Florida Fish and Wildlife Conservation Commission **Fish and Wildlife Research Institute**

BAY SCALLOPS

Underwater Canaries

A secretive bivalve that spends most of its short life hiding in underwater grasses, the bay scallop is a prized dinner entree for many Floridians and an important component of the marine ecosystem. Although bay scallops historically were a valuable seafood commodity, declining populations in many coastal areas of Florida have prompted restrictions that now allow only recreational harvest. Scallops are highly sensitive to changes in water quality and therefore are an accurate barometer of an ecosystem's health. Just as coal miners used canaries to detect waning oxygen levels or the presence of dangerous gases, the bay scallop provides an early-warning system for scientists monitoring the quality of Florida's coastal waters.

Description

The bay scallop is a member of the shellfish family known as bivalves—for its two valves, or shells. Its upper valve is a dark mottled color and its lower valve is typically white. On occasion, both valves may take on a bright yellow or orange coloration. Bay scallops may reach a shell height of three inches and live two years, although in Florida their life span is generally only one year.

The bay scallop feeds continuously by "vacuuming" or filtering small particles of algae and organic matter from the water. It does this by funneling water over open pathways called siphons. One of these pathways takes in water, where it is moved through the gills by cilia, and particles are skimmed off. The other pathway expels the filtered water along with digestive waste.

fast FACT

An adult bay scallop can pump as much as 15.5 quarts of water per hour.

At a glance

Scientific name	*Argopecten irradians*
Size	3 inches
Range	Throughout the Florida Gulf Coast and on the Atlantic Coast as far north as West Palm Beach
Habitat	Seagrass meadows in shallow waters
Status	No commercial harvest is permitted. Recreational harvest is allowed only in state waters north of the Pasco-Hernando county line to the west bank of Mexico Beach Canal from July 1 through September 10.

Scallop art after Pete Carmichael photo; used with permission.

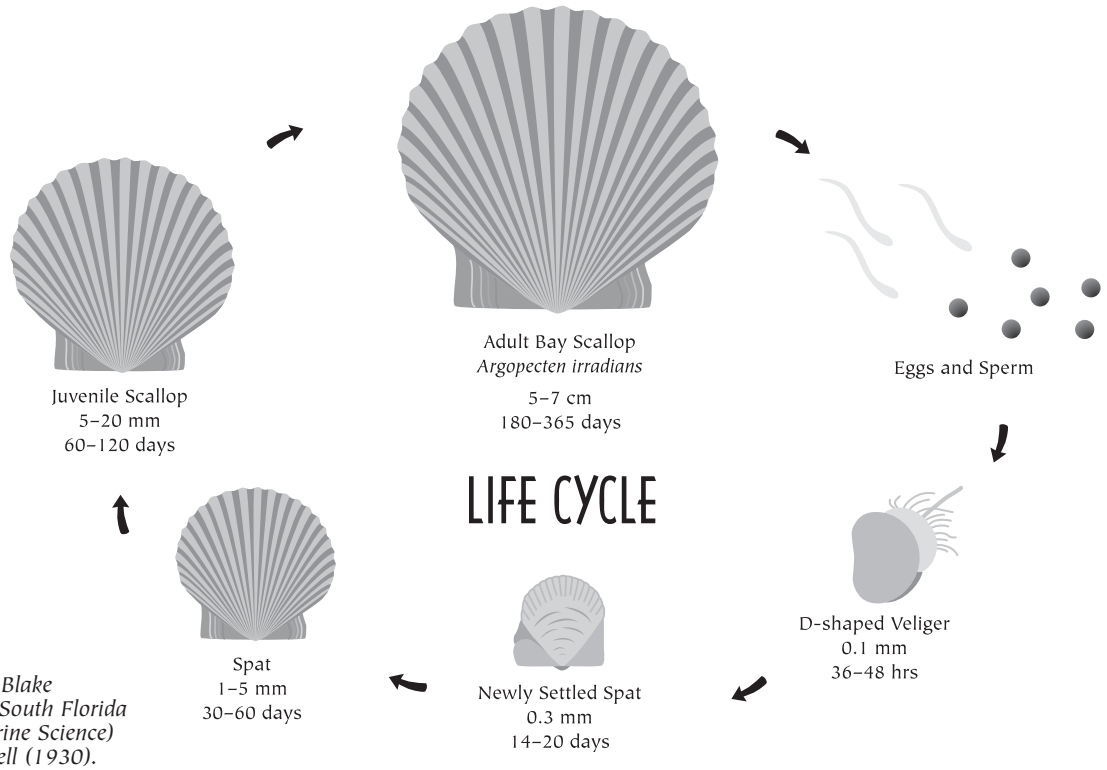
Scallops open their valves when feeding or breathing and close them when predators approach. The shell can also be slammed shut to avoid silt, which can clog the animal's delicate gills. Many tiny blue eyes arrayed along the outer rim of the shell detect movement near the animal and serve as a warning system. When threatened, the scallop can swim by clapping its valves and expelling water rapidly. Generally, most people eat only the large adductor muscle of the scallop. Scientists advise against eating the other parts unless the scallop is harvested from approved shellfishing waters, because these viscera may contain waterborne contaminants that can cause illness.

Life History

A bay scallop has the remarkable ability to develop both male and female sexual organs; consequently, each scallop produces both eggs and sperm. An interval occurs between the release of sperm and eggs so that self-fertilization is unlikely to occur; this interval helps to prevent inbreeding. Development of the reproductive organs is influenced by the amount of food available and the surrounding water temperature. If too little food is present, the scallop will direct all its energy toward survival and will forego reproduction.

A change in water temperature may trigger spawning. In Florida, spawning occurs in the fall when the temperature drops, although elsewhere in their range, bay scallops typically spawn earlier in the year when the temperature rises. Each scallop is capable of producing millions of eggs at once, but the mortality rate is extremely high. Only one egg out of the millions that are produced may survive to adulthood.

In about 36 hours, the fertilized eggs become tiny larvae that float in the water for about 14 days before attaching to the base of seagrass blades. At this time, larvae are transformed into juvenile scallops, commonly called spat. The spat gradually move up the seagrass blades, out of the reach of bottom-dwelling predators such as crabs. But even then, survival is uncertain. As



Art after N. J. Blake (University of South Florida College of Marine Science) and J. S. Gutsell (1930).

many as 90% of the spat will die within six weeks of latching on to seagrasses. Those that do grow large enough to avoid consumption by predators will eventually drop off and fall to the bottom, where they will remain the rest of their lives.

Even as adults, scallops live a precarious existence. A variety of marine creatures, including blue crabs, stone crabs, and whelks, are able to pry the scallop shells open and extract the tender meat within. Sometimes the scallop can escape this fate by swimming away. Occasionally, the algae, tunicates, and other organisms that attach to scallop shells may conceal them from predators—although this is not a reliable defense.

fast FACT

Researchers frequently find the outside of stone crab burrows littered with broken scallop shells.

One creature, the pea crab, manages to live in harmony with the bay scallop; this little crab finds protection within the scallop's shells. Although the pea crab does steal some food from the scallop, it doesn't take enough to jeopardize the health of its host.

Bay scallops are very sensitive to changes in temperature and salinity. They are also vulnerable to changes in water quality. Water made cloudy by floating particles and sediments, referred to as turbidity, can clog the scallop's gills. The scallop can close its shell to protect these gills for short periods but is unable to shut out the dirty water for more than about two hours.

Threats to Bay Scallops

Bay scallops were once plentiful throughout Florida's west coast but have virtually disappeared in some areas. An extensive scallop fishery existed in Tampa Bay as recently as the 1960s, but scallops are rarely found there now. Charlotte Harbor also supported a commercial scallop fishery some 30 years ago. Scientists believe that poor water quality is responsible for these declines. Currently, the most extensive bay scallop populations are located north and west of the Suwannee River, particularly near the fishing hamlet of Steinhatchee and in St. Joseph Bay.

Once a population is depleted, it may not be able to recover on its own, even with improved water quality and restrictions on harvest. Scallops are broadcast spawners, sequentially releasing eggs and sperm to maximize fertilization by other scallops. If no other scallops are nearby, reproduction may not be successful. Consequently, a depleted scallop population may have to rely on neighboring populations to replenish its losses.

Fishing Regulations*

Restrictions on scallop harvesting have been enacted to enhance the natural recovery of scallop populations. No commercial harvest of bay scallops is allowed anywhere in the state, and recreational catches are now limited.

Before the restrictions were adopted, telephone surveys of scallopers and aerial surveys of popular harvesting areas were conducted by the Florida Fish and Wildlife Conservation Commission's (FWC) Fish and Wildlife Research Institute. Those surveys revealed that the intense fishing pressure placed on already depleted scallop populations hindered natural recovery of some stocks. As a result, all scalloping areas south of the Suwannee River, including Homosassa and Crystal rivers, were closed, and scalloping north of the Suwannee was restricted to the period from July 1 through September 10. Subsequent

*Fishing regulations may change annually. Contact the FWC Division of Law Enforcement for information about current regulations. Current saltwater fishing regulations can also be found on the Web site for the FWC Division of Marine Fisheries Management, located at http://MyFWC.com/marine.

surveys of the population density of bay scallops have indicated a shift in harvestable stocks. As a result, changes were made to recreational harvest regulations. A large area south of the Suwanee River was reopened, because bay scallops have increased significantly. Areas west of St. Joseph Bay, where bay scallop abundances were found to be low, were closed to all harvest.

In areas where scalloping is permitted, each person is limited to a maximum of 2 gallons of whole scallops in the shell, or 1 pint of bay scallop meat per day, and each vessel can have no more than 10 gallons of whole bay scallops or 1/2 gallon of scallop meat in their possession. This means that a boat carrying four or more people must be within the vessel bag limit, regardless of the number of people onboard. These regulations, which were instituted in 1994 and became permanent in 1995, will be periodically reevaluated to determine how effective they are at protecting scallop populations.

Fast FACT

Aerial surveys of the Homosassa and Crystal rivers at the start of the scallop season showed the presence of 500 or more boats per weekend, each carrying an average of four people.

All scallopers operating from a boat must have a valid saltwater fishing license from the state. People who collect scallops by wading into shallow areas at low tide do not need to have a license, but they cannot use dive masks or snorkels to help them find the scallops.

Research

Scientists at the Fish and Wildlife Research Institute conduct a variety of studies to assess scallop populations and to learn more about their environmental needs. In conjunction with other researchers, they are also attempting to "jump-start" depleted scallop populations in Tampa Bay and other west coast estuaries by rearing scallops in laboratories and releasing juveniles into the wild. Various estuaries in Florida were selected for this project because researchers believe water quality in these estuaries has improved enough to again support bay scallops.

In the laboratory, scientists are experimenting with a variety of materials that mimic the natural seagrass meadows scallops require during their development. In fact, scallops have already been successfully reared on artificial turf like that used on football fields. When they are transplanted in the wild, the juvenile scallops are often placed in protective cages—dubbed "scallop condos" by one researcher. The cages help shield them from predators until they are large enough to spawn. Although the scallops commonly die soon after spawning, it is hoped that the eggs they release will survive in the wild and eventually replenish the local area.

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