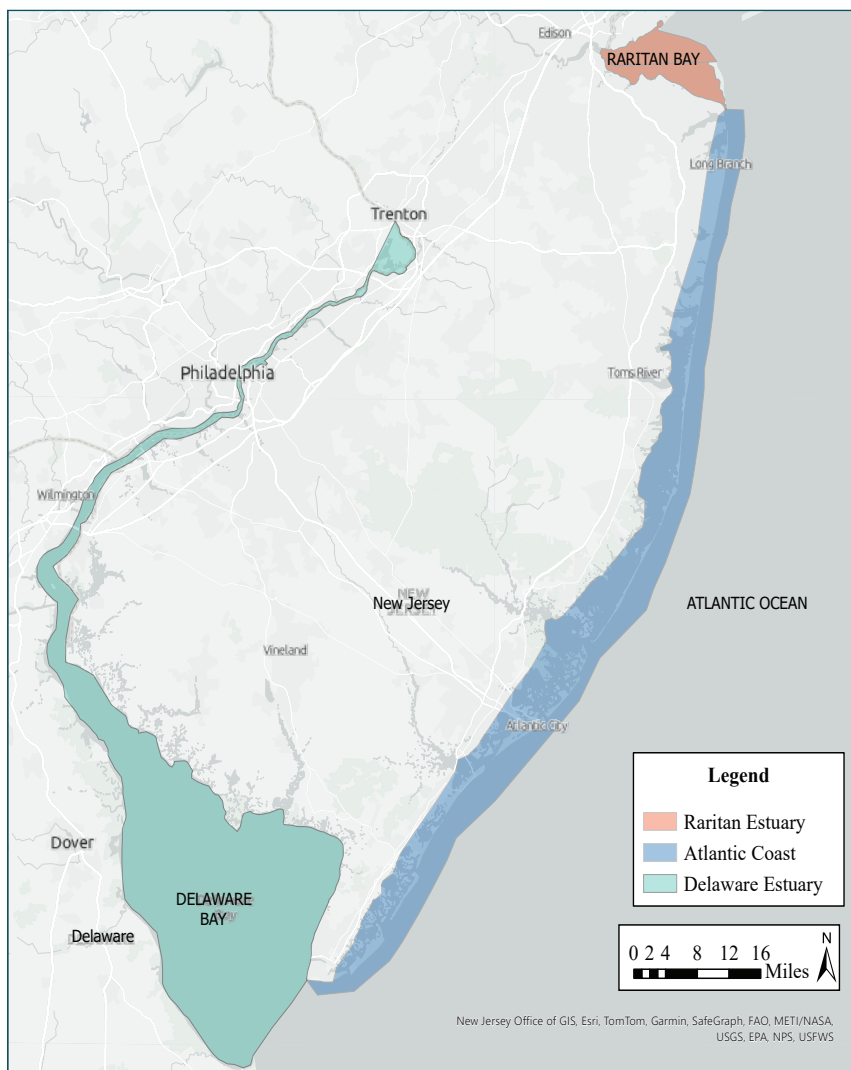


# Coastal Habitats of New Jersey

**Habitat is defined as the natural home of an animal. Habitat loss and degradation have been identified as significant factors affecting the long-term sustainability of the nation's fisheries.<sup>1</sup>**



New Jersey Office of GIS, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS

In New Jersey, there are many types of habitats, one of which is the saltwater environment where many recreationally sought species live. The NJDEP Fish & Wildlife's **Marine Resources Administration (MRA)**, comprised of the Bureau of Marine Fisheries and the Bureau of Marine Habitat and Shellfisheries, studies and protects saltwater species within the coastal habitats of the state. By conducting different types of surveys and assessing the populations of various species, biologists can determine how healthy local habitats are and which areas need improvement. This data allows biologists to make educated recommendations for the conservation of the species and the waterways they call home.

Biologists survey tidal waters in all areas of New Jersey. For this article, the state has been broken down into three regional habitats:

- **Raritan Estuary:** Sandy Hook Bay, Raritan Bay and tidal tributaries.
- **Atlantic Coast:** Atlantic Ocean, inlets, bays, and tidal tributaries from Sandy Hook to Cape May.
- **Delaware Estuary:** Delaware Bay, Delaware River, and tidal tributaries.

## Current MRA Surveys by Region

### Raritan Estuary

Angler Intercept Survey  
Hard Clam Estuarine Inventory  
Fishery Resource Inventory

### Atlantic Coast

Angler Intercept Survey  
Blue Crab Pot Survey  
Glass Eel Survey  
Ocean Trawl Stock Assessment Survey  
River Herring Assessment Survey  
Shell Recycling Program  
Ventless Trap Survey  
Yellow Eel Survey

### Delaware Estuary

Acoustic Telemetry Monitoring Survey  
Angler Intercept Survey  
Juvenile Finfish Trawl Survey  
Horseshoe Crab Spawning Survey  
Oyster Reef Enhancement and Transplant Program  
River Herring Assessment Survey  
Striped Bass Recruitment Seine Survey  
Striped Bass Tagging Survey



**Biologists measure clams collected during a dredge tow.**

<sup>1</sup> Atlantic States Marine Fisheries Commission's Habitat Committee



Marine Fisheries staff pull in an otter trawl during the Raritan-Sandy Hook Bay Complex Fishery Resource Inventory.



Typical October catch dominated by American lobster and black sea bass during the Ventless Trap Survey.

## Raritan Estuary

### Hard Clam Estuarine Inventory:

This inventory of shellfish resources assesses hard clam populations across New Jersey's estuaries. Since 1983, the survey's results have determined the standing stock, distribution, and relative abundance of hard clams, providing important data for the management of shellfish resources.

The survey involves towing a hydraulic dredge for 100 feet at multiple stations within an estuary. The number of stations varies depending on the size of the water body. After each tow, biologists sort, count, and measure all hard clams while noting any associated species. The data collected offers an accurate representation of the status and distribution of hard clams within the estuary, which helps to manage commercial and recreational fishing efforts, waterfront development plans, and restoration and enhancement efforts.

In the summer of 2024, the MRA completed its fifth sampling effort within Sandy Hook Bay, as part of a federally funded project, to characterize the shellfish habitat within the Raritan and Sandy Hook Bay complex. This estuary houses an important commercial hard clamming industry. All commercial clamming within this complex is processed through two depuration plants as the waters are less than approved for shellfish harvesting. Ongoing assessments and reported harvests within designated harvest zones enable the MRA to monitor populations and identify long-term trends in the status of this resource as well as changes to the estuarine habitat. Looking ahead, biologists intend to survey Raritan Bay in 2025 as the next part of this ongoing project.

### Raritan-Sandy Hook Bay Complex Fishery Resource Inventory:

The Fishery Resource Inventory is a multi-gear project conducted monthly using an otter trawl, bagged seine, and multi-mesh gillnets. Each month, sampling stations are randomly selected for all gear types by depth and/or region, identifying and measuring each collected species. MRA staff does this to develop estimates of the abundance of

finfish and invertebrates, determine stock status and population changes, and characterize finfish and invertebrate communities within this complex for all size and age classes. This data can be used to assist with regional stock assessments and help aid fishery management. In the past three years, this project has collected just over 250,000 finfish and invertebrates, spanning 100 different species. The beach seine hauls collected the most fish of all three gear types and the top three species collected were Atlantic menhaden, Atlantic silversides, and bay anchovies. Along with housing species migrating from the south, such as Florida pompano and speckled swimming crab, the Raritan-Sandy Hook Bay Complex has shown to be an essential nursery ground for commercially and recreationally important species such as bluefish, winter flounder, black sea bass, and weakfish, which have been observed from the last three years of sampling.

## Atlantic Coast

### Ventless Trap Survey:

The Ventless Trap Survey, now in its tenth year, examines annual variation on the Sea Girt, Manasquan Inlet, Little Egg and Atlantic City reef sites. The survey includes two sites north and two sites south of Barnegat Inlet, the midway point of the state's ocean shoreline. Scientists are interested in characterizing seasonal and spatial changes in reef community composition and relative abundance of structure-associated species. The survey focuses on several commercial and recreational important species, including black sea bass, tautog (blackfish), and lobster, however, it also provides data on other important fish and crustacean species that occur on our reefs and naturally occurring structure. Results from the project are valuable for improving our ecological understanding of New Jersey's artificial reef habitats and help in the development of fishery management plans and informing ongoing projects as part of NJDEP's artificial reef program.

#### Survey objectives are to:

1. Characterize seasonal changes in fish and invertebrate communities between survey sites.

2. Evaluate possible differences in community composition and abundance between two of the most commonly used artificial reef materials: concrete-based structures (reef balls, castings, and demolition concrete) and metal structures.
3. Characterize the statistical distribution through catch-per-unit-effort (CPUE) on hard and soft bottoms for the three target species and any other species captured in sufficient numbers.
4. Assess the influence of trap soak time on CPUE for the three target species and any other species captured in sufficient numbers.

Biologists have found significant differences in catch rates for several structure-dependent species when compared to traditional survey methods including trawls and hook and line, implying that this sampling method has a significant place in fisheries management. In turn, the artificial reef program will create and expand locally suitable artificial habitats that help to ensure the survivability of many species.

### Blue Crab Pot Survey:

The Blue Crab Pot Survey collects abundance data on blue crabs and much more. Chesapeake-style crab pots are used containing different size bycatch reduction devices (BRDs). The devices control the size of the opening to the pot. Blue crabs are



Marine Fisheries staff measure the carapace of a blue crab.



plentiful throughout New Jersey's bays and rivers including Great Bay and the Mullica River, where the survey takes place, and are prized table fare for their sweet and tender meat. Crab pots catch more than just blue crabs: during the past year, staff captured 13 different types of sharks, fish, whelks, and turtles within deployed traps. Another important species caught is the diamondback terrapin, a non-game reptile species of special concern in New Jersey. A major goal of this survey is to maximize the blue crab fishery while obtaining additional data on diamondback terrapins.

### Great Bay Yellow Eel Survey:

The Yellow Eel Survey collects an abundance of data on yellow-stage American eels. This survey supplements the glass eel survey by sampling additional life stages, determining suitable adult habitats, and providing valuable life cycle information. Commercial pots are used so that the data supplements commercial fishery sampling conducted by the MRA. While American eels are found in various habitats, from open ocean to freshwater, Great Bay has proven itself to be a sanctuary for eels. The abundance of small fish, insects, and mollusks makes this estuary an excellent home. At this stage of life, eels are commonly used as fishing bait; therefore, knowledge of the estuary and the population within is essential for proper fishery management. While catches vary, American eels are consistently present, and this remains a positive sign that eels continue to endure at a local habitat once they've entered Jersey waters.



An eel pot is tended during the Yellow Eel Survey.

Staff processing a haul of oysters aboard F/V Peter R. Paynter during an oyster transplant.



### Ocean Trawl Stock Assessment Survey:

- Since 1988, this survey has sampled over 6,300 miles, about the distance from New York City to Cairo, Egypt, and has taken over 63,000 staff hours at sea, or over seven years, to survey that area.
- The survey has encountered nearly 300 unique species; 33 of which were only ever caught once and never encountered again.
- The most abundant species that have been encountered by weight are skates (211,000 pounds), dogfish (168,000 pounds), and searobins (38,000 pounds).

### River Herring Assessment Survey:

- With the completion of the 2024 sampling year, the data collected from the Great Egg Harbor estuary now meets the minimum time series needed for stock assessment and management purposes.
- A total of 108 individual species have been collected on the Great Egg Harbor River since the survey began in 2015.

### Glass Eel Survey:

- The largest single-day catch in the fyke net was 39,283 glass eels in March 2022.
- The smallest glass eel ever caught was 1.3 inches long and weighed 0.0001 pounds.
- Glass eel catches have been above average for the past four years (2000–2024).

## Delaware Estuary

### Oyster Reef Enhancement and Intermediate Transplant Programs

The MRA manages a sustainable, \$40+ million-dollar wild harvest oyster fishery within Delaware Bay. The fishery has a self-imposed per-bushel tax on its annual quota, which is used to fund restoration and enhancement programs. These programs include shell planting and oyster transplants managed by the MRA. Staff use stock assessment data to narrow down reef sites that require enhancement work and conduct sampling to determine suitable recipient sites for activities.

Barges are used to plant clean shell onto existing oyster reefs around the start of the oyster spawning season, typically in late June to early July. Planting shell is important because it provides more habitat for oyster larvae, known as spat, to set onto and build upon existing reefs. Areas, where these planting events have occurred, have been monitored for spat for years after shells have been planted.

The transplant program moves oysters from “transplant” reefs to “harvest” reefs. Specific oyster reefs are managed as transplant-only source reefs because salinities are lower, which causes slower growth and less marketable meat quality for the fishery. Vessels are hired to harvest oysters from these transplant regions and plant them onto market reefs selected by the MRA. This allows the fishery to utilize the entire resource and help supplement certain areas in need of assistance due to low natural recruitment or natural mortality events such as diseases that affect oysters and predation. The entire program aims to maintain sustainable fishing rates recommended by an independent stock assessment committee. Both programs have been shown to benefit the enhancement sites and the surrounding areas that bolster the oyster population and local fishery.

### Juvenile Finfish Trawl Survey:

The Delaware Bay serves as spawning and feeding grounds, nursery areas, and migratory routes for many important recreational fish and invertebrates such as striped bass, weakfish, American shad, and blue crabs. The Juvenile Finfish Trawl Survey samples eleven stations from April to October. The total number of individuals, relative abundance, and length frequency are analyzed on an annual basis for all species collected.

In 2023, the index for all finfish collected showed an increase from that in 2022. The bay anchovy was the most abundant species collected during that year. Typically, bay anchovies, along with Atlantic croaker and weakfish, account for the majority of the total individuals collected. The success of a fishery will be contingent upon the survival of the early life stages and eventual recruitment into the adult populations. The recent index increase provides insight into the health of the Delaware Bay, demonstrating that estuarine-dependent finfish continue to utilize this important habitat.

Occasionally, some unique species will show up on the sorting table that are typically not seen in New Jersey's marine waters but are drawn to warmer water temperatures in late August through September. Some migrant species encountered throughout the years have included lookdowns, Florida pompanos, skillettfish and more! Information collected by this survey provides timely and accurate estimates of relative abundance to resource managers, which is necessary to predict future fishery trends and harvest potential.



Biologists haul a net on the Delaware Bay Finfish Trawl Survey.

### Striped Bass Recruitment Seine Survey:

- Since the survey's inception in 1980, the seine net has been hauled in nearly 10,000 times and caught over 1,500,000 fish.
- The survey is the MRA's longest-running fishery-independent survey.
- A total of 96 unique species have been identified during the survey.

### Striped Bass Tagging Survey:

- Since 1989, MRA staff have tagged over 35,000 striped bass in Delaware Bay: 8,700 have been recaptured and reported.
- The longest amount of time between a striped bass tagged in Delaware Bay and recaptured is 7,075 days (over 19 years): staff tagged this fish on March 14, 1995, and it was recaptured off Block Island, RI on July 27, 2014.
- The largest amount of striped bass tagged in a single day was 579 fish on March 31, 1996.
- Striped bass tagged in Delaware Bay have been reportedly recaptured as far south as Onslow Bay, NC, and as far north as Sebasticook River in Winslow, ME.

### River Herring Assessment Survey:

- A total of 75 individual species have been collected on the Maurice River since the survey began in 2013.
- Data from the Maurice River survey was used for the first time for management purposes in the Atlantic States Marine Fisheries Commission's 2024 Benchmark Stock Assessment for River Herring.

### Horseshoe Crab Spawning Survey:

- Thanks to MRA partnerships, the survey samples 20 different beaches in New Jersey and Delaware.
- In 2024 across all beaches, a total of 167,544 horseshoe crabs were counted during sampling.

### Acoustic Telemetry Monitoring Survey:

- Since 2012, the MRA has identified 1,190 unique tags in over 20 species including fish, sharks, sea turtles, and horseshoe crabs!
- Delaware Bay receivers detect many Southern species coming to pup or hang out during summer months, including sand tiger sharks, bull sharks, and cownose rays.

The **Access Point Angler Intercept Survey (APAIS)**, which conducts in-person interviews with recreational saltwater anglers, samples in all regions. Catch and effort data is used in stock assessments which aim to ensure healthy sustainable stocks.

In addition to field surveys, MRA biologists aim to protect New Jersey's coastal habitats by conducting thorough reviews of proposed in-water

construction. Project restrictions on timing and gear are implemented to protect the fragile habitats of many species. Staff serve as representatives on the **Atlantic States Marine Fisheries Commission's Habitat Committee** and work closely with the **Atlantic Coastal Fish Habitat Partnership**. This collaborative initiative is dedicated to accelerating the conservation, protection, restoration and enhancement of habitats for native Atlantic coastal, estuarine-dependent, and diadromous fish species. They work to ensure healthy, thriving habitats capable of supporting all life stages of these fish along the Atlantic coast.

A healthy habitat provides the essential foundation for successful fisheries management.<sup>1</sup> Considering habitat in fishery management decisions is part of a newer assessment process called **ecosystem-based management**. This type of management allows biologists to consider all influences within the ecosystem as a whole, as opposed to traditional methods which only consider one fishery or species. Through conservative fishing regulations, habitat restoration, and protection projects, fish passage improvements, and other approaches, fisheries managers aim to protect vital fish habitats. All to leave New Jersey's saltwater species in a healthier state for future generations.

### MRA Fisheries Biologist Contributors:

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# Species Profiles

Research conducted in various coastal habitats in New Jersey provides valuable data for stock assessments of numerous species. Continue reading to learn more about the important species highlighted in the surveys discussed on the previous pages.

## American Eel (*Anguilla rostrata*)

**Features:** Brownish, greenish to black or gray above whitish belly. Slender, snake-like body. Small, pointed head. One long dorsal fin extends more than half of the body. One small gill slit before pectoral fin. Up to 60 inches long.

**Habitat:** Greenland to the Gulf States, Bahamas and Bermuda. Prefer shallow water in fresh or estuarine environments.

**Behavior:** Catadromous = Larval stage eels ascend freshwater streams and rivers in North America to live until sexually mature, when they migrate to the Sargasso Sea to spawn and die. Nocturnal foragers.



## American Lobster (*Homarus americanus*)

**Features:** Olive-green or greenish-brown with orange, reddish or black speckles. Body cylindrical and smooth. Long antennae measure 2 inches and split in “Y” structures with pointed tips. Armed with asymmetrical pair of claws. Three pairs of walking legs. Grow to 25 inches and 44 pounds.

**Habitat:** Most abundant Maine and Massachusetts but found in offshore areas Maine through Virginia.

**Behavior:** Prefer cold, shallow water. Molt 25 times in their first 5–7 years. Feed on bottom dwelling fish and crustaceans. Can regenerate some parts of their body as needed: claws, legs and antennae.



## Black Sea Bass (*Centropristis striata*)

**Features:** Blackish to gray on body and fins. Centers of scales white. Unpaired fins with white streaks and margins. Bars or dark stripes on sides. Caudal fin rounded with trailing filaments. Up to 2 feet and 9 pounds.

**Habitat:** Massachusetts to Florida. Rocky and soft bottoms around reefs, pilings and jetties.

**Behavior:** Hermaphroditic (all start out as females). Feed on invertebrates.

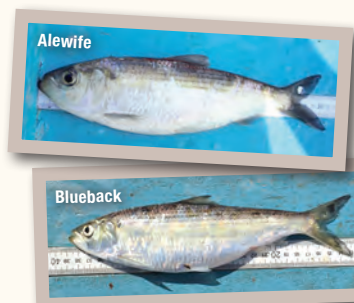


## River Herring: Blueback and Alewife (*Alosa aestivalis* and *Alosa pseudoharengus*)

**Features:** Alewife – Grayish to bluish green dorsally. Sides and ventral area silvery with a dark spot behind the gill plate. Deep bodied with large eyes and white body cavity lining. Blueback – Dark blue fading to pale blue dorsally. Sides and ventral area silvery with a dark spot behind the gill plate. Moderately deep bodied with small eyes and black body cavity lining. Adults of both species range from 12–15 inches.

**Habitat:** Nova Scotia to South Carolina with bluebacks ranging as far south as the St. John River in Florida. Adults feed and overwinter in nearshore waters out to the continental shelf.

**Behavior:** Filter feeders. Anadromous spawners, adults migrate to coastal streams and rivers every spring to spawn in freshwater. Juveniles mature in freshwater nursery grounds and join the coastal migration in the fall.



### Eastern Oyster (*Crassostrea virginica*)

**Features:** Bivalve, consisting of two shells attached at one end by a hinge and large muscle. Variable in shape. Pale white to gray shell. Shell has rough ridges or bumps. Average 3–5 inches.

**Habitat:** Ocean and estuarine waters from Gulf of St. Lawrence, Canada to the Gulf States. Abundant in shallow, saltwater bays, lagoons and estuaries.

**Behavior:** Filter feeders. One adult oyster can filter significant amounts of water each day. Found in water 8–25 feet deep. Intolerant to prolonged exposure to freshwater.



### Hard Clam (*Mercenaria mercenaria*)

**Features:** Bivalve. Rounded shell with equal size halves hinged at one end. Gray to white. Concentric growth rings on outside of shell. Inside of shell white with violet marking. Can grow up to 5 inches.

**Habitat:** Canada to Florida. Most abundant between Cape Cod and New Jersey. Found in sand or muddy sand in bays and along ocean beaches.

**Behavior:** Grow quickly. May live 20–25 years. Prefer saltwater and cannot survive if salinity is too low.



### Tautog (*Tautoga onitis*)

**Features:** Color varies with habitat. Shades of brownish or grayish green to blackish brown. Females and smaller fish mottled with irregular bars. Large males more uniformly colored with a pale blotch on each side. Can grow to 36 inches and over 25 pounds.

**Habitat:** Nova Scotia to South Carolina. Most common between Cape Cod and the Chesapeake Bay.

**Behavior:** Prefer to be near the bottom, around coastal rocks, pilings, artificial reefs and wrecks. Migratory. Long lived, up to 40 years old.

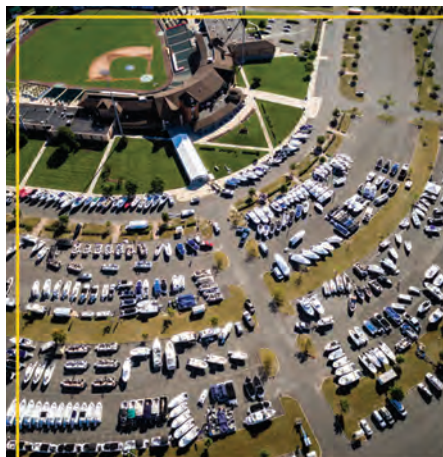


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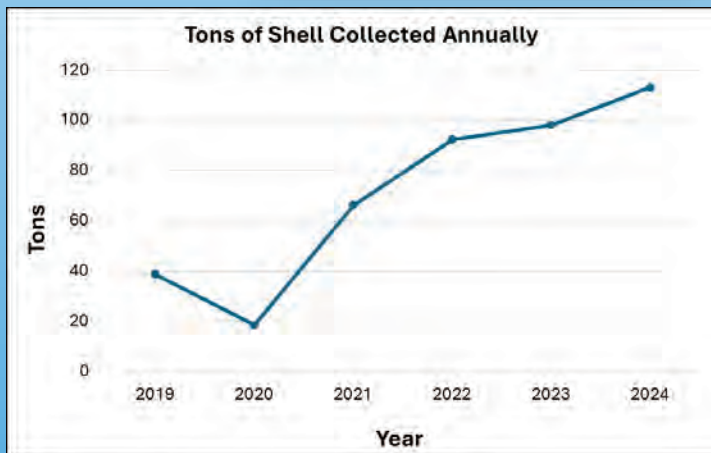
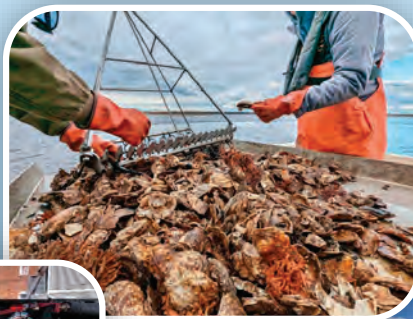




# Shell Recycling Program Expansion



Since 2019, the Marine Resources Administration has collected shell from restaurant partners in Atlantic City through the Shell Recycling Program. As a result of this effort, discarded shell otherwise destined for a landfill is repurposed to enhance local oyster reefs along New Jersey's Atlantic coast. Oysters early in their life cycle require a hard substrate to attach to. Without such surfaces available for larvae to settle on, an oyster populations sustainability could be at risk. With shell being a limited resource that is often diverted for other purposes, shell recycling helps provide the substrate that oyster populations need to grow and succeed. Initial efforts have focused on the Mullica River oyster reefs, home to one of the last self-sustaining oyster populations on the Atlantic coast. These reefs are resilient, overcoming disease, freshwater intrusion and the impacts associated with climate change, making them the ideal candidate for expansion.



To date the program has collected over 400 tons of recycled shell from the greater Atlantic City area through weekly collections from 12 restaurant partners. Thanks to a recent grant award from NOAA's Coastal Zone Management Program, the Shell Recycling Program is set to expand into the rest of Atlantic and Cape May counties. The program aims to add a minimum of 15 additional restaurant partners over the next three years, along with three public drop-off locations, allowing those who consume shellfish at home to do their part.

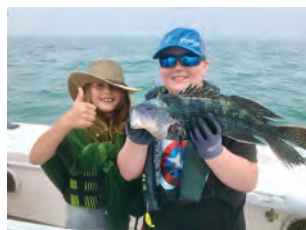
The addition of restaurant partners and drop off locations will enhance shell planting efforts within the Mullica River oyster reefs, planting 25,000 bushels (approximately 700 tons) annually. This plan will more than double largest planting to date which occurred last summer when 10,000 bushels were planted. With additional funding, the MRA introduced an educational component to the program within local schools to expose students to the marine sciences, collaborating with educators to provide learning opportunities at an early age while fostering a sense of environmental stewardship.





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