# Marine Resources Administration

# Shell Recycling Program

## 2021 Collection Year

## Annual Report

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## Acknowledgments

The Shell Recycling Program would not be possible without the hardworking, dedicated staff of the Marine Resources Administration's Bureau of Marine Habitat & Shellfisheries, restaurant partners and program partners, and supporters. Great appreciation is extended to Les Frie and Ricky DiVaccaro for performing weekly shell collection, data collection/ entry, and the operation and maintenance of equipment. Special thanks are extended to Jenny Tomko and Allie Hoffman in program outreach planning and execution. Sincere appreciation is extended to supervisory staff, Kira Dacanay, Jeff Normant, and Russ Babb, for guidance and direction on shell recycling activities. For photography, videography, and media creation services, gratitude is extended to New Jersey Fish and Wildlife's Jon Carlucci and Matt Hencheck. Thanks are extended to all restaurant partners, Hard Rock Hotel & Casino, Dock's Oyster House, Knife & Fork Inn, and Steve & Cookies by the Bay. Finally, thanks are offered to all program partners and supporters, including Jetty/ Jetty Rock Foundation, Stockton University, Rutgers's Cooperative Extension, the Atlantic Coast Fish Habitat Partnership, and Catrachos Trash and Recycling.

## Executive Summary

This report documents recycled shell collection during 2021 by the Marine Resources Administration's Shell Recycling Program in Atlantic City, New Jersey, including the economic and potential ecological benefits, logistical tasks, partners, outreach, and challenges associated with the collection of shell. Additionally, this document summarizes program operations, the program's origins and history, the partners' roles, and the recycled shell's intended use. In 2021, a total of 2,410 bushels (66 tons) were collected from four restaurant partners. A separate report providing a complete analysis of the MRA's shellfish enhancement activities, in which recycled shell is a critical component, will be produced and available in the coming months. Full shell planting activities are not described in this report.

## Introduction

Eastern oysters (*Crassostrea virginica*) are a keystone species, meaning they are an integral part of a healthy ecosystem. As reef-building organisms, oysters provide structural habitat for many of New Jersey's commercially and recreationally important species, such as striped bass, blue crab, and summer flounder. The three-dimensional structure the reefs create offers protection from predators and forms a nursery ground for juvenile finfish. Additionally, adult oysters can filter significant volumes of water, helping to improve water quality by cycling excess nutrients.

Oysters are critical socially and economically in the United States, recognized as one of the most popular seafood dishes served at seafood restaurants. Traditionally, when oysters and other bivalve shellfish (such as hard clams, *Mercenaria mercenaria*) are consumed at a local restaurant, the leftover shell is put in the trash for disposal in a landfill. Shell recycling programs aim to beneficially reuse what otherwise would be a waste product by collecting the shell and using it for oyster enhancement efforts. The cured shell provides the hard substrate required for oyster populations to grow and succeed. In addition to the ecological benefits, shell recycling produces significant cost savings for local restaurants (see Table 3) by reducing the total weight of trash produced. Recycling shell also allows local restaurants to display their commitment to environmental stewardship, providing a good advertising platform to engage consumers.

In February of 2019, NJDEP Marine Resources Administration (MRA), the Jetty Rock Foundation (JRF), Rutgers Cooperative Extension (RCE), and Stockton University (SU) collaborated on the development of a conceptual shell recycling program in Atlantic City, New Jersey. The program was developed after the Hard Rock Hotel and Casino in Atlantic City (HRC) learned of an existing program in Long Beach Township, New Jersey, and expressed interest in recycling shell. The Jetty Rock Foundation and Long Beach Township built a successful model through their Oyster Recycling Program, demonstrating how municipalities can make shell recycling efforts successful, and it sparked the interest and development of this program in Atlantic City. Many other shell recycling programs exist throughout the United States.

As anticipated, the benefits of shell recycling have become appealing to additional casinos and area restaurants. As the partnership moved forward, many logistical challenges became apparent. Transportation, storage, and curing locations for the shell are among the most challenging,

especially with the prospect of adding more casinos/restaurants. Shell was being collected by RCE using an F-250 pickup truck and stored at the SU marine field station, which was quickly running out of available storage space. Trucks were manually loaded at the casino and unloaded at SU marine field station. The process was incredibly time-consuming and labor-intensive. Additional partners were sought to help with these challenges but without success. Consequently, in October 2019, after careful consideration and discussions with partners, the MRA agreed to take on a larger coordination role in this project to help continue its growth and success. Having assumed the lead role in the program, MRA dedicated staff, equipment, and resources. The program has expanded significantly since 2019 and now serves Hard Rock Hotel & Casino, Dock's Oyster House, the Knife & Fork Inn, and Steve & Cookies by The Bay. The program continues in efforts to expand to additional venues in the Atlantic City region.

## Program Implementation

### Partnerships, Roles, and Support

Project Partners & Supporters

**NJDEP Marine Resources Administration:**

MRA is responsible for protecting and managing New Jersey's marine habitat, resources, and industry. Improving the overall conditions of shellfish habitat and increasing shellfish populations through various enhancement and restoration programs is a focus of the MRA. These programs provide a net benefit to the ecology of New Jersey's estuarine waters and afford harvest opportunities for commercial and recreational shellfishermen. The MRA is the coordinating agency for this program and will collect, store, and plant the recycled shell primarily to enhance the Mullica River oyster reefs, one of the last self-sustaining oyster populations on the Atlantic coast of New Jersey.

**Jetty/ Jetty Rock Foundation:**

Jetty/Jetty Rock Foundation is an outdoor coastal lifestyle apparel brand and certified corporation that runs charitable initiatives through its 501(C)3 nonprofit. Jetty is the content/media creation partner of the Shell Recycling Program. Jetty designed the Shell Recycling Program logo and all promotional materials. Jetty will continue producing media, signage, apparel, and content for the program moving forward.

**Rutgers Cooperative Extension:**

RCE provides science-based educational programs and brings knowledge of the state university to local communities. Extension efforts include educational programming and applied research in fisheries, aquaculture, and coastal resource management, part of which is the Barnegat Bay Shellfish Restoration Program that focuses on estuarine ecology, environmental stewardship, and shellfish biology, restoration, and aquaculture. RCE assists the shell recycling program where necessary by providing resources in Ocean and Atlantic Counties, including personnel, relevant educational programming for the public and volunteers, and support for other logistics involved (i.e., vehicles, shell transport, and planting)

**Stockton University Marine Field Station:**

The SU marine field station houses research vessels, sampling equipment, and staff to conduct research-driven programs. Faculty at the SU conduct oyster restoration and monitoring projects throughout New Jersey's coastal bays and seek external funding and partnerships to support those projects. The University is well situated, geographically and strategically, to serve the program through student engagement, research, and monitoring.

**Atlantic Coast Fish Habitat Partnership:**

The Atlantic Coast Fish Habitat Partnership (ACFHP) endorsed the Shell Recycling Program in 2019. ACFHP's focus is *"enhancing, preserving, and protecting Atlantic diadromous, estuarine, and coastal fish habitats."* The Shell Recycling Program aligns with ACFHP's mission-centric work by enhancing coastal fish habitat with the collected shell being beneficially reused to provide much-needed hard substrate to local oyster reefs.

**Catrachos Trash & Recycling:**

In 2021, Catrachos Trash and Recycling (CTR) assisted the program's expansion by providing several 64-gallon recycling containers for shell collection (see Figure 10). The containers facilitated a more efficient shell collection process and allowed additional venues to join the program.

**Restaurant Partners:**

Table 1

*Active Restaurant Partners*

| Start Date | Venue |
|---|---|
| February 2019 | Hard Rock Hotel & Casino |
| January 2020 | Dock's Oyster House |
| August 2020 | The Knife & Fork Inn |
| October 2021 | Steve & Cookies by the Bay |

Areas for Future Partnership

**Collection Assistance:**

At this time, MRA can only dedicate staff members to collect shell on a weekly basis. This limits the ability to include additional casino or restaurant participants. Many prospective restaurants are deterred from joining the program when requests for more frequent collection due to odor or storage constraints cannot be met. Vehicle/staff support for supplementary shell collections during the week would provide the opportunity for more venues to join the program.

**Public Drop-Off Locations:**

The top question received by MRA staff is where the public can drop off shells from personal shellfish consumption. Currently, the program does not offer a public drop-off location. MRA staff has contacted local trash and recycling centers and county parks and recreation departments to find a suitable public drop-off location, but they have yet to be identified. This is an area for a future partnership that would help increase public engagement and environmental stewardship education.

Shell Collection

Shell is picked up weekly by MRA staff on an agreed-upon schedule with the restaurant partners. In 2021, staff began using its newly purchased dump trailer (see Figures 5-8) equipped with a hydraulic lift arm to maximize efficiency. The dump trailer cleared the way for a more streamlined process and increased the capacity for shell collection, allowing for the collection of up to 175 bushels of shell (nearly five tons) in one trip. The increased capacity resulted in the addition of Steve & Cookies by the Bay, located in Margate. Although located outside Atlantic City, Steve & Cookie's interest and eagerness to join led to the program's expansion to the greater Atlantic City area.

All restaurant partners keep shell separate from their regular trash stream and place them in the designated Shell Recycling Program containers. Each venue uses 64-gallon recycling containers (see Figures 11-12). To accurately assess the amount of shell collected from each venue, the total volume of the container was determined relative to the US standard bushel. Staff estimated that the maximum number of bushels per container is 6.90 bu/container (e.g., a 64-gallon container has a volume of 8.56 cu ft, and a standard US Bushel has a volume of 1.24 cu ft. 8.56/1.24= 6.90 bu./container)

During pickups, staff recorded pertinent data (see Figure 4), which included a percentage estimate of the fullness of each container. This percentage and the maximum bushels per container were used to estimate the number of bushels collected. All shell was transported back to Nacote Creek Research Station, where it was left to cure for a minimum of six months.

In 2021, a total of 2,410 bushels of shell were collected, an estimated 66 tons. This marks a **258%** increase in collected shell from 2020 (see Table 2 and Figures 2-3).

Curing Site & Maintenance

Prior to shell being returned to a marine environment for oyster reef enhancement, it must cure by being subjected to the elements to rid it of any potential pathogens or bacteria that may be left on the shell. This primarily refers to Dermo disease (*Perkinsus marinus*), which is not harmful to humans but can be detrimental to native oyster populations. The curing process reduces the risk to the native shellfish population when adding the shell back into the marine environment. According to Bushek et al. (2004), a minimum curing of one month is needed to dramatically reduce the risk of spreading *P. marinus*. Out of an abundance of caution, most shell recycling programs use a six-month curing period prior to planting shell back in the marine environment.

In following this protocol, MRA staff spreads the collected shell as thin as possible and tends to it regularly using a front-end loading tractor. Spreading the shell out and rotating piles allows for maximum exposure to the elements, speeding up the curing process. Regularly tending the shell ensures that all shells are safe to be planted after six months. Additionally, this process ensures

that any unintended trash present in the collected shell is removed and will not enter the marine environment.

One of the many challenges in recycling shell is finding an adequate storage location to place the shell while curing. Due to the strong unpleasant odor and the amount of space needed, it can be challenging to identify appropriate locations, especially within New Jersey's heavily developed coastal communities. In 2020, the MRA developed two storage sites at the Nacote Creek Research Station in Port Republic, a long-term storage and short-term staging area (see Figure 1). Shell is stored in the long-term storage area (see Figure 14) until it is cured and then is loaded back into the dump trailer to be transported down to the short-term staging area by the waterfront (see Figure 15). Placement here allows for the easy loading of the shell onto a barge for shell planting. The Nacote Creek Research Station is uniquely situated, only a short boat ride away from the Mullica River oyster reefs, allowing for an efficient shell planting process.


*Figure 1.* Shell Curing Locations

## 2021 Shell Planting[1]

While shell planting has occurred on these beds in the past, the Summer of 2021 marked the first annual shell plant on the Mullica River oyster reefs with recycled shell. The Mullica River is the initial focus for enhancement using collected shell as it houses one of the last self-sustaining oyster reefs on the Atlantic coast of New Jersey. These reefs are an excellent platform to enhance and expand due to this oyster populations' resiliency. A full report on the MRA's shellfish

[1] Recycled shell planted in 2021 was collected in 2019 and 2020. Shell collected in 2021 will be planted in 2022 in accordance with shell curing protocols.

enhancement efforts is under development and will provide additional detail on the planting process, equipment, methods, and results.

The MRA rented a 30-foot-long by 24-foot-wide barge from a local contractor that was delivered to the Nacote Creek Research Station. Shell was loaded from the staging area onto the barge using a 3032e John Deer tractor. The tractor loaded shell onto a 30-foot-long portable electric conveyor that was staged overhanging the bulkhead with the end centered over the barge (see Figure 17). The barge and conveyor were shifted periodically throughout the loading process to ensure the barge was loaded evenly for proper weight distribution. Once loaded, the barge was towed to the planting site by the MRA's 42-foot research vessel, RV Zephyrus. Shell was then planted using a series of high-pressure water hoses to blow shell off the barge and onto a 2-acre parcel within the Mullica River oyster reefs. Shell planting commenced over several weeks throughout June and July to align with the oyster spawn. Planting during this time allows for the greatest likelihood of successful recruitment.

The Shell Recycling Program, while it expanded considerably in 2021, did not collect enough shell to meet the MRA's enhancement goals. As a result, the recycled shell was supplemented with additional shell sources for the 2021 shell plant. In total, 2,667 bushels (70 tons) of shell was planted: 2,000 bushels (55 tons) of recycled oyster and clam shell and 667 bushels (15 tons) of surf clam shell. The planted shell will allow this resilient oyster population to expand and succeed. The MRA intends to plant shell on these reefs annually to provide the substrate needed for continued success.

## Outreach

The 2021 season marked continued progress in branding the Shell Recycling Program, community engagement, and content creation. Due to COVID-19, outreach was slow to resume; however, the program made significant strides in program awareness.

The newly acquired dump trailer was branded using Shell Recycling Program and partner logos (see Figures 5-8). The trailer serves as a mobile billboard through Atlantic City to display the Program and create opportunities for public engagement.

In the summer of 2021, recycled shell was planted as a part of the first annual shell plant on the Mullica River oyster reefs. The inaugural planting was attended by representatives from restaurant partners, program partners, the press, and Commissioner Shawn LaTourette of the Department of Environmental Protection. Jetty, the program's content/media creation partner, designed a logo and t-shirt to commemorate the occasion (see Figure 9). The t-shirts, shell recycling stickers, and information on the Shell Recycling Program were given to all in attendance to advance recognition and awareness of the program.

During and after the inaugural planting event, MRA Staff worked with Fish and Wildlife staff to create an informational video about the Shell Recycling Program. The video outlined the shell recycling process, highlighted restaurant partners, and offered a look into the shell planting process. The video was well received and is now a standard tool for staff when engaging with the public and prospective venue representatives. A link to the Program video can be found in the appendix of this report.

Additionally, the program was highlighted in the 2021 edition of the New Jersey Marine Digest and an article published by the Associated Press (see Figures 23-24).

## Challenges and Lessons Learned

While 2021 demonstrated a significant increase in the program shell collection, branding, and general program awareness, the program still faced many challenges and lessons learned throughout the year.

### Trash in Collected Shell

One of the continuing challenges associated with shell collection is receiving shell that contains trash. This includes excess food waste, plastic utensils, cans, bottles, straws, etc. Ensuring that these items do not find their way back into the marine environment is a top priority for the MRA. To minimize this issue, MRA has discussed the importance of this matter with restaurant partners and has instituted a protocol for tending to shell (see Curing and Maintenance) during the curing process in which any remaining trash is removed. Additionally, MRA staff uses a vessel and crew dedicated to collecting remaining trash that makes its way into the marine environment during the planting (see Figure 22). In 2021, MRA staff worked with program partner Jetty to develop a large sticker for the lid of all shell recycling containers to deter the addition of trash into these containers (see Figure 9).

### Odor Produced by Shell Collection at Restaurants

A challenge identified by restaurant partners in 2021 was the odor produced by the accumulated shell at the venue, as well as insects being attracted to the area. This was particularly an issue for venues that have outdoor seating during the warmer months. MRA staff continues to work with restaurant partners to find cost-effective solutions to alleviate this issue.

### Collection Frequency

Due to the above issue regarding odor, many venues request more frequent shell collection than the standard once-per-week currently in place. Due to staff and equipment limitations, MRA is currently unable to collect shell more than once per week. This results in some restaurants not participating in the program.

### Equipment

The Shell Recycling Program dump trailer is a critical component to the viability and success of the program. Ensuring the functionality and longevity of the trailer and the hydraulic lift arm is a top priority. One of the main concerns with the dump trailer is rust. In the short time the trailer has been in operation, there are clear signs of corrosion due to the salt left behind by shell and liquid in the containers dumped into the trailer. In attempts to combat the rust and protect the equipment, MRA had the interior bottom of the trailer lined with stainless steel. Additionally, after each shell collection, MRA staff thoroughly wash the trailer and lift arm with fresh water.

The program dump trailer has been an exceptional upgrade to the performance of the Shell Recycling Program that has permitted expansion, more efficient collections, and decreased manual labor. Despite these benefits, there is concern that as the program expands, dependence on the trailer increases, and should the trailer have mechanical or other issues, serving the increased capacity would prove to be challenging.

Another concern is the longevity of the hydraulic lift arm. The arm has difficulty lifting 64-gallon containers when full, in extremely cold weather, and when containing excess water from rain events. Regular maintenance of the lift arm will be continued to help ensure it can continue to operate as desired.

## Plans for 2022

MRA staff intends to continue to serve existing restaurant partners weekly in 2022. In addition to regular shell collection, the main priorities for 2022 include the following:

- Development of a Standard Operating Procedure for the Shell Recycling Program to outline staff duties and responsibilities and ensure a consistent approach to collection, maintenance, data collection and entry, and public interaction.
- Work with program partner Jetty to create additional outreach content for the Program.
- Work with restaurant partners to assist with developing methods to display involvement and commitment to shell recycling.
- Attend public events and give presentations to better promote the Program and generate awareness of shell recycling and the public's role in environmental stewardship.
- Work with restaurant partners to continue reducing the amount of trash found in shell recycling containers. Evaluate additional options to prevent waste from entering the shell collection bins.
- Work with restaurant partners to evaluate and develop innovative solutions to odor and insect problems.
- Assess and reduce full-time staff time spent on shell collections and maintenance by hiring hourly employees to assist where appropriate.
- Continued equipment maintenance and considering creative methods to address anticipated equipment challenges.
- Work to acquire additional partnerships in areas of need.
- Work to develop a public drop-off location for shell to be discarded.
- Compile a record of all restaurants/casinos that serve shellfish within the Atlantic City area that can be used to help target additional restaurant partners.
- Plant collected shell from 2021 and supplemental surf clam shell on the Mullica River oyster reefs.

# Appendix

## Shell Collection Numbers

Table 2

*Collection Statistics by Year*[2]

| Year | Total Number of Trips | Average Run Time (h: mm) | Average Number of Bushels Per Trip | Total Bushels Collected | Total Tons Collected |
|---|---|---|---|---|---|
| 2020 | 36 | 1:22 | 18.9 | 672.7 | 18.5 |
| 2021 | 51 | 2:02 | 47.3 | 2410.3 | 66.3 |


*Figure 2.* 2021 Tons Collected per Month

[2] Shell collection numbers were significantly lower than anticipated in 2020 as a direct result of COVID-19. Collection was suspended for three months, and many restaurants did not reopen until 2021.

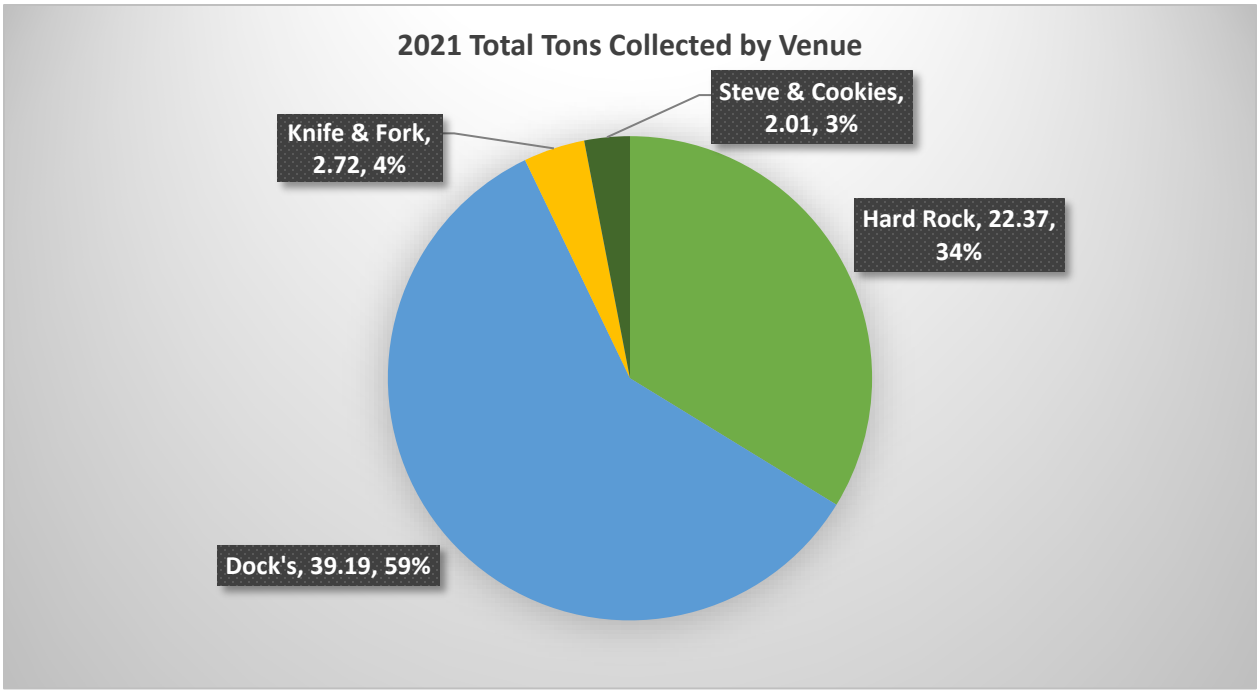


*Figure 3.* Collection Total by Venue

## Economic Data

Table 3.

*Estimated Waste Disposal Savings*[3]

| Venue | Tons Collected | Estimated Waste Disposal Savings |
|---|---|---|
| **Hard Rock** | 22.37 | $1,789.50 |
| **Docks** | 39.19 | $3,134.89 |
| **Knife and Fork** | 2.72 | $217.41 |
| **Steve & Cookies** | 2.01 | $160.96 |
| **Total** | **66.28** | **$5,302.77** |

[2] Estimated savings calculated using disposal fees listed by Waste Management at $80 per ton. This is an estimated cost saving and may vary dependent on the waste disposal company or fee changes.

## Shell Recycling Program

**Date:**_____

**Staff:** _____

**Container type:** _____

**Start Time (Leaving Nacote):** _____

**End Time (Returned to Nacote):** _____

**Percentage Filled**

| # of cans | S&C | K&F | Dock's | HR |
|---|---|---|---|---|
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |
| 9 | | | | |
| 10 | | | | |
| 11 | | | | |
| 12 | | | | |
| 13 | | | | |
| 14 | | | | |
| 15 | | | | |
| Total # of full cans | | | | |
| Total # of bushels | | | | |

**Comments:**

*Figure 4.* Sample Shell Collection Data Sheet

## Outreach Materials

### Trailer Signage


*Figure 5.* Left Side of Trailer and F-450 Truck

*Figure* 6. Right Side of Trailer


*Figure* 7. Front of Trailer


*Figure 8.* Rear of Trailer

## Promotional Materials


*Figure 9.* First Annual Oyster Reef Enhancement Artwork used on T-shirts to commemorate the event


*Figure 10.* Shell Only Stickers now used on the lids of all shell recycling containers to discourage the addition of trash

Shell Recycling Program Video- https://www.youtube.com/watch?v=VDmhFTxom0o

# Program Photographs

## Shell Collection


*Figure 11.* Shell container being placed within lift-arm at Dock's Oyster House

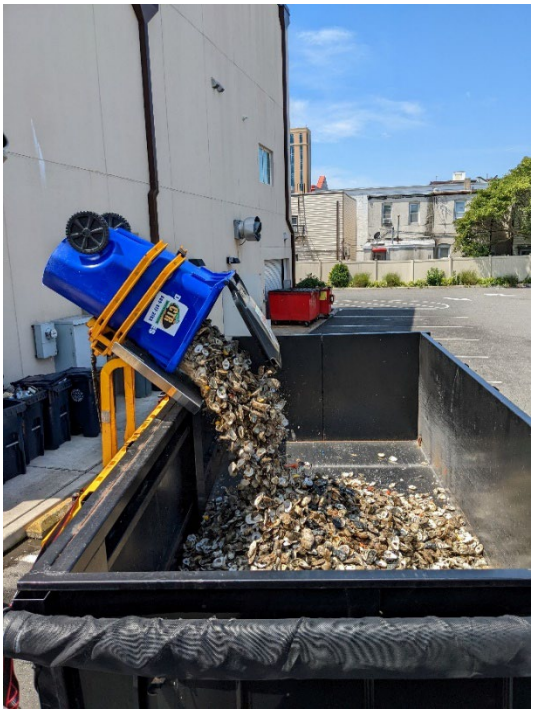

*Figure 12.* Shell being dumped into dump trailer at Dock's Oyster House

*Figure 13.* Dump trailer full of shell after collection at Hard Rock Hotel & Casino

## Curing and Maintenance

*Figure* 14. Shell being dumped at the long-term storage/ curing site

*Figure 15.* Accumulated shell at the long-term storage and curing site

*Figure 16.* Accumulated shell at the staging area along the waterfront where shell will be loaded onto the barge

Shell Planting

*Figure* 17. Loading shell onto the barge at the Nacote Creek Research Station- front view

*Figure* 18. Loading shell onto the barge at the Nacote Creek Research Station- side view

*Figure* 19. Shell being planted over the Mullica River oyster reefs during the NJDEP Commissioner's visit

*Figure* 20. Shell being planted over the Mullica River oyster reefs

*Figure* 21. Aerial photo of shell planting via drone courtesy of Jon Carlucci NJFW


*Figure* 22. Vessel collecting any remaining trash to ensure it is removed from the marine environment

Publications

# Shell Recycling Program: Atlantic City

**By Scott Stueber,** Assistant Fisheries Biologist

Atlantic City, a popular Jersey Shore destination for tourists and locals alike, is well known for its casinos, boardwalk and excellent restaurants. A newly developed program by New Jersey Division of Fish and Wildlife's Marine Fisheries Administration is taking place at the heart of it all, helping Atlantic City establishments save money, reduce waste and enhance local oyster reefs, one shell at a time.

## Shell Out, Shell In

Shell recycling is a well-established practice in many states and has been gaining interest nationwide in recent years. Oysters, unlike many other species of shellfish, must attach to a hard substrate in order to grow. Traditionally, when oysters and clams are harvested and consumed at a local restaurant, the discarded shells are put in the trash and head directly for an area landfill. Shell recycling programs allow for a beneficial use of this resource by serving as the hard substrate necessary for oyster populations to grow.

Participating restaurants save oyster and clam shells commonly found in their seafood dishes. These shells are collected for use in restoration and enhancement efforts. Putting clean shell back in local waterways keeps excess waste from accumulating in landfills while simultaneously providing the preferred and much needed habitat for oyster populations to be successful.

## Oyster Reefs Support Popular Fish Species

Oysters are a keystone species, meaning they are an integral part of a healthy ecosystem. Oyster reefs provide vital habitat for many of the commercial and recreational species that fishermen, boaters and naturalists enjoy in New Jersey's waters. Oyster reefs are home to a host of species including striped bass, blue crab and summer flounder, among many others. Additionally, a single adult oyster can filter and clear significant volumes of water each day, helping to improve water quality by cycling excess nutrients.

## Recycling Partnerships

New Jersey Division of Fish and Wildlife's Marine Fisheries Administration — in partnership with Rutgers Cooperative Extension, Stockton University Marine Field Station and the Jetty Rock Foundation — has developed a shell recycling program in Atlantic City. The program was sparked by initial interest from the Hard Rock Hotel and Casino Atlantic City. The Hard Rock became aware of the very successful Oyster Recycling Program taking place in Long Beach Township and also wanted to do their part to enhance local oyster reefs. This interest led to the establishment of the Marine Fisheries Administration's Shell Recycling Program, which now collects from the Hard Rock, Dock's Oyster House and The Knife and Fork Inn.

Shell Recycling Program representatives are communicating with additional casinos and restaurants throughout Atlantic City, encouraging others to join the effort to enhance New Jersey's marine habitat. This program now gives restaurant patrons an opportunity to be involved in the restoration and preservation of marine resources while enjoying their favorite seafood dish.



Accumulated shell from the Shell Recycling Program.

Scott Stueber/NJDFW, Fish and Wildlife

## Cure for the Common...Shell

Fish and Wildlife's Marine Fisheries Administration currently picks up shell from participating venues on a weekly basis. Shell is then transported back to the Nacote Creek Research Station where it will cure for a minimum of six months prior to being placed back in the water. Shells can carry diseases detrimental to native oyster populations. Oyster mortality outbreaks, such as that caused by Dermo Disease, can have a significant impact on the health of oyster populations. Thankfully, Dermo only impacts oysters, not human consumers.

This curing process helps to ensure that the waste shell is suitable for planting and would not cause harm to the native oyster population. The shells collected from these Atlantic City establishments will be used to enhance oyster populations in the Mullica River. This river, which spans Ocean, Atlantic and Burlington counties, is home to one of the last self-sustaining oyster reefs on the Atlantic coast of New Jersey. Our Marine Fisheries Administration looks to plant the recycled shell on these existing reefs which will help to enhance and increase this productive resource.

These reefs are hardy and have survived disease outbreak, freshwater intrusion and coastal development. The Mullica River is an excellent platform to enhance and expand due to this oyster population's resiliency.

## Engagement, Education and Ecosystems

The Shell Recycling Program has already garnered much interest from Atlantic City tourists and residents alike. As our Marine Fisheries Administration staff picks up shell, we engage with the community, discussing the ecological benefits of recycling shell. Education is a key part of preserving our natural resources.

Recycling shell is a simple way to connect the consumer to these important ecosystems and to their role in environmental stewardship. The program provides an avenue for the public to make a direct difference in the local environment.

## Planting Shell for Future Growth

New Jersey Division of Fish and Wildlife's Marine Fisheries Administration intends to plant clean shell on the Mullica River oyster reefs annually. Unfortunately, due to the impact of COVID-19, collection of shell was suspended in March of 2020. Thankfully, as some restaurants re-opened, collection resumed in June of 2020 and the Marine Fisheries Administration plans to begin shell planting in the summer of 2021. Because the developing Shell Recycling Program currently cannot collect enough shell to meet the Administration's enhancement goals, plans are underway to augment recycled shell with additional shell sources used in our other reef enhancement programs. Stay tuned for information relating to shell planting events and results as they become available. For more information on this program or any questions, contact the Shell Recycling Program Coordinator Scott Stueber at Scott.Stueber@dep.nj.gov.



*Figure 23.* NJ Marine Digest Article on the Shell Recycling Program

# Diners' discarded shells help establish new oyster colonies

AP apnews.com/article/environment-and-nature-business-a0b29f2d113ffa9326f7505422c891f3

July 3, 2021

By WAYNE PARRYJuly 3, 2021 GMT

This June 29, 2021 photo shows a pile of oyster, clam and whelk shells drying in the sun in Port Republic, N.J. The shells are collected from restaurants in Atlantic City, dried, and placed into the Mullica River, where they become the foundation for new oyster colonies as free-floating baby oysters attach to them and start to grow. Communities around the world are running similar shell recycling programs. (AP Photo/Wayne Parry)

PORT REPUBLIC, N.J. (AP) — Call it the seafood circle of life: Shells discarded by diners are being collected, cleaned and dumped into waterways around the country and the world, where they form the basis of new oyster colonies.

One of the latest such projects is taking place in Atlantic City, where a casino and two other restaurants are saving the shells left over from their diners. The shells are then collected by the state Department of Environmental Protection, and workers and volunteers with Rutgers and Stockton universities and the Jetty Rock Foundation load them on barges and dump them into the Mullica River.

That waterway is home to one of the last self-sustaining oyster populations on the Atlantic coast, according to Shawn LaTourette, the state's environmental commissioner. The clam, oyster and other shells form the basis of new or expanded oyster colonies when free-floating baby oysters, known as spat, attach to the shells and begin to grow on them.

"You have the benefit not only of ecological restoration, but it has kept 65 tons of shells out of landfills," said Scott Stueber, a fisheries biologist with the DEP. That helps the eateries save on waste disposal costs.

The program began in 2019 and currently collects oysters from the Hard Rock casino, the Knife & Fork restaurant and Dock's Oyster House in Atlantic City. Several other casinos have expressed interest in joining.

"We go through a ton of these shells at our restaurants," said Grace Chow, Hard Rock's vice president of food and beverages. "The buffet on a slow day will shuck 500 oysters, and on a busy day, 1,200."

Oysters are nature's filters: a single adult oyster can can strain particles and contaminants from 50 gallons of water a day. In addition to improving water quality, oyster colonies also are being planted along coastlines as a shore stabilization and storm mitigation strategy: the bumpy underwater colonies can act as speed bumps for destructive waves headed for the shoreline, dissipating some of their energy.

The goal is not so much to create new places to harvest and sell oysters for consumption as to improve the environment.

In New Jersey, oysters can be harvested for commercial use in Delaware Bay, and the state has a robust aquaculture industry that grows them. The Mullica River project aims to grow oysters for ecological purposes, but it is being studied for possible approval as a commercial harvesting site in the future, the DEP said.

Communities, environmental groups and governments around the world have embraced oyster recycling and replanting in recent decades.

In Maryland, the Chesapeake Bay Foundation turns 2,000 bushels of recycled shells a year into oyster habitat in the bay. In Texas, the Harte Research Institute at Texas A&M University has collected 1.75 million pounds of shells and restored 25 acres of oyster reefs since 2009.

New York's Billion Oyster Project has collected 1.6 million pounds of shells from 75 restaurants, and planted 13 oyster reefs across New York Harbor since 2015. Florida has several such programs including one in Apalachicola Bay, and the Alabama Coastal Foundation has collected 15.5 million shells in less than five years.

In Massachusetts, numerous towns conduct oyster recycling programs including the "Shuck It For Nantucket" program, and similar efforts exist in Wellfleet and on Martha's Vineyard.

The effort reaches as far as Australia, where The Nature Conservancy's "Shuck, Don't Chuck" program recycles oysters to restore colonies in places including Port Phillip Bay.

In New Jersey, several such programs exist, including one run by the American Littoral Society and another by Long Beach Township.

For the Atlantic City project, the state makes the rounds of the eateries once a week with a trailer, hauling the shells to a research station on Nacote Creek in Port Republic. There they are set out to dry for at least six months so that any remaining meat or foreign substances on the shells will bake off.

When they have sufficiently cured, the shells are loaded onto a barge and pulled out into the Mullica River. Workers aboard the barge use high-pressure hoses to blast the 10-foot-tall piles of shells into the water, accomplishing in less than an hour what would take many times as long if they were shoveled overboard.

About 3,000 bushels of shells will be placed in the river this year. Russ Babb, a shell fisheries bureau chief with the DEP, hopes to eventually increase that amount to 10,000 bushels a year.

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*Figure 24.* Associated Press Article on the Shell Recycling Program and shell planting event

## References

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