



The oysters used in this project are not for human consumption. Their intended purpose is to be used for restoration efforts only.





Overview

The Eastern oyster, *Crassostrea virginica*, is an important commercial shellfish species for Alabama. Recent figures indicate that Alabama ranks first in the nation for oyster processing. Regionally in 2008, the Gulf of Mexico led in oyster landings with 20,642,118 pounds or 89 percent of the national total. However, oyster production is highly variable from year to year due primarily to natural environmental and predator fluctuations. In 2010 Alabama oyster harvests were 119,964 pounds worth an estimated \$389,572.

Considerable state and regional oyster research along the Gulf Coast, including studies of oyster aquaculture, is being conducted for this valuable industry. Oyster farming consists of producing oyster larvae, protecting the juveniles (spat), and then planting in natural waters with various degrees of control. Methods of growing oysters can range from scattering the spat on the bottom to maintaining spat in an enclosed structure suspended above the bottom.

Small-scale oyster gardening programs began in Maryland and Virginia as a means of restoring oyster population and improving water quality in Chesapeake Bay. Volunteer oyster gardeners on the Chesapeake grow oysters in floating gardens moored to private piers. Coordinating organizations provide spat set on shell to the volunteers, who monitor the oysters and maintain the garden. Oysters are grown inside the gardens until they are approximately three inches long and then planted onto oyster reefs to augment the restoration efforts in the Chesapeake Bay.

Based on the success of this program, a similar project was initiated on the Gulf Coast in 2000. Successful implementation of an oyster gardening program in Mobile Bay will provide a number of benefits the coastal community. Oyster gardening improves the Bay's water quality and accelerate the establishment of sustainable oyster populations on existing or constructed oyster reefs. As filter feeders, the oysters you will grow cleanse the water of excess nutrients and suspended particles—one oyster is

capable of filtering up to four gallons of water per hour. Once they are added to the reefs in Mobile Bay, your oysters will also provide habitat for other important marine species who concentrate there to feed, to protect themselves, or to use oyster shell as a nursery for producing their young.

Oyster gardening programs can also bring intangible benefits, including greater public awareness of how oysters improve the Bay's water quality, the economic role of the oyster in our communities, and a greater understanding of the cultural importance of Mobile Bay's oyster industry.

The Mobile Bay Oyster Gardening Program is now entering its 16th year of operation and has produced nearly 800,000 oysters. Through volunteer participation, our objective is to continue to provide education on the role of the oyster in the ecology of Mobile Bay while simultaneously improving the water quality and increasing the productivity of local oyster reefs. Thank you for participating in this joint effort between the Alabama Cooperative Extension System, the Mobile Bay National Estuary Program, the Mississippi-Alabama Sea Grant Consortium, the Auburn University Marine Extension and Research Center, the Alabama Department of Public Health—Seafood Branch and the Alabama Department of Conservation and Natural Resources—Marine Resources Division.

Site Assessment

To determine if your location is acceptable please complete the following assessment.

You must be able to answer "yes" to the following criteria to qualify for the oyster gardening program.

1. Do you live on the water with a pier or landing?

Yes No

2. Is your property in the conditionally approved oyster growing areas according to the map provided?

Yes No

3. Does the tide ever recede beyond the end of your pier and expose the bottom for more than 2 hours?

Yes No

4. Do you reside at this location year round?

Yes No

5. Are you willing to spend approximately 20 minutes per week caring for your oysters until they are ready for reef restoration?

Yes No

Please answer the following questions for our reference, but these questions will not affect your application as an oyster gardener:

1. Do you have freshwater plumbing at your pier?

Yes No

2. Do you have prior experience as a volunteer master gardener or other similar program?

Yes No

Oyster Growout Gardens used in the Mobile Bay Oyster Gardening Program



MBOGP Oyster Garden

Ideal for volunteers with piers

Dimensions: 1.5' x 1.2' x 0.7'

Carrying Capacity: ~250 oysters

No. gardens per volunteer: 4

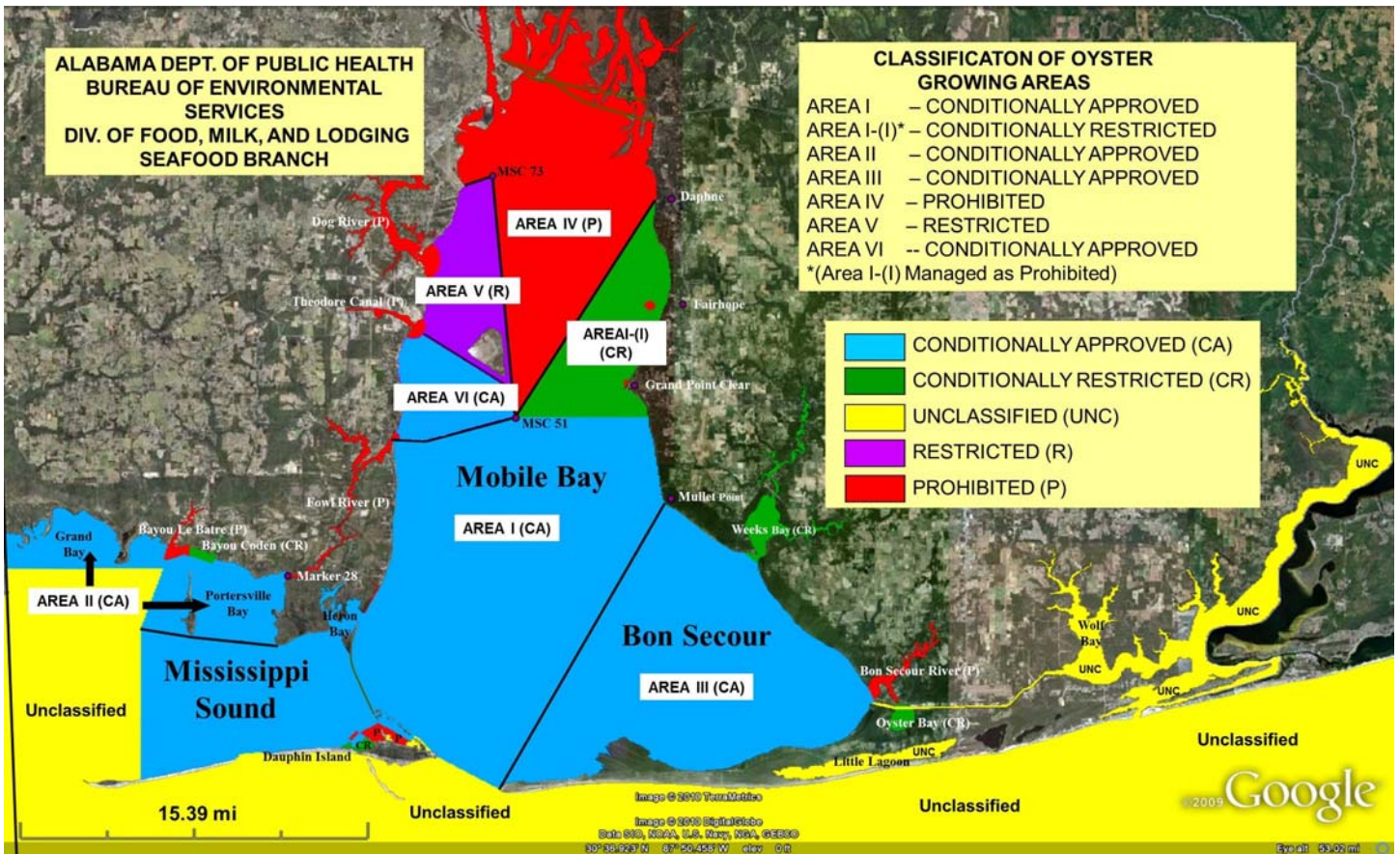


ALABAMA DEPT. OF PUBLIC HEALTH
 BUREAU OF ENVIRONMENTAL
 SERVICES
 DIV. OF FOOD, MILK, AND LODGING
 SEAFOOD BRANCH

**CLASSIFICATION OF OYSTER
 GROWING AREAS**

AREA I – CONDITIONALLY APPROVED
 AREA I-(I)* – CONDITIONALLY RESTRICTED
 AREA II – CONDITIONALLY APPROVED
 AREA III – CONDITIONALLY APPROVED
 AREA IV – PROHIBITED
 AREA V – RESTRICTED
 AREA VI – CONDITIONALLY APPROVED
 *(Area I-(I) Managed as Prohibited)

CONDITIONALLY APPROVED (CA)
 CONDITIONALLY RESTRICTED (CR)
 UNCLASSIFIED (UNC)
 RESTRICTED (R)
 PROHIBITED (P)

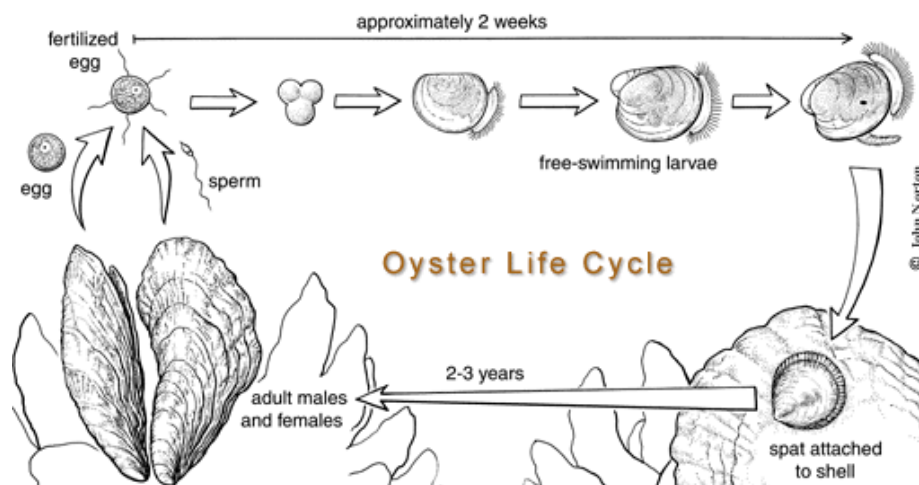


Seed and Spat

As a volunteer with the program, you will receive young oysters, called “seed” or “spat,” that have been spawned and reared in a hatchery. After oysters are spawned they first go through a free-swimming larval phase and then reach a stage when they must attach to a hard surface, usually another oyster or shell. In hatcheries, old whole oyster shells are often used as the hard surface (called cultch) on which the larvae are “set.” Several spat may set on one oyster shell. This arrangement, where larvae set onto oyster shell, is called “cultched” seed. Cultched seed is used in the oyster gardening program because it more closely replicates oysters as they are found in nature.

In producing cultched seed in the hatchery, old oyster shell is first dried out on land in order to remove organic material that could degrade water quality in the setting tanks. Shell is placed in plastic meshed bags and stacked in tanks. The spat are generally kept in the tanks for several days, then removed to a nursery area where tides and currents provide the water exchange necessary for growth and survival. Although cultched oysters can exhibit rapid growth, sometimes reaching 25 mm in two to three months after settlement, growth is extremely variable and depends on many interacting factors, especially salinity, temperature, food availability and water quality.

You will start off with one mesh bag of spat-on-shell for your oyster gardens. Cut open your mesh bag of spat. Divide the spat evenly among all four gardens. Deploy gardens horizontally.

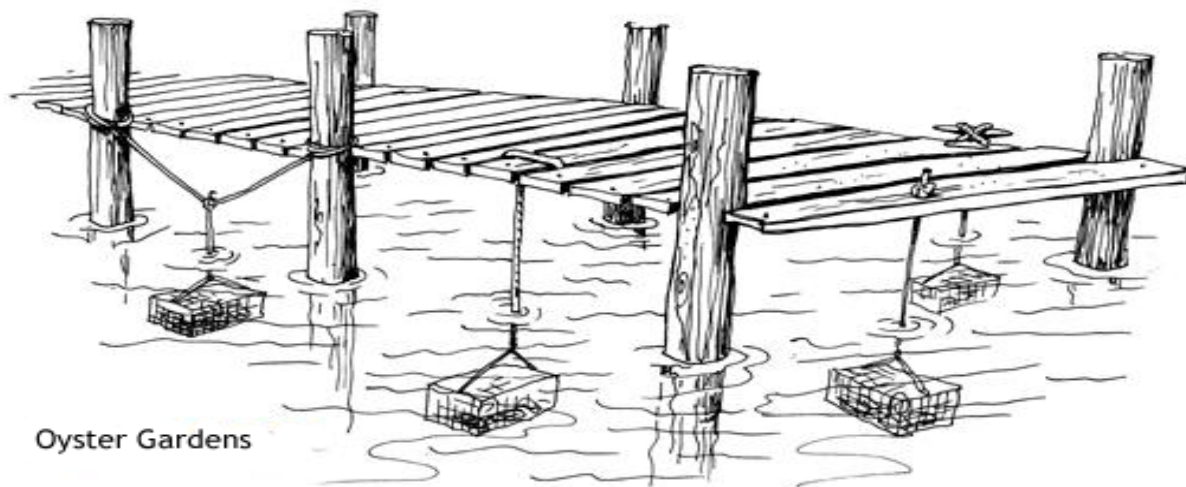


Securing Your Oyster Garden

The location of your oyster garden is important: since oysters grow best when they are located in areas with maximum water flow around them, place your garden where tidal flow is good. Securing the garden underneath your dock will shade it, and help reduce algal growth. Throughout the winter, keep an eye on your garden to make sure it is secure. Every dock site is different, because of tides, currents, salinity, water depth and dock facilities. Experience will be your best guide for determining exactly how to set up a garden at your site.

Oyster gardens are usually hung horizontally to give the oysters plenty of room and to maximize their growth rates. **They should be tied off so the oysters sit about one foot above the bottom.** The top of the garden may be exposed during low tides. The objective is to keep gardens as high up in the water column as possible without risking exposure to low air temperatures.

Gardens can be secured to the dock in any number of ways. **Each garden should be suspended between two pilings** or hung by tying a line around a plank on your dock. Some gardeners drill small holes through four dock planks and thread one garden line through each hole. Knots can be tied in the top ends of the lines so they can't fall back down through the holes. Your securing system will depend on your dock site. The important point here is to make sure the gardens **do not bang against pilings**—banging can cause oysters to close up and stop feeding, and allow oyster drills to easily access your gardens.



Oyster Gardens

Cindy Fletcher-Holden

Maintaining Your Oyster Garden

SAFETY FIRST

The first priority for all Gardeners, Adopters, and others involved with the Mobile Bay Oyster Gardening Program is safety. Children should be supervised at all times while working with the garden. It is the recommendation that every individual who may handle the gardens or oysters wear gloves. Care should be taken when lifting gardens for cleaning, observations, or other reasons. The gardens can be heavy, so seek assistance when necessary. Avoid working with your gardens during inclement weather, if you can hear thunder or see lightening you should leave your gardening site immediately. Be aware of the risk of heat related illness, particularly in the summer months. Work in the shade, early morning, or late evening-avoiding the hottest times of the day. In the event of hurricanes, or other strong storms, your first priority is the safety of yourself and your family. **IF** you have time to secure the gardens, they can be lashed to pilings on the shore side or removed to a shaded area for 24-36 hours. This should only be done if there are no other preparations that need to be made, and your area is not under any type of evacuation order.

Follow the monthly newsletter for updates and additions to conditions which may warrant additions to these safety guidelines.

Finally, you are your best safety rule: **IF IT DOES NOT FEEL RIGHT, STOP!**

If you are unsure of anything, **STOP** and contact us with your question.

There are three things that will be the most important maintenance takes for oyster gardening: (1) keep the gardens clear of fouling organisms such as barnacles, mussels, and algae (allow your garden to dry for 1-2 hours each week in a shady spot); (2) remove sediment and oyster feces that will collect in the garden (vigorously shake your gardens at the water surface); and (3) remove predators that will invade your garden and feed on the young oysters. Your garden will need to be pulled from the water and allowed to dry out in the shade each week.

Control of Fouling Organisms

Drying out or desiccation can control most barnacles and mussels. This will be accomplished by lifting the gardens out of the water and letting them sit in a shady location on the dock, exposed to the fresh air. The oysters can survive extended periods exposed to the air. Letting your oysters sit in hot, direct sunlight for more than a couple of hours is not recommended. Keeping the garden shaded will help to reduce the fouling while increasing the chance of oyster survival. On cloudy or rainy days, the oysters can survive for a longer period of exposure to the air. Your gardens should be left out in the air as often as every week during the season. Each site will vary in the method and length of time needed to control the fouling organisms.

Filamentous algae are persistent fouling organisms. The algae do not harm the oysters but it does make it hard to observe the growth of the spat. The best way to control algae is to make sure it does not have a chance to grow. When you observe algae beginning to grow on your garden you should begin the routine

of letting your gardens air out in the shade. Once the algae are established it will grow very quickly. If the gardens are heavily fouled with algae, remove as much as possible before the desiccation process. It is possible to control the algae growth by limiting the amount of sunlight reaching the gardens.

If you cannot control the growth of barnacles, mussels, or algae using the drying out method alone, you will need to take a more direct approach. Scrubbing the gardens with a hard bristle brush will help remove the algae. Scraping with a hoe can help remove barnacles. A high pressure hose can also help to remove fouling organisms.

Cleaning Gardens

The gardens will trap sediment that is suspended in the water. The problem you have with sediment will depend on where you are located. Some areas may have a high load of suspended sediments, while others may not. Examining the bottom sediments near your pier will be an indication of the problem you may have. Sandy sediments are seldom a major problem because the larger grains will tend to settle out of the water because of their size. Gardens located in areas where high wave activity occurs may have to clean their gardens after a major storm.

If your area has fine clay sediment, this will be more of a problem. The oysters in the gardens will catch the sediment as it falls out of the water. Oysters will also remove some of the sediment and algae through their own filtration process. The waste product of the oyster, known as “pseudofeces” will contain some of the sediment as well as the natural oyster waste. Without routine cleaning, the oysters can quickly become covered which will inhibit their ability to feed and breathe. The oysters that are trapped below the sediment will probably die. For this reason, your gardens must be cleaned on a regular basis. The time between cleaning will very depending on the location of your float and the season. All gardens will need to be cleaned as often as every week. Cleaning can consist of moving the gardens up and down in the water until all the sediment is rinsed off, or by using a hose if one is available. You will also need to shake your gardens to prevent the oysters from growing through the mesh. When cleaning your gardens, do not remove the dead oysters from the garden because they will need to be counted when collecting data on your oysters.



Dried Barnacles



Dried Algae

Controlling Oyster Predators

The structure of your oyster garden will help to exclude many predatory organisms that would normally eat your oysters. Several species of crabs, fish and other animals may feed on oysters at different stages of their life cycle. Blue crabs should be removed from your garden whenever they are noticed. While blue crabs should not cause major mortalities in your garden, a confined blue crab will eat what is available to it, and in most cases this will be your oysters. Removing any blue crabs when you see them should alleviate the potential problem. You may see many small brown mud crabs in your garden—these are not harmful to your oysters.

It is not likely that most other oyster predators will cause problems in your garden. One advantage to spat-on-shell is that they are generally more predator-resistant than cultchless oysters. The shell to which they are attached acts as protection for the spat until they reach a size where predation is more difficult.

Source: Oyster Gardening for Restoration & Education.
William Goldsborough, Donald Meritt.



Harvesting and Restoration

Community-based oyster restoration programs are one important element in widespread efforts to restore populations devastated by overfishing, habitat destruction, land runoff, pollution, and oyster disease. As an oyster gardener, you will be doing your part for Alabama's oyster restoration effort. In November, personell from the Mobile Bay Oyster Gardening Program will collect the oysters and they will be planted on reefs in Mobile Bay. Those oysters should eventually serve as a foundation for new generations of oysters. In this way, the oysters that you grow year after year will help contribute to sustainable oyster populations in the Mobile Bay ecosystem.



Harvested Oysters are Deposited on Shellbanks Reef

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Mobile Bay Oyster Gardening Calendar

June/July: Auburn University Shellfish Lab will provide roughly 4 mm oyster spat per volunteer. Pickup times and locations will be announced well in advance through the MBOGP Newsletter. Pickup locations are spread around the bay for convenience, and is normally conducted on a Saturday.

June – October:

As needed, maintain gardens by removing fouling organisms. Growth of algae can add 10-50 pounds of weight to the garden. A high pressure hose most efficiently removes fouling from oysters and gardens.

August/September: As needed/requested by Gardeners. Check your newsletter for details on a midseason check of your oysters.

November:

The newsletter will provide details on the final pickup of your oysters. Oysters will be planted onto reefs in Mobile Bay. Gardens must be removed from water and cleaned for winter storage.*

Oyster Drill Fact Sheet

Scientific Name: *Stramonita haemastoma*

Common Name: Southern Oyster Drill

Geographic Distribution: Found along the Atlantic and Pacific coasts as well as the Gulf of Mexico.

The oyster drill, a gastropod, is the primary oyster predator in the Gulf of Mexico. It is also a significant threat in Mobile Bay. Oyster drills are small, slow moving snails with a heavy shell. They will drill a pin size hole in the oyster shell and suck the oyster out. Their preferred method of attacking an oyster is to bore between valves at the bill, their weakest point. It can take up to three weeks to eat one large oyster. These predators will attack any oyster but they are most devastating to very young oysters.

The greatest density of oyster drills will be found where the water is the most saline, usually near the mouth of the bay. The range of oyster drills is limited by salinity. Salinity greater than 15 ppt is needed for its survival. During the late 1960's, the oyster drill in Mobile Bay killed 80% of the oyster spat in a nine month period where salinities were over 15 ppt. At a salinity of 7ppt this predator will become immobile and if it remains at that level for one to two weeks the oyster drill will die. Flooding conditions that bring a great amount of freshwater will eliminate the oyster drill.



Dorsal View



Ventral View

Oyster Drill Eggs

