

Sea Science

An Information/Education Series from the Marine Resources Division
South Carolina Department of Natural Resources



Oysters and Clams

Oysters and clams belong to a large group of mollusks called bivalves. They possess a shell of two halves hinged in the middle. They can open the shells to filter food from the water, or close the shells for protection from predators and to prevent drying out. Tasty and nutritious, they support both commercial and recreational fisheries in South Carolina.

Oysters

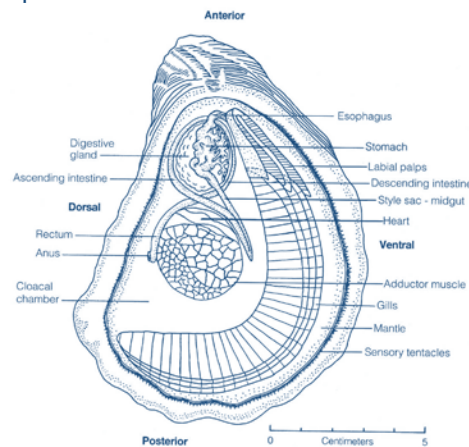
In South Carolina, the eastern oyster, *Crassostrea virginica*, grows mostly intertidally, in the area exposed between high and low tides. Intertidal oysters occur along most of South Carolina's saltwater creeks and riverbanks, and on exposed mud flats. Intertidal oysters experience rapidly changing temperatures, including freezing air during the winter, but they are rarely killed by extremes of temperature.

As seafood, oysters can be served in a variety of appetizing ways and contain vitamins, minerals, carbohydrates, and proteins. Oysters not only serve as a valuable food source for humans, they provide a variety of important functions in the environment, including erosion control, water filtration, and habitat for other animals.

Feeding

The oyster feeds by drawing in food particles from the surrounding water by the motion of small, fringed whips called cilia located in the gills. A large, healthy oyster can pump four gallons of water per hour. Food particles retained by the gills move by ciliary action to the mouth and then to the stomach. Silt and other debris

is collected by mucus on the gills and then discharged. This ability to separate food from silt allows oysters to survive in the murky waters typical of estuaries. The filtering action of oysters removes suspended sediment, and cleans the water of various pollutants.



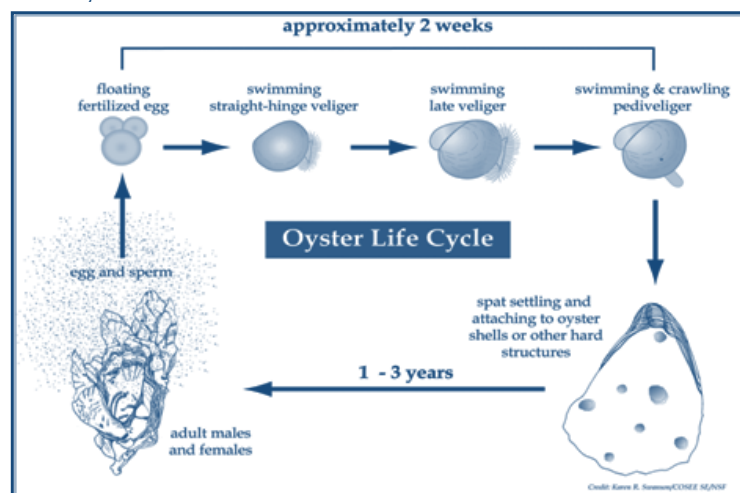
Internal organs of the Eastern Oyster, *Crassostrea virginica*.

Spawning and Attachment

Oysters spawn by releasing sperm and eggs directly into the water

column where fertilization and the early stages of development occur. Spawning begins in the spring when water temperature exceeds 70°F. In South Carolina, most spawning occurs from April to October and is intensive during the summer.

Free-swimming larvae develop in approximately 24 hours. Larvae have limited locomotion, moving mostly with tides and currents. After approximately two weeks, these larvae settle on the bottom where they must locate a hard, clean surface for permanent attachment. Larvae unable to find a suitable place for attachment sink to the bottom and die. The larva secretes a fluid that cements the left shell permanently to the surface of attachment. Once attached, the small oyster, called spat, never moves again. Almost any hard, clean surface is acceptable for attachment, although other oyster shells provide the most favored surface. Oyster shells that are purposely planted to attract oyster larvae are known as culch.



Life Cycle of the Eastern Oyster, *Crassostrea virginica*.

Growth and Predation

In southern waters, there is a nearly continuous setting of spat during warm weather. This frequently produces overcrowding and results in thin, elongated oysters growing in clusters, one oyster attached to one or more others. The cluster continues to grow as each new set occurs. Sometimes clusters reach a foot or more in thickness. The added weight of additional individuals tends to push the lowermost oysters into the mud, where they eventually suffocate. Only the outermost oysters remain alive.

Oysters reach a harvestable size in South Carolina at an age of about three years. Harvesters are encouraged to cull-in-place that is, to break apart clusters while harvesting, thereby leaving smaller oysters in place for future growth. Harvesting is done by hand at low tide.

Blue crabs, as well as other crab species, oyster drills, sea stars, and boring sponges prey on oysters, especially small oysters.

Abundance of oysters in South Carolina has remained relatively stable in recent years, although populations are lower now than they were in 1900. Declines, in part, have been related to increased siltation resulting from alterations in stream flow, overharvesting, and physical disturbances to the shell bed. Diseases, particularly in areas with high salinities, have also periodically killed oysters.

Oyster Reefs

Intertidal oysters often grow in groups of interconnected clusters known as oyster reefs. The intricate reefs provide extensive habitat for numerous marine species. Mud crabs, shrimps, juvenile fishes, and other organisms seek shelter in reefs from predators as the tide rises. Loose oyster shell on creek bottoms serves as hard clam habitat as well as substrate for sponges, sea fans, and whip corals which, in turn, supply habitat for small crustaceans and fishes.

Stone crabs typically reside near or in oyster reefs and feed largely upon oysters. Many larger fish forage for prey hiding among the oysters. Oyster

reefs also stabilize exposed marsh edges, preventing bank erosion and loss of marsh grasses by waves and boat wakes.



Storage and Cleaning

Harvested live oysters in the shell should be stored at 35 to 40 °F in a refrigerator, not in water. Discard any oysters with broken shells or with gaping shells that do not close when lightly tapped.

Shucked oysters should be light grey in color with clear liquid. If stored in their own liquid, sealed, and packed on ice in a refrigerator, oysters will keep for about one week.

Although home freezing is possible, the resulting product is not as good as commercially quick frozen oysters. Shucked oysters can be frozen in their own liquid if sealed in a container with as little air space as possible. They should be used within two months. If oysters are to be used immediately, they can be placed in the freezer for a few hours to relax the muscle which holds the shell closed. This makes shucking much easier. Oysters, like other shellfish, should not be refrozen.

Clams

Clams burrow into the bottom, preferring a shell and sand substrate rather than mud and usually occur in groups. In South Carolina, the northern quahog, or hard clam, *Mercenaria mercenaria*, is the predominant species. In suitable environments, clams inhabit coastal waters from Florida to the Gulf of St. Lawrence and along the Gulf of Mexico to the Yucatan Peninsula. Clams indigenous to South Carolina are predominantly the northern

quahog (*Mercenaria mercenaria*).

Clams prefer waters with a salinity range of 24 to 32 parts of salt per thousand (sea water is roughly 35 parts per thousand). Growth occurs throughout the year in South Carolina.

Spawning and Feeding

Like oysters, clams spawn by releasing sperm and eggs into the water. Spawning begins in the spring, continues through midsummer, and may resume in September, continuing through October. Two to four weeks after spawning the resulting juvenile clams burrow into bottom sediments. Unless protected by overlying shell, juvenile clams are easy prey for crabs.

Clams feed on plankton through a double-tubed siphon which operates like a snorkel. The siphon pulls in food and eliminates waste products. Water is pumped through the incoming siphon, passed over the gills, and strained to remove food particles. The gills remove oxygen from the water, and emit carbon dioxide. Then waste products from the digestive tract are expelled through the outgoing siphon. The beating of a multitude of microscopic hairs (cilia) located inside the siphon and in the gill chamber maintain constant water circulation.

Chowders, Cherrystones, and Littlenecks

More than 85% of South Carolina's commercial clam production is shipped out of the state in the shell, some to return months later to grocery store shelves as Manhattan or New England clam chowder. The recipe may originate from our northern counterparts, but not necessarily the clam.

Clams are sold under three market categories based on their size. The largest and cheapest of the clams are sold for chowders or minced, diced, or ground for other food uses.

Cherrystones are medium sized, medium priced, and sometimes served on the half shell or used in clam bakes. Littlenecks are the smallest, most tender, and most expensive. They are usually served

steamed with clam broth and garlic butter.

Storage and Cleaning

Despite their sturdy appearance, clam shells are fragile and should be handled with care to avoid damage. Any clams with broken or gaping shells should be discarded. Live clams may be stored in the shell or shucked in the same manner as oysters. They also may be frozen in the shell for up to six months. It is easier to shuck them before thawing.

Recreational Harvesting of Oysters and Clams

Recreational harvesting of oysters and clams for personal consumption is a traditional and popular activity in South Carolina. Recreational harvesters must have a Saltwater Recreational Fishing License available from SCDNR (<http://dnr.sc.gov/licensing.html>) and can be taken only from authorized areas.

Harvest areas include privately managed grounds (Shellfish Culture Permits and Grant areas), State Shellfish Grounds, and Public Oyster Grounds. State Shellfish Grounds and Public Oyster Grounds may be harvested recreationally. Harvesting in Grant areas or Shellfish Culture Permits requires written permission of the owner or permittee.

The DNR website has maps of recreational harvest grounds, and printed maps are available upon request from DNR offices. Harvest area boundaries are marked with DNR signs. Harvest maps also indicate areas which have been designated by SC Department of Health and Environmental Control as unsafe for shellfish harvest. If there is any doubt as to the harvest status, call SCDNR Shellfish Management Section for advice. Always obtain the most recent maps from SCDNR prior to harvesting, as the boundaries of the DHEC-closed areas may change annually.

Oysters and clams may be harvested only during the approved harvest season, generally October to May. SCDNR announces the harvest opening and closing each year, and these may vary if

conditions such as water temperature warrant. Additionally, all shellfish grounds are subject to closure at any time by SCDHEC if water quality conditions make it unsafe to consume the oysters. These closures are announced in newspapers and on a toll-free hotline 1-800-285-1618. Generally, tropical storms or hurricanes, unusually heavy rainfall, or sewage spills are the cause of such closures.

The personal limit for recreational harvest is two bushels of oysters and/or one-half bushel of clams per licensed harvester per day, no more than two days per seven day period. Clams must be one inch thick. Additionally, there is a cumulative limit of three personal limits per boat or vehicle.

Hand tools such as a small pry-bar or screwdriver should be used for harvesting oysters. Harvesters are encouraged to break up clusters and take only the large oysters, leaving the smaller ones on the bank to grow. Additionally, break off and leave on the bank as much empty shell as possible, since the shell provides the hard structure needed for juvenile oysters to attach.

Clams are often harvested with

a potato rake or similar tool, but care should be exercised not to damage marsh or living oysters when harvesting clams.

Harvested oysters and clams should be refrigerated as soon as possible and may keep for a week or more. Do not store shellfish in water. Discard any individuals whose shells "gape" and do not close when tapped. Shellfish should always be cooked prior to consumption. Because they are filter feeders, mollusks accumulate naturally-occurring bacteria and viruses which may cause illness if the shellfish are not adequately cooked. Individuals with certain health conditions such as auto-immune diseases or liver problems are more susceptible to these illnesses.

After enjoying your oyster roast or clam bake, please return the shell to SCDNR to be used for oyster reef replenishment. SCDNR plants more than 40,000 bushels of oyster shells annually to replace those that were harvested, and to provide hard substrate for juvenile oysters to attach. SCDNR maintains drop-off sites for consumers to return their oyster shells. To find the site nearest you, visit saltwaterfishing.sc.gov/oyster.html.

Saltwater Fishing Conservation and Ethics

Ocean resources, once thought to be unlimited, have declined rapidly in recent decades, due in part to the overharvest of many commercial and recreational species of fish and shellfish.

To reduce overfishing, all anglers should practice wise conservation practices and adopt an ethical approach to fishing.

Size and catch limits, seasons and gear restrictions should be adhered to strictly. These regulations change from time to time as managers learn more about fish life histories and how to provide angling opportunities without depleting fish populations.

The challenge of catching, not killing, fish should provide anglers with the excitement and the reward of fishing. Undersized fish or fish over the limit should be released to ensure the future of fish populations.

More and more South Carolina fishermen now practice tag and release, which not only conserves resources but also provides information on growth and movement of fish.

Saltwater fishermen can further contribute to conservation by purchasing a Saltwater Recreational Fishing License, which is required to fish from a private boat or gather shellfish in South Carolina's salt waters. Funds from the sale of licenses must be spent on programs that directly benefit saltwater fish, shellfish and fishermen.

Help ensure the outdoor enjoyment of future generations by strictly adhering to all rules, regulations, seasons, catch limits and size limits, and through the catch and release of saltwater game fish.

This publication was made possible in part with funds from the sale of the [South Carolina Saltwater Recreational Fishing License](#). The South Carolina Department of Natural Resources publishes an annual [Rules and Regulations](#) booklet that lists all saltwater fishing regulations. Have an enjoyable fishing trip by reading these requirements before you fish.

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Glossary

Culch – Oyster shells that are purposely planted to attract oyster larvae

Estuary — A partially enclosed area where freshwater from a river or stream comes into contact with salty oceanic water. It is characterized by water with salt content between that of fresh and marine environments, tidal effects, and populations of animals and plants that are distinct from either the freshwater or oceanic environments. Estuaries are among the most diverse and biologically productive ecosystems on Earth

Intertidal - Refers to the environment between high and low tides (mean high water and mean low water) that is alternately exposed to the air and to the sea. Ninety-five percent (95%) of South Carolina oysters live in intertidal areas

Shucking – Opening an oyster

Spat – Early juvenile oysters that have settled by attaching to a hard substrate

Spawning – Producing and releasing gametes (eggs or sperm). Oysters in South Carolina spawn from May through October.

Substrate – Substance, base, nutrient, or medium in which an organism lives and grows, or surface to which a fixed organism is attached. Oysters attach to hard substrates, preferably oyster shell.

Subtidal – A marine or estuarine environment that lies below mean low-water; always (or almost always) submerged in a tidally-influenced area.

Sessile – Describes animals that are permanently attached or fixed in position to a surface. Oysters are sessile organisms.

Tidal Creek – A creek that is affected by tides, often meandering through salt marsh. In South Carolina, many tidal creeks have oyster reefs along their shorelines.

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