

This presentation provides a report on the Florida oyster resource. Florida's oysters are vital to the health of coastal environments and essential to the commercial oyster fishery. The state has experienced a dramatic decline in oyster reefs, similar to declines seen elsewhere in the world. Efforts to understand and respond to these declines are ongoing, but continued investment and commitment will be needed to restore Florida's oysters.

Division: Marine Fisheries Management Authors: Devin Resko, Erika Burgess, Matt Kenworthy, Jeff Renchen, and Jessica McCawley Contact Phone Number: (850) 487-0554 <u>Report date</u>: February 2025

Unless otherwise noted, images throughout the presentation are by FWC.



This presentation will discuss the importance of oysters and the condition of the oyster resource, both globally and locally. This presentation will provide an overview of management and regulations, the commercial wild and aquaculture fisheries, research and monitoring efforts, and recent restoration initiatives, with a particular focus on Apalachicola Bay. This presentation will conclude by previewing proposed next steps for management of this important Florida resource.



Oysters have historically been ecologically and culturally important by providing value to their local environment and the surrounding community. However, there has been a global decline of oysters. This decline has been documented in the Gulf of Mexico and throughout Florida. The decline of Florida's oyster reefs is due to a combination of factors.

In response to the decline of the oyster resource in Florida, the Florida state government, the National Fish and Wildlife Foundation (NFWF), the federal government, and non-profit organizations have made significant investments in restoration and recovery, with much of these efforts focused in Apalachicola Bay. Continued investment in restoration and recovery, along with an improved regulatory framework for wild oyster harvest, is necessary to improve the condition of oysters in Florida.



As previously mentioned, oysters are valuable to their environment, including the human communities that live near them. Due to the variety of benefits they deliver, especially providing habitat, some have called oysters the coral reefs of the estuary. Specific ways oysters provide value are detailed below.

Oysters are filter feeders that improve water quality by filtering algae and other suspended particles. They remove nitrogen from the water, which can help reduce the occurrence of harmful algal blooms. It is estimated that an oyster can filter as much as 50 gallons of water per day.

Oysters protect shorelines as a natural barrier reducing wave energy and storm surge. Their reef structure positively alters water flow, reducing erosion. Oyster reefs can also stabilize sediments, which can promote seagrass growth.

Oysters are an economically and culturally important fishery resource harvested commercially and recreationally for consumption. Generations of families in Florida proudly claim the title of oystermen.

Oysters play a crucial role in their environment as habitat creators. New generations of oysters settle on existing shell material, resulting in complex, three-dimensional structures that continue to expand as oysters grow and new generations recruit to the oyster reef. In doing so, they provide habitat for numerous important species, including redfish and spotted seatrout. Over 30 species classified by FWC as Florida's Species of Greatest Conservation Need are linked to habitat or food sources provided by oyster reefs. This highlights the importance oysters have in providing a suitable environment for the next generation of oysters and the local ecosystem.



Like coral reefs, oysters build their own reef habitat; unlike coral reefs, they rely solely on oyster larvae settling out of the water column on a reef site, attaching themselves, and thereby contributing to an existing oyster reef. The preferred material for oyster settlement is an oyster reef.

In reality, larval oysters can settle on any hard surface and attach themselves. Once attached, their ability to grow and flourish depends on having settled in the right environmental conditions. Thus, having habitat in the right place is vital for successful recruitment.

Baby oysters, known as "spat," can reach market size (3 inches) in 18–24 months, but the timing varies based on temperature, nutrient availability, and salinity. In Apalachicola Bay, market size can typically be reached in 18 months.



Unfortunately, this valuable and important ecological resource has seen severe declines worldwide. This image displays the condition of oyster reefs globally, based on the research from Beck et al. 2011, which illustrates the poor conditions of many oyster resources.

Based on this research, 85% of the world's oyster reefs have been lost as of 2008. Until recently, the Gulf was described as one of the last remaining areas in the world for which oyster conservation and sustainable wild fisheries were feasible. But in a 2023 meeting among U.S. Gulf States, all five reported severely depleted oyster resources despite states implementing increased regulations and restoration efforts. In Florida, many estuaries have lost 80–90% of their oyster reefs.

Citation: Beck, M.W., Brumbaugh, R.D., Airoldi, L., Carranza, A., Coen, L.D., Crawford, C., Defeo, O., Edgar, G.J., Hancock, B., Kay, M.C., Lenihan, H.S., Luckenbach, M.W., Toropova, C.L., Zhang, G., & Guo, X. (2011). Oyster reefs at risk and recommendations for conservation, restoration, and management. BioScience, 61(2), 107–116. https://doi.org/10.1525/bio.2011.61.2.5



The decline of Florida's oyster reefs, is due to a combination of factors that have worked in tandem. The threats described below have negatively impacted the oyster resource in Florida to varying degrees over the centuries.

As previously described, oysters are reliant on existing habitat, preferably oyster shell. The removal of oyster reef shell from the environment is primarily a result of harvest, but has historically also been due to construction. The transition from a shucking fishery to half-shell fishery has resulted in significant declines in habitat retention. In the half-shell market, oysters are shipped whole to retailers and restaurants and the shell is not often returned to the site of harvest. Reef loss can also occur when sub-legal oysters are culled from harvested oysters and transported away from the reef by waves or currents.

Oyster diseases can cause high mortality in oyster populations. They can cause declines in oyster health and reproduction and can lead to mortality.

Altered water resources can lead to changes in salinity, temperature, and other important water quality factors, increasing oyster stress. Stressed oysters are more susceptible to mortality from other threats.

Natural occurring predators can impact local oyster reefs. High salinity increases predation rates, most notably by sea snails known as oyster drills. Boring sponges and boring mollusks can stress oysters, increasing the likelihood of mortality.

Lastly, oysters face competition with increasing mangrove presence. As mangroves migrate northward, oyster habitat may transition to mangrove habitat.

Many of these threats have had profound, negative effects on Florida oyster reefs.



The level of impacts of certain threats can be dependent on the type of oyster reef. In Florida, oyster reef habitat varies widely in type and location. Oysters are found intertidally and in shallow subtidal depths in nearshore and inshore estuarine waters. The greatest concentrations of oysters are found in the northern half of the state.

Some oyster reefs are in areas more protected from the elements, whereas others are more exposed to open water. Oyster reef systems found in bays or inshore of barrier islands can be sheltered from adverse water changes and weather conditions, but they can also be more likely to experience pollution and sedimentation. Examples of systems like this include Apalachicola Bay, Pensacola Bay, and St. Augustine. Oyster reef systems exposed to open water (e.g., the Gulf) with no natural barriers are more vulnerable to adverse weather conditions and sea level rise. Examples of systems like this include Cedar Key and Crystal River.

Regardless of reef type or location, all Florida oyster reefs that were once dense and prolific are now extremely patchy due to severe declines. Several areas in Florida have shown significant loss in oyster reefs. Apalachicola Bay has shown a 95% decline in oyster reefs, Pensacola Bay has a 72% loss, and the Big Bend has shown an 88% decline in offshore reefs and a 50% loss in inshore reefs. The two images on the slide show the loss of oysters on the Suwannee Offshore Reef, in the Big Bend, in just over two decades.



Today, the responsibility for management and recovery of Florida's oyster resource lies with three separate state agencies: FWC, the Florida Department of Agriculture and Consumer Services (FDACS), and the Florida Department of Environmental Protection (DEP). Since 1881, when the first oyster-specific regulations were established, the authority to manage Florida oysters transitioned between various entities, including the Florida state legislature, the Shellfish Commission, the State Board of Conservation, the Department of Natural Resources, the Marine Fisheries Commission, the Fish and Wildlife Conservation Commission, and FDACS.

FWC is primarily responsible for wild oyster harvest regulations; enforcement of wild harvest and wholesale dealer inspections; and monitoring wild oyster populations. FWC also performs research, monitoring, and restoration of oyster habitat for the benefit of people, the oyster resource, and the native species that depend upon oyster habitat.

FDACS is primarily responsible for aquaculture-related regulations. FDACS monitors bacteria and harmful algal blooms in state waters and has the authority to close shellfish harvest areas due to water quality issues that pose human health risks. The shellfish harvest area open/closure status applies to aquaculture and wild harvest. FDACS inspects shellfish processing facilities to ensure shellfish are handled properly and are safe for consumption.

DEP sets general water quality standards, which can affect natural oyster reef health. DEP also permits activities in, on, or over surface waters or sovereign submerged lands that could impact areas where oysters are present. DEP also performs restoration of oyster habitat.



There is large public interest in oyster aquaculture, which is fed by the rise in prominence of aquacultured oysters in the marketplace and at restaurants. Oyster aquaculture is a growing industry in Florida. The Florida Legislature declared the importance of aquaculture in the Florida Aquaculture Policy Act and directed FDACS to regulate and encourage the growth of the aquaculture industry. In 2023, there were 350 registered oyster aquaculture licenses in 16 counties, with more than half being in Franklin and Levy counties.

Aquaculture operations are not required to follow some FWC regulations. For example, size limits, daily harvest limits, and seasons do not pertain to oyster aquaculture operations. Aquaculture farmers must comply with FDACS' mandatory Aquaculture Best Management Practices and lease terms (effective cultivation, gear marking, etc.).



The wild-harvest oyster industry significantly predates aquaculture in Florida. It has been both culturally and economically important since the 1800s. For centuries, the state's fishery has been dominated by the iconic Apalachicola Bay.

In recent decades, Florida's wild-harvest commercial fishery harvest fluctuated from the mid-1990s through 2012, with the value of landings tracking with the pattern in the harvest. The fluctuations ended with a sharp decline in 2013, due primarily to the collapse of oysters in Apalachicola Bay. Since the collapse, landings and value of Florida's commercial oysters have continuously declined. In 2023, commercial oyster harvest was the lowest on record; 2023 harvest levels represented a 94% decline in pounds and an 87% decline in value from the peak in 2012. A similar decline in harvester participation occurred. In 2023, only 119 people commercially harvested oysters, which represents over a 90% decline in participation from the most recent peak in 2011.

Again, these observed declines in Florida's wild-harvest fishery are due primarily to the collapse of the resource in Apalachicola Bay, which historically dominated commercial oyster harvest in Florida and represented a significant component of commercial oyster production nationally. In fact, 90% of the state's commercial landings and 10% of commercially harvested wild oysters sold in the U.S. used to come from Apalachicola Bay. To date, no significant recovery has occurred since the 2013 collapse.



Performing research on Florida oysters helps gather information to better understand and respond to the declines. FWC's Fish and Wildlife Research Institute (FWRI) performs regular oyster monitoring throughout Florida, and our work represents the most widespread and comprehensive oyster monitoring in the state.

Active population monitoring collects data on oyster size and density, as well as recruitment. FWRI performs mapping of oyster reefs and assesses the habitat suitability of these environments. Regular monitoring of water quality and the presence of disease and predators, is performed to better understand potential threats and to inform siting for future restoration efforts. FWRI also acts as a data repository by compiling statewide information on monitoring and mapping data.



Much of FWC's research helps inform oyster reef restoration. Various agencies, organizations, and institutions contribute to ongoing oyster restoration throughout the state. There have been and continue to be multiple FWC-led projects administered by DMFM, HSC, and FWRI. Additionally, FWC works with a network of local, state, federal, and non-profit partners to increase funding impact and implement large-scale, regionally significant restoration projects. FWC partners with FDACS for cultch deposition restoration projects because the activity is authorized by a U.S. Army Corps of Engineers permit issued to FDACS.

Restoration approaches can vary significantly in the methods, objectives, scale, and material used. FWC has restored over 100 acres of oyster reef since 2014. There are several FWC restoration projects completed in 2024. The Governor and Legislature gave \$10 million, which restored 77 acres in Apalachicola Bay, including sites to test new reef designs. A \$2 million restoration project in St. Andrews Bay and West Bay, funded by the National Fish and Wildlife Foundation and the Land Acquisition Trust Fund, created 62 curved oyster reefs totaling six acres to reduce wave energy and enhance seagrass recovery. Lastly, funds from the State Wildlife Grants program, the Marine Resources Conservation Trust Fund, and the Land Acquisition Trust Fund were used for a \$500,000, 1.5-acre oysters reef living shoreline project located at the Florida State University (FSU) Coastal and Marine Laboratory to protect coastal marsh habitat.

Ongoing and continued restoration is required to maintain and reestablish oyster reefs that are harvested or that have been degraded based on water quality and other threats. This management concept is accepted by oyster management experts throughout the eastern and southeastern United States. States with active and productive oyster fisheries (e.g., Virginia, Maryland, Louisiana) rely upon routine and continued restoration to maintain their fisheries.



Now, to shift focus to Apalachicola Bay. Harvest from Apalachicola Bay historically dominated commercial oyster harvest in Florida and represented a significant component of commercial oyster production on the national scale. Recall that 90% of the state's commercial landings and 10% of commercially harvested wild oysters sold in the U.S. used to come from Apalachicola Bay.

Apalachicola oysters were an iconic, name-brand fishery on par with Maine lobster and Maryland blue crab. The fishery defined the Apalachicola community, both culturally and economically. It employed over 2,500 individuals in a rural region of the state whose economy was supported by fishing and timber.

Oyster harvest from the bay routinely fluctuated between periods of highs and lows. The fishery was severely impacted by Hurricane Elena in 1985. However, it quickly began recovering in the late 1980s. Landings later collapsed in 2013, but unlike the 1980s response to Hurricane Elena, there have been no significant recovery in the following years.

Starting in 2013, the FWC issued 20 Executive Orders to reduce harvest pressure in Apalachicola Bay in response to the collapse. A five-year closure was implemented in 2020 to provide the oyster reefs with time to recover from continued low abundance following the fishery's collapse. During this time, the agency began a restoration effort with funds provided by the National Fish and Wildlife Foundation and, later, by the Governor and Legislature.



Oyster landings from Apalachicola Bay routinely fluctuated between periods of good and better years of harvest, until a drastic decline in 1985 resulting from Hurricane Elena. Almost immediately after Hurricane Elena, the fishery began rebounding quickly; however, it never again reached the same highs as earlier decades. Instead, a new, lower cyclical pattern emerged. The best periods since the 1980s are more similar to the lower periods experienced prior to Hurricane Elena. Landings later collapsed in 2013 and showed no significant recovery in the following years.



The recent decline of oysters in Apalachicola Bay is due to a combination of factors that have worked in tandem. Factors that have played a role in the decline include lower freshwater flow into Apalachicola Bay, increased presence of oyster predators, high juvenile mortality, the removal of shell material, and harvest.

The figure highlights the extent of the loss of suitable oyster habitat in Apalachicola Bay. The brown areas represent the historical spatial distribution of oyster habitat. The much smaller, green areas represent suitable oyster habitat that is currently present. Based on mapping in 2022, these green areas total about 500 acres, representing a 95% decline from the estimated 10,000 acres that historically existed. On the existing 500 acres of oyster reef, densities are low and relatively few oysters are of legal harvest size (3 inches).



Significant investment is being made in response to the collapse in Apalachicola Bay by entities including the state and federal governments, non-profits, and universities. One such non-profit is the National Fish and Wildlife Foundation, or NFWF. FWC has a \$20 million agreement with NFWF, focused on oysters in Apalachicola Bay and the Big Bend. Much of the funding (\$16 million) is dedicated to oyster reef restoration in Apalachicola Bay, with additional funds for monitoring and adaptive management plans in Apalachicola Bay and the Big Bend. The Governor and Legislature made another significant investment of \$10 million for restoration in Apalachicola Bay.



Restoration in Apalachicola Bay is being performed by several entities. FWC, DACS, DEP, and FSU have conducted numerous restoration projects in Apalachicola Bay that have varied by scale, materials used, and location.

As previously mentioned, a \$10 million state allocation was provided for restoration, which allowed for the deployment of 77 acres of limestone rock. That project was performed in 2024. This project is testing new restoration construction design (i.e., increased reef height) not performed before in Apalachicola Bay in attempt to identify a reef design that will lead to successful restoration. New restoration designs are being tested, because previous restoration efforts have not produced the expected results.

Preliminary results from the 2024 reef construction show promising oyster spat settlement and recruitment. Stakeholders have shown enthusiasm regarding these early results. FWC has led multiple site visits to highlight the restoration work.



Building on the current investment to continue the recovery of the Apalachicola Bay oysters and wild-harvest fishery will require a long-term commitment. Staff has proposed two overarching goals for the oyster resource in the bay, which are to restore 2,000 acres of oyster habitat by 2032 and to reestablish the wild-harvest oyster fishery with a long-term cultching program (i.e., continued replenishment of reef material in harvested areas). Achieving these two goals should provide a substantial, enduring foundation for the oyster resource to again provide important services to the bay, including the re-establishment of a fishery.

At present, the majority of the bay's oyster reefs cannot sustain harvest; however, there are restoration sites where reefs are regaining good numbers of legal-sized oysters. Based on this, staff would recommend three short-term actions in support of the proposed goals. First is to allow a limited opening of the fishery. Second would be to continue to conduct restoration to support ongoing recovery. Third would be to continue to keep some areas closed to harvest. These goals would restart this iconic fishery while also promoting continued recovery through restoration.

Along with the short-term goals, staff would continue to seek out funding for restoration and the establishment of a long-term reef maintenance program. Funding would be used to continue restoration and maintenance on an annual basis. Staff estimates this will require an annual budget ranging between \$30 – \$55 million.

Staff will workshop these proposals with stakeholders this spring and summer and return to the Commission in August 2025 with a recommendation for a proposed rule.



To summarize, many of Florida's estuaries have experienced a significant loss of oyster reefs, having lost 80–90% of the reefs that were present before human development. These dramatic declines have had damaging effects on both the local environments and the commercial oyster fisheries. The loss of these reefs means less protection for shorelines and the loss of a natural water filtration system. Additionally, fishery declines have harmed local economies, including the harvesters, seafood dealers and processors, and retail establishments. Florida's commercial oyster fishery produced the lowest harvest of wild oysters on record in 2023.

One location demonstrating significant loss in the oyster resource is Apalachicola Bay, which has historically been the foundation of the state's wild oyster fishery. The iconic Apalachicola Bay oyster fishery collapsed in 2013. Unlike previous oyster population crashes, there has been no significant recovery in Apalachicola Bay, which indicates that this system will not recover its oyster reefs without intervention through successful restoration.

Several entities have made substantial investments in restoring and recovering Florida's oyster resources, particularly in Apalachicola Bay. FWC is part of this effort, and we also contribute considerably through extensive monitoring of the resource and research to inform more successful restoration efforts.

Continued improvement in Florida's oyster resource will require ongoing investment in restoration paired with an improved, modern regulatory framework for wild oyster harvest.



Moving forward, staff will take a stepwise approach to review oyster regulations in Florida, meet with stakeholders, and bring recommendations for rule changes to the Commission as necessary. The proposed timeline for the Commission to consider rule proposals is:

Aug. 2025: Consider proposed rules for Apalachicola Bay and statewide measures November 2025: Consider final rules for Apalachicola Bay and statewide measures Feb. 2026: Consider proposed rules for the Big Bend May 2026: Consider final rules for the Big Bend

Additional rule proposals for other systems will be evaluated after Apalachicola Bay and the Big Bend.

Funding for ongoing restoration is a priority. Thus, FWC will continue to request funding from the Florida Legislature and seek out other funding sources for restoration, perform FWC-led restoration of oyster reefs throughout Florida, and advise and support external partners on other restoration efforts. In the agency's current budget request, FWC is seeking \$20 million for restoration in Apalachicola Bay for the next fiscal year. Dependent on funding, the next phase of restoration for Apalachicola Bay is planned for fiscal year (FY) 2025/2026. Additionally, FWC is planning restoration construction for the Big Bend in FY 2025/2026 as well.

Staff will also continue monitoring and research on oysters throughout Florida, and engaging with stakeholders on this important topic.

No action is requested at this time, but input from Commissioners is welcome.