating Walkways and the CAMA Land Use Plan is hereby amended subsequent to read as follows:

Table 4-1 Use Table

Table 4-1 Use Table											
Use	*MHR*	*R5*	*R8*	*R10*	*R15*	*R20*	*RA*	*COND*	*B1*	*B2*	*Use Specific Standard*
Dock, pier (accessory, principal,)	P	P	P	P	P	P	P	P	P	P	**4.03.23**

^add floating walkways

§ 4.03 USE SPECIFIC STANDARDS.

§ 4.03.23 Docks, Piers And Floating Walkways

Unencapsulated polystyrene as a floatation device for floating dock systems, piers and floating walkways is prohibited.

And that the CAMA Land Use Plan be amended to include the following policy statement:

The use of unencapsulated polystyrene as a flotation device for floating dock systems and floating walkways is prohibited for use in the coastal waters and marshes within the Town of North Topsail Beach.

This ordinance is effective upon its adoption.

Adopted this the 6th day of July 2022.

Joann McDermon, Mayor

ATTEST:

Melinda Mier, Town Clerk