A component of the University of Georgia's Marine Extension Service, the Shellfish Aquaculture Laboratory (SAL) was established to help develop both natural and aquacultural molluscan fisheries. While several other aquacultural research centers are located in the southeastern US, the SAL is the only one which has been uniquely developed for Georgia waters and which is dedicated exclusively to the culture of marine bivalves. Although the SAL performs basic research, its primary emphasis is on applied research coupled with extension work in which successful experimental projects are integrated into Georgia's commercial fisheries.
FACILITIES

The SAL contains complete facilities for holding molluscan brood stock. It also has the capability of culturing quantities of algae sufficient to feed the shellfish throughout their various developmental stages. Other facilities include an 84 m² analytical laboratory and a 158 m² experimental area which is supplied with filtered ambient seawater that can be heated or chilled as needed. Four walk-in temperature-controlled environmental chambers and a complete histology lab also are available on site.

Adjacent to the main SAL building is a 170 m² greenhouse which was custom designed to meet the stringent requirements for the mass culture of shellfish seed and algal monocultures. The building’s design and orientation maximize thermal benefits during winter months while minimizing direct light penetration and attendant heat buildup in the summer.

The SAL also has several small boats available for field research projects.
FISHERIES DEVELOPMENT

Quahog Studies

Stock assessment and basic ecological studies of the native northern quahog (hard clam) in Georgia have led to the development of a small but consistent fishery here. Research has demonstrated that Georgia's northern quahog has a basic ecology that is distinct from that of other members of this species throughout the range of its natural distribution. Georgia quahogs occur intertidally (exposed at low tide), and often are found in association with sediments that contain oyster shell. Quahogs occur in dense numbers in the many small creeks which characterize Georgia's estuarine environment and attain market size in 2 to 2 1/2 years (versus 4 to 5 years in New York). Additionally, Georgia's quahogs deposit growth rings during summer months unlike northern populations which deposit them during the winter.

Oyster Studies

Population dynamics for the eastern oyster, *Crassostrea virginica*, in Georgia are distinct from those of others of this species. Like Georgia's quahogs, these oysters primarily occur intertidally. Spawning takes place from May to October or November, depending on water temperature. Oyster spat recruitment varies greatly from year to year but in general occurs at very high rates. Oyster spat can become sexually mature at one month, spawn and contribute to the annual recruitment rate. Overproduction of oyster spat results in overcrowded oyster beds, which in turn produce oysters of poor commercial quality.
Reproductive Studies

The SAL has described the reproductive cycles of numerous native shellfish species: the blood ark, *Anadara ovalis*; the northern quahog, *Mercenaria mercenaria*; the eastern oyster, *Crassostrea virginica*; the ribbed mussel, *Brachidontes exustus*; the southern surf clam, *Spisula solidissima similis*; the marsh clam, *Polymesoda caroliniana*; and introduced species such as the Atlantic surf clam, *Spisula solidissima*.

Oyster Pathogen Studies

Substantial oyster mortalities occurred along the Georgia coast from 1985-87. Subsequent research determined that these mortalities were caused by a protozoan, *Perkinsus marinus*, or "Dermo." Juvenile oysters, some less than two months old, have been shown to acquire Dermo. The protozoan parasite, *Haplosporidium nelsoni* ("MSX"), also was documented in Georgia's oyster populations.

Southern Surf Clam

Studies on the southern surf clam, *Spisula solidissima similis*, have shown it to be short-lived (usually less than five years) and rather small in size when compared to the Atlantic surf clam, *Spisula solidissima*. Commercial quantities of southern surf clams usually are not found in the inshore or nearshore waters of coastal Georgia. However, smaller quantities do occur in areas near the mouth of sounds. These clams reproduce only in late winter or early spring and frequently will grow to 35 mm within 1.5 years—a size sufficient to consider developing them as an aquacultural product.
AQUACULTURE

Quahogs

Mud, rather than sand, is the predominant substrate in the marsh system of coastal Georgia. Because most quahog aquacultural efforts are based on growing bivalves in sandy bottom areas, SAL researchers had to design a new method for farming quahogs in Georgia. Using a Florida prototype as a stepping stone, SAL scientists developed a mesh bag line system for growing quahogs in mud bottoms.

Genetic Studies

SAL researchers have established a genetic selection program to increase growth rates in quahogs. Already in its third generation, the program has documented a 10% increase thus far.
Greenhouse Studies

The SAL has joined with Skidaway Institute of Oceanography in conducting joint research on various algae species cultured under greenhouse conditions. Their research has identified two species, Isochrysis sp. (Tahitian strain) and Chaetoceros muellertii, that will grow year-round in Georgia and especially well during the often torrid summer months. Other greenhouse related research has shown that quahog growth rates improve when the clams are fed a mixed diet consisting of more than one species of algae.

Algal Turbidostat

In a cooperative project with civil engineers from Louisiana State University, SAL scientists tested an automated, commercial-scale turbidostat. This computer-controlled system produces algae under greenhouse conditions. It subsequently was integrated into an automated clam upweller recirculating feeding system.

Atlantic Surf Clams

In field grow-out studies, the non-native northern surf clam has shown excellent potential for development as an aquacultural species. While this clam will not survive the high temperatures typical of Georgia waters during summer months, it does
Southern Atlantic Surf Clams

The SAL has documented the larval cycle of the southern Atlantic surf clam. Hatchery rearing and nursery culture techniques have been demonstrated. Although the southern Atlantic surf clam grows slower in the nursery and field than the Atlantic surf clam, the southern Atlantic surf clam ultimately will achieve a comparable size by surviving and growing longer into the summer.

Bay Scallops

Bay scallops, Argopecten irradians concentricus, do not occur naturally in coastal Georgia, but field grow-out studies have shown that they do grow and survive well in shrimp ponds at the Waddell Maricultural Center in SC and in tanks at the SAL. Bay scallops, however, will not survive in Georgia rivers during summer months when planted in pearl nets due to the overwhelming number of oyster spat which attach themselves to the scallops from May to September. Scallops are completely enveloped and subsequently die.
Arks

Various species of arks represent an important worldwide molluscan fishery; however, until recently arks have been ignored as a commercial species in the United States. Studies on the growth and reproductive cycle of the blood ark, Anadara ovalis, in Georgia are now underway. Natural recruitment of blood arks occurs in August-October. Blood arks recruited in September 1995 were found to be sexually mature in December 1995 (4 months of age). Arks grow from spat size in September to 40mm by the next fall, indicating that a commercial crop can be achieved within one year. Growth studies showed that blood arks will survive in protective nets for 2 1/2 years, at which time they have attained a size approaching their maximum shell length.

Graduate Studies

Graduate students working through accredited university programs are encouraged to perform graduate research at the SAL. Interested students should contact Dr. Randal Walker to discuss their specific needs.
Extension Efforts

The Shellfish Aquaculture Lab was responsible for helping to establish a clam farm for the residents of the Hog Hammock community on Sapelo Island. Lab scientists also are helping the DeWitt Seafood Company start a clam farm in the Four Mile Island area. Both farms are in McIntosh County, one of Georgia's most economically depressed counties. Clam farming is envisioned as an environmentally friendly means of increasing employment opportunities within economically depressed coastal areas.

Efforts are underway to assist DeWitt Seafood Company in harvesting clams from non-certified shellfish growing areas and transplanting them to certified growing areas. Due to state budget cuts, the Georgia Department of Natural Resources no longer has the staff to perform this service for the industry, so Shellfish Aquaculture Lab personnel have assumed the responsibility.

For More Information

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As an applied research facility, the SAL normally is not open to the public. However, with sufficient advance notice, interested parties can arrange for a tour.

Visit the University of Georgia Marine Extension Service and the Shellfish Aquaculture Laboratory at the World-Wide Web address: http://www.marsci.uga.edu/ ext/marex.html