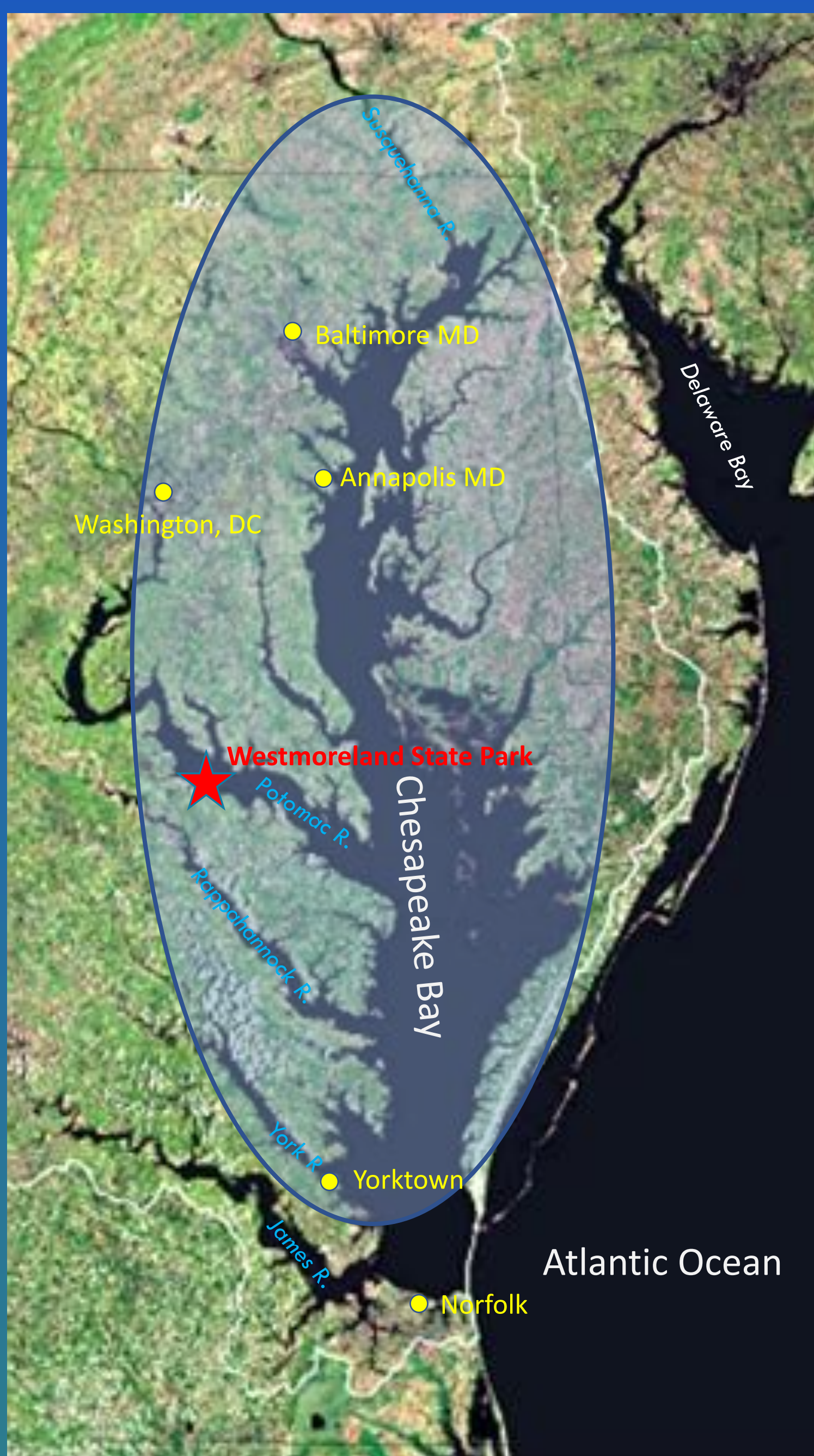


Oysters and the Chesapeake Bay

Tidewater Oyster Gardeners Association
and Friends of Westmoreland State Park



The Chesapeake Bay is the second largest estuary in the world.



Fresh water from 6 states and the District of Columbia meet the ocean in the bay, mixing to create somewhat salty brackish water.



The Bay is a productive ecosystem that supports plant, animal, fish, bird, human, and other life including shellfish.

Oysters are a keystone species of the Chesapeake Bay. Without oysters in the ecosystem, the Bay would become vastly different.



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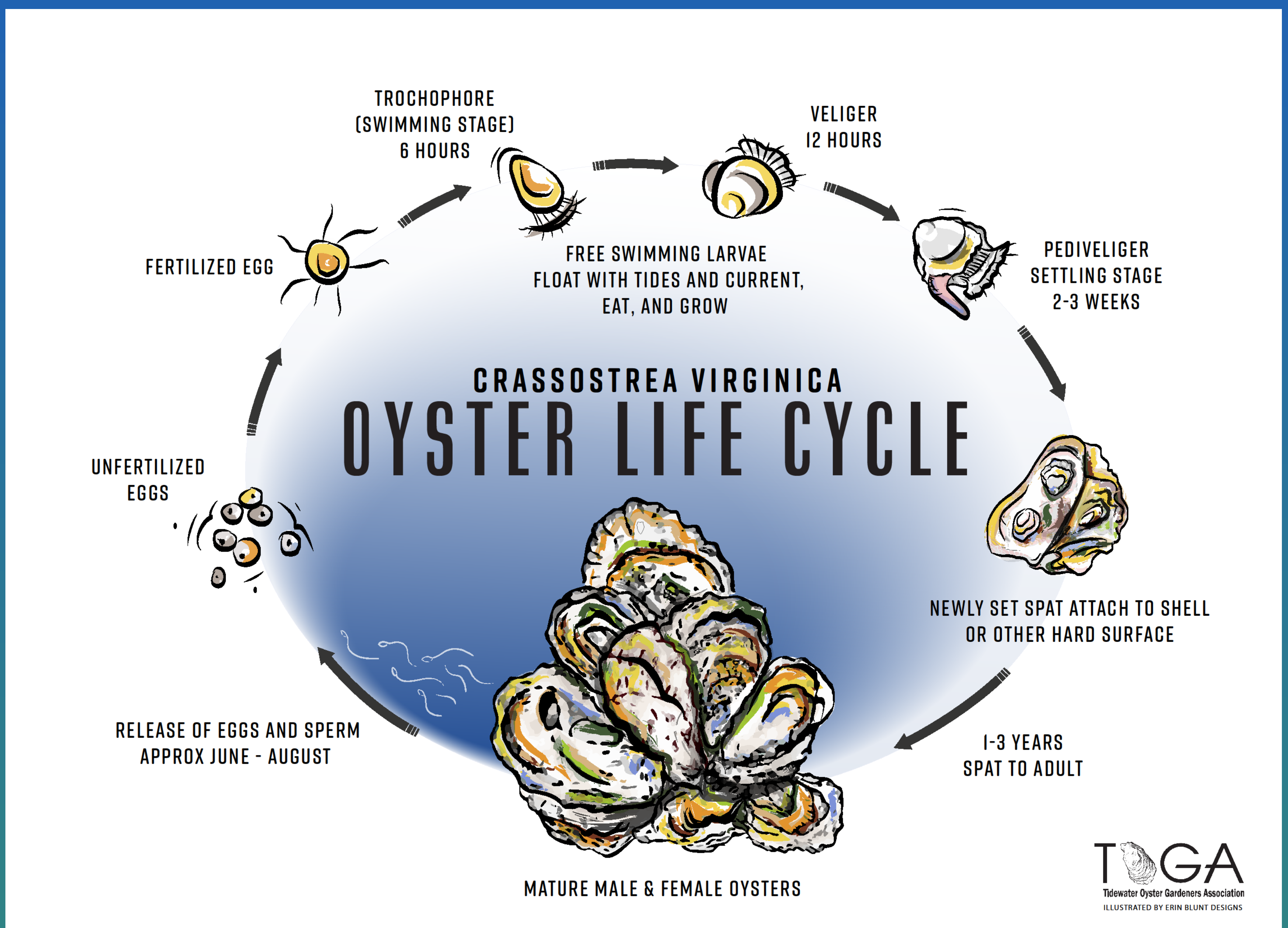
Funded in part by the purchase of Virginia "Friend of the Chesapeake" License Plates



Biology and the Life Cycle of Oysters

Eastern oysters (*Crassostrea virginica*) are a bivalve mollusk. As they filter water through their gills, oysters feed on plankton and algae that block sunlight from reaching beneficial underwater bay grasses. Filtering up to 50 gallons of water a day, each oyster removes damaging nitrogen, phosphorous, silt, and other pollutants, vastly improving water quality and helping underwater grasses get more sunlight. Grasses are important habitat for crabs, fish, and other life.

Reefs formed by oysters over thousands of years protect shorelines from erosion and create habitat for hundreds of species including fish, eels, crabs, worms, shrimp and plant life.



Baby oysters are called spat. As they mature, they grow an inch or more per year. Adult oysters build a hard shell by sequestering calcium carbonate from the water.

Oysters feed and grow when the water temperature is 50°F or warmer. They grow best at a salinity above 12 ppt but tolerate as low as 6 ppt.

Oyster Gardening Scientific Tools



Refractometer measures salinity



pocket Thermometer

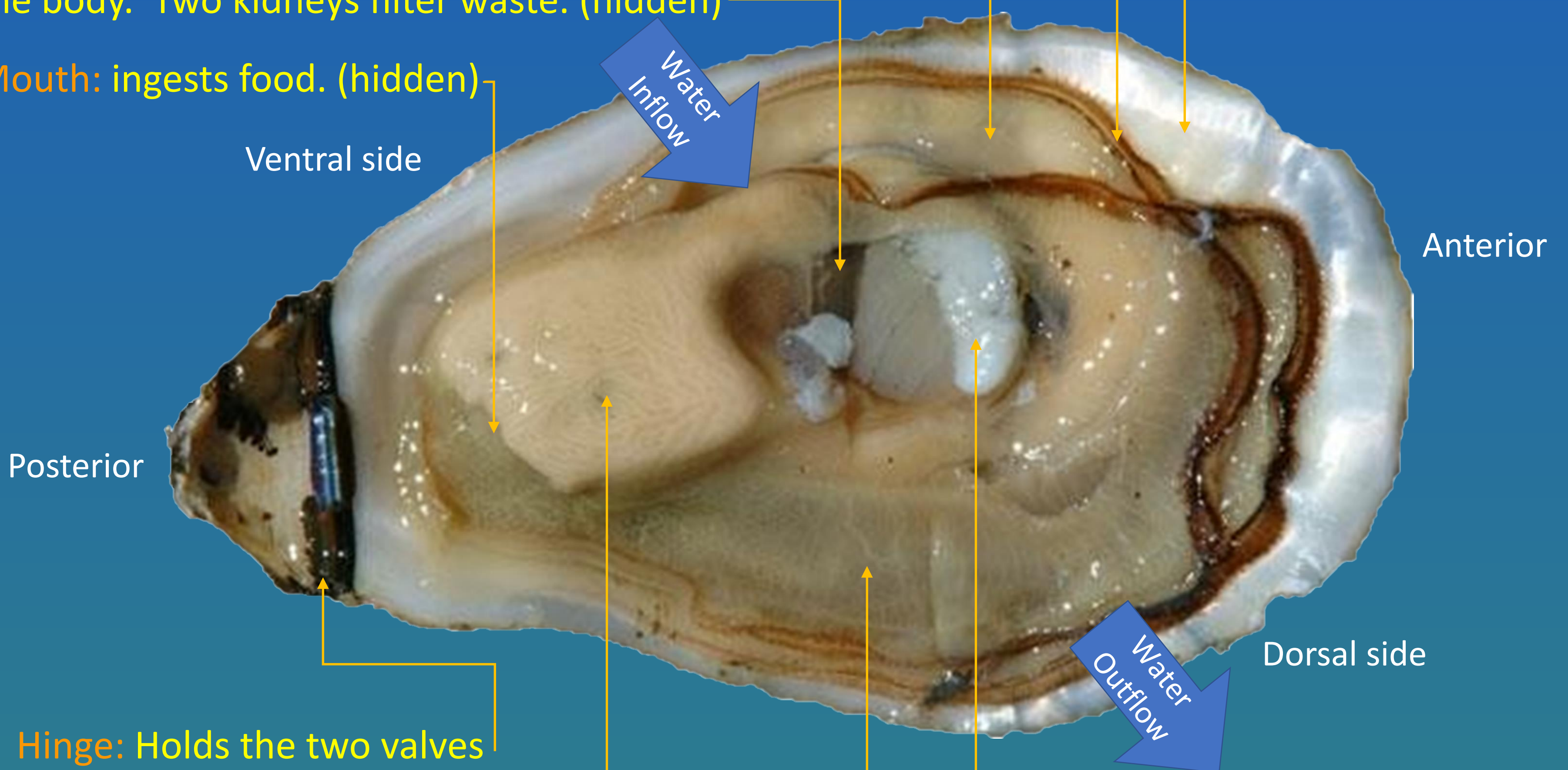


Microscope

The Anatomy of an Oyster

Did You Know oysters are filter feeders. A sticky mucus layer on the gills collects plankton, algae, and other organic matter and moves it into the mouth where it is eaten. Oysters don't have a head, but they have:

- **Shells:** called left and right valve, are formed by the mantle.
- **Cilia:** (hairlike "tentacles") moves water from their ventral side over their gills to their dorsal side.
- **Gills:** Absorb oxygen and carbon dioxide from the water.
- **Heart:** Pumps colorless blood from the gills throughout the body. Two kidneys filter waste. (hidden)
- **Mouth:** ingests food. (hidden)

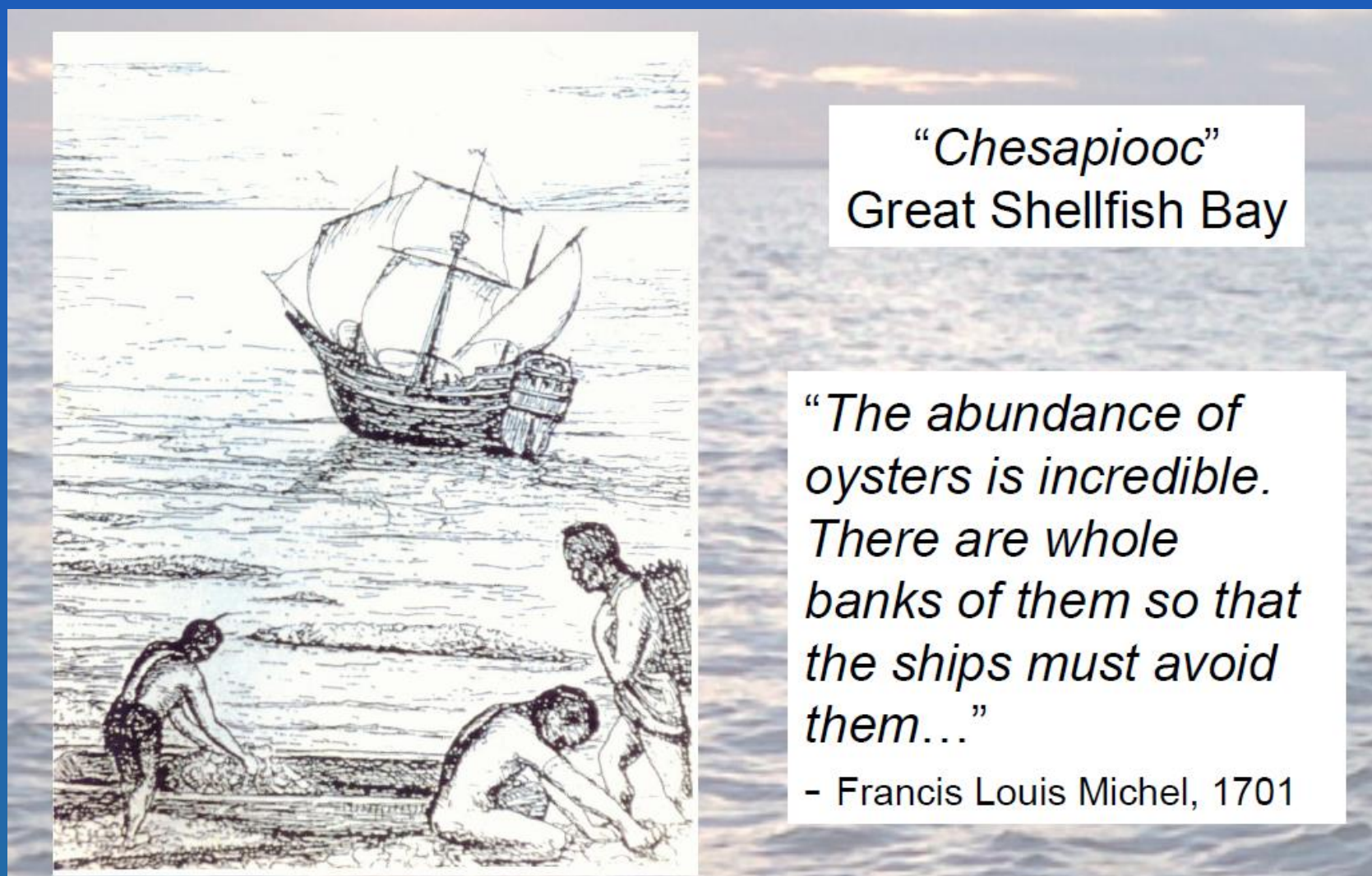


- **Hinge:** Holds the two valves together on the anterior end of the oyster.
- **Stomach:** Digests food and passes waste through its intestine out the anus. (hidden)
- **Mantle:** forms the oyster shell and mother-of-pearl lining of the shell.
- **Adductor muscle:** This muscle stretches and contracts to open or close the shell during eating, spawning, and resting. It protects the oyster when shut tightly.

Common name: Eastern Oyster
Latin name: *Crassostrea virginica*
Kingdom: Animalia (animals)
Phylum: Mollusca (mollusks)
Class: Bivalvia (bivalves)
Order: Ostreoida (oysters & scallops)
Family: *Ostreidae* (true oysters)
Genus: *Crassostrea*
Species: *Crassostrea virginica*

Growing Oysters to Help the Bay

Over the last 150 years, wild oyster populations have been impacted and reduced by harvesting techniques, disease, and pollution. Huge reefs existed when Captain John Smith explored the Chesapeake, but they are now gone. The oysters could filter the entire bay in just one day— today it takes a year. But there is hope for the future.



“Chesapiooc”
Great Shellfish Bay

“The abundance of oysters is incredible. There are whole banks of them so that the ships must avoid them...”

- Francis Louis Michel, 1701

Credit: Chesapeake Bay Foundation



Credit: National Park Service

Techniques for aquaculture have been developed for raising farmed oysters which reduces pressure from wild harvests. Scientists have worked with non-profits, academia, and government to establish disease resistant stock, sustainable growing and harvest practices, and restoration efforts.



You can help!

- Collect oyster shells and recycle them back to the water. Many communities have collection programs. Shell is used to restore reefs and provide a medium for wild spat to set and grow upon.
- Learn about and grow oysters yourself. TOGA can help you become a Master Oyster Gardener!

Steps in Making an Oyster Garden

1. Purchase oyster seed (spat) about 1/4" to 3/4" from a supplier. Select either triploid or diploid spat. Triploids grow faster and are more disease resistant but don't reproduce.

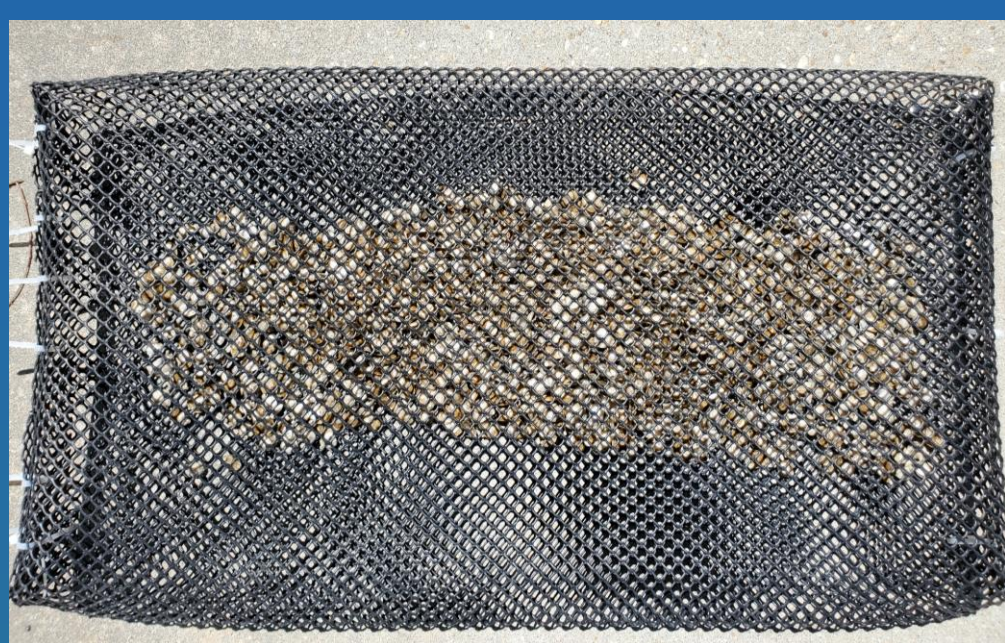


Buying Seed in bags



Oyster spat

2. Put new spat into a plastic mesh bag with 3/16" openings to protect them from crabs, rays, and other predators.

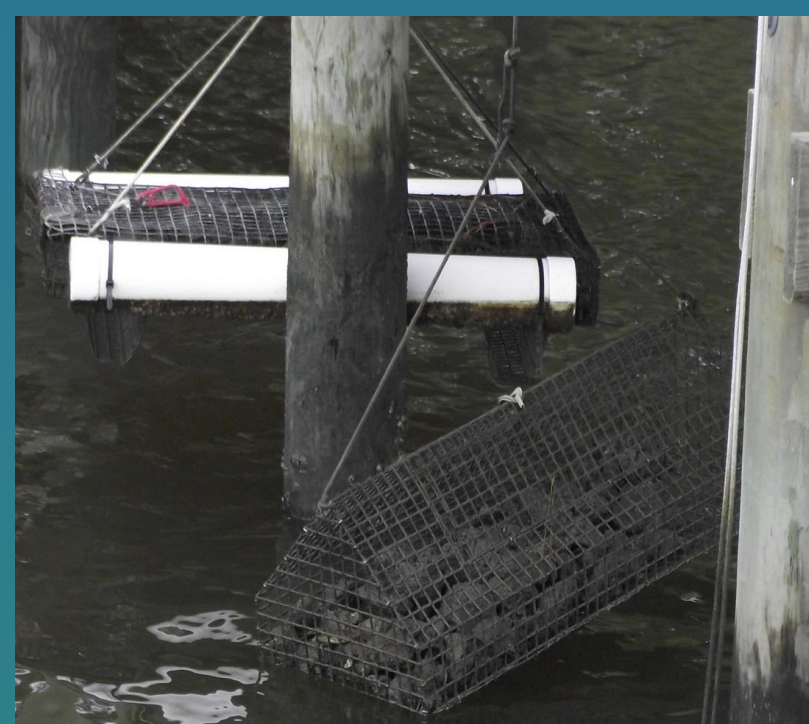


1,000 oyster spat in a mesh bag

3. Select one of many different cage devices. Place bags in cages or floats.



Tidal tumbler



Flip float and downunder

4. Periodically clean the mesh bag to remove algae, fouling, and baby crabs. As the spat grow, transfer to a larger mesh bag to improve flow and divide into lots of 200-500, depending on the float.

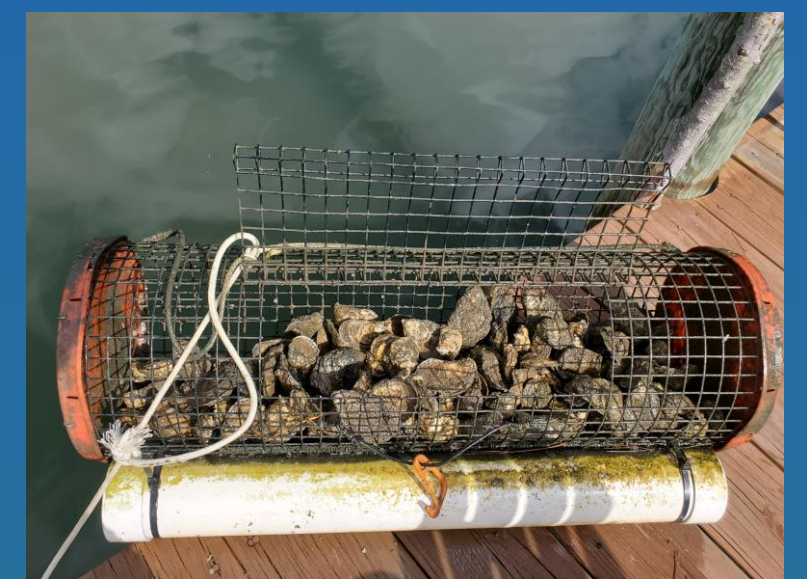


Cleaning a mesh bag

5. When the oysters are over 1 inch, empty the bag into a cage or float where they get better flow. Cover open floats with a lid to keep out predators.



Taylor Floats



Tidal Tumbler

6. Keep the floats clean and remove baby crabs, or they will eat your oysters.



Hanging bags



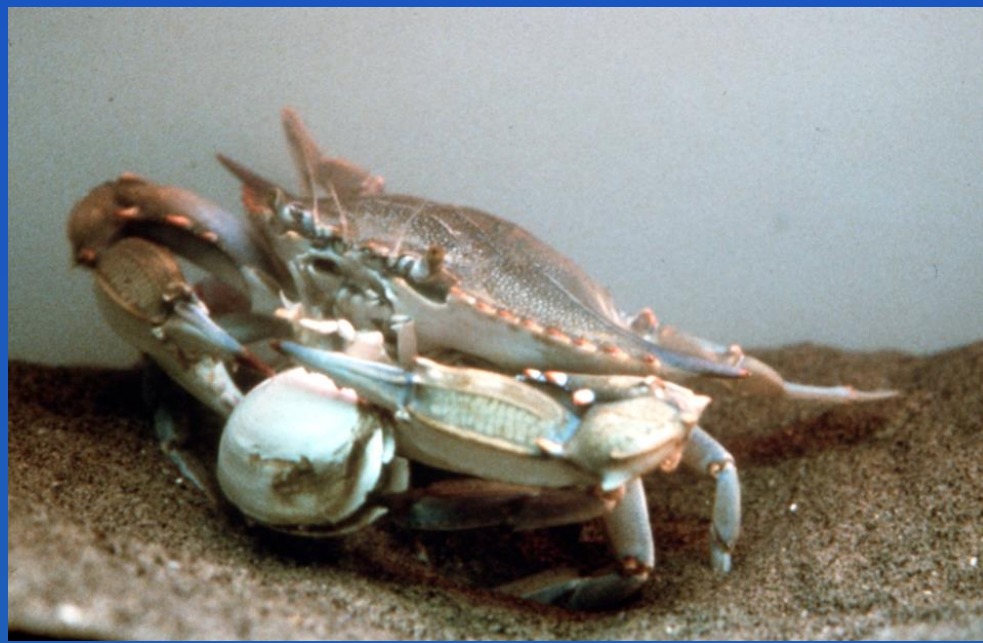
TOGA float sale

7. In good conditions, your oysters could be market size in 1 to 1 1/2 years.



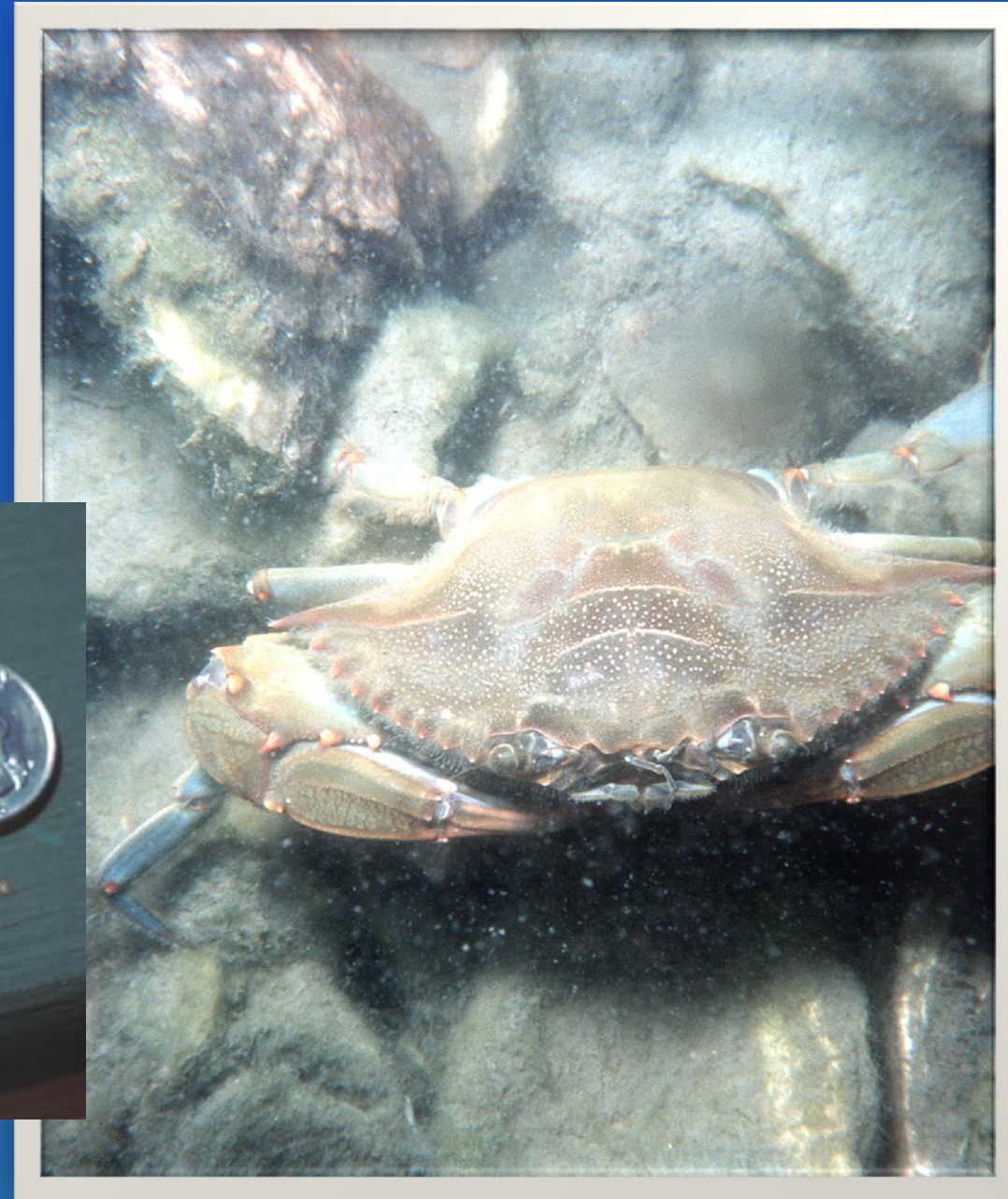
Predators And Other Threats

BLUE CRAB: The worst predators of oysters are blue crabs. Since oysters grow very rapidly, the shells are thin and easy for crabs to break.

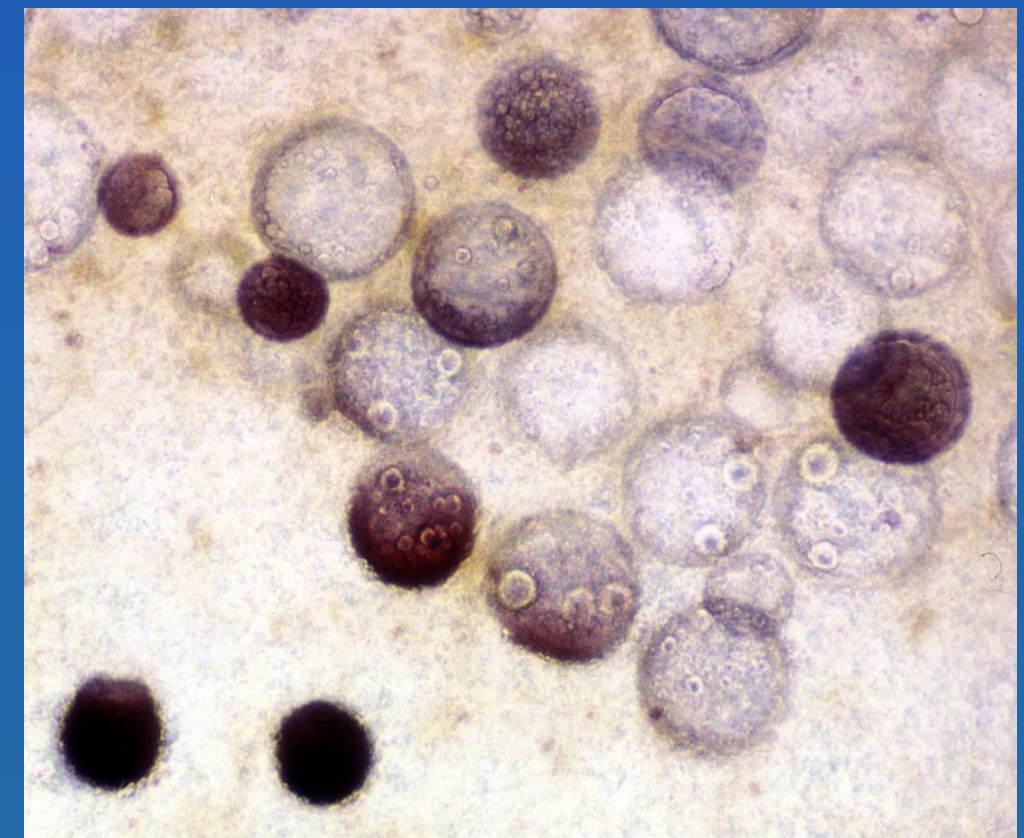


Crab damage to oysters

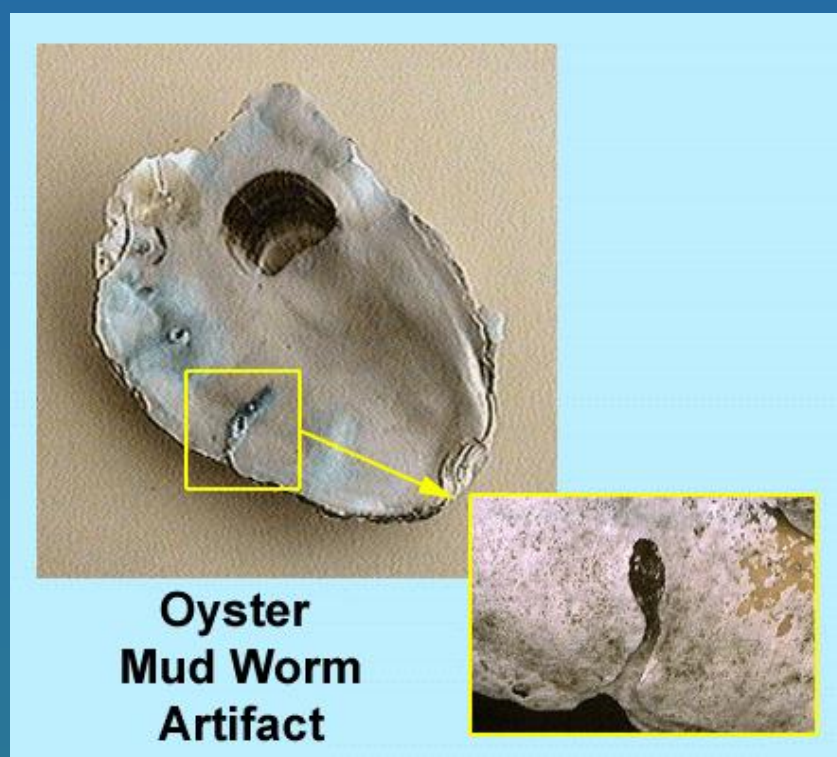
Blue crab on an oyster reef



DISEASES: Wild oysters die at a high rate due to MSX (*Haplosporidium nelsoni*) and Dermo (*Perkinsus marinus*). Hatchery-raised oysters developed by the Virginia Institute of Marine Science (VIMS) are disease resistant.



Perkinsus marinus (Dermo) in oyster tissue



MUD WORM: Polydora is a small worm that burrows into the oyster shell, weakening it. The oyster can become rough, unattractive and difficult to shuck.

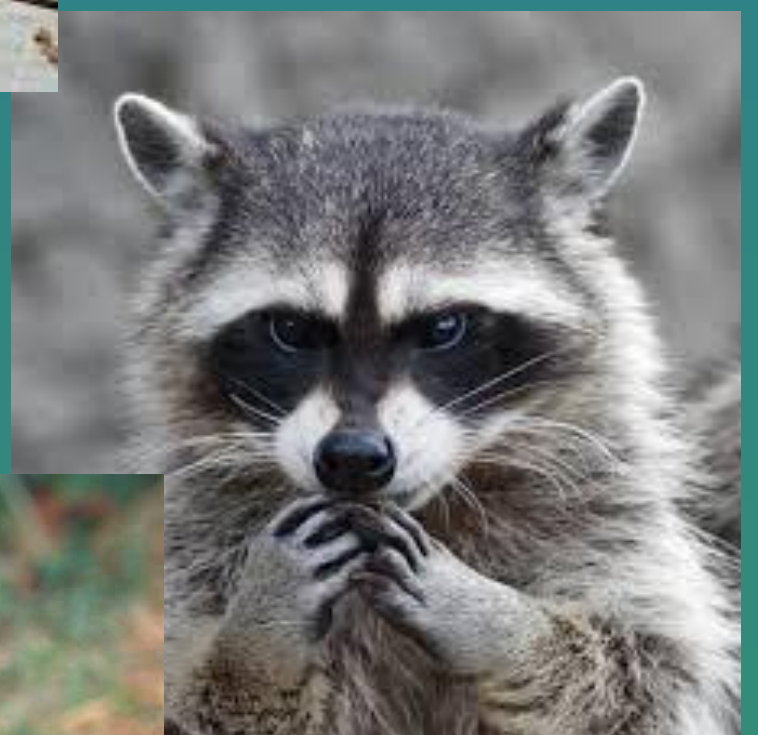
Cownose ray



American Oystercatcher



Raccoon



Oyster drill

WHELKS AND OYSTER DRILLS: These gastropods attack all sizes of oysters.



Knobbed whelk



River Otter

OTHER VERTEBRATES: Other vertebrates (rays, fish and birds) attack oysters in the wild. Few will bother oysters grown in cages.

www.oystergardener.org



Friends of Westmoreland State Park