Spat on tile

Evaluation of Oyster Spat Settlement in the Delaware Inland Bays

Design and Implementation

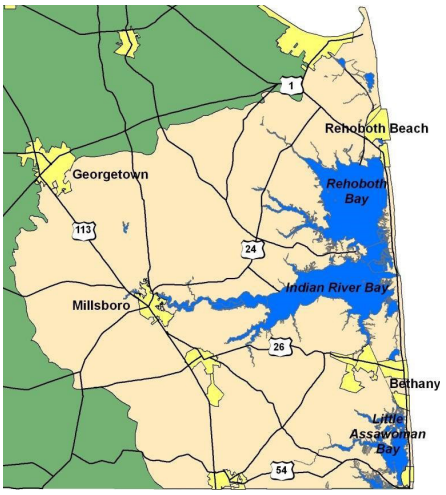
Delaware State University | College of Agriculture, Science and Technology

BACKGROUND

Delaware's Inland Bays, consisting of three interconnected bodies of water in southeastern Sussex County, are increasingly in need of the ecological services that oysters offer. These bays comprise 32 square miles (20,480 acres) of surface waters within a 320 square mile watershed that is rapidly undergoing development (Ewart, 2013). Because these bays are very shallow (three to eight feet in depth) and are poorly flushed by tidal movement, they are especially sensitive to environmental changes (Delaware Sea Grant – NOAA 2003). A general consensus among state resource managers has been that since the demise of the Inland Bay oyster industry in the 1970s, high salinities, predation, and the potential for disease outbreaks made the bays an unsuitable environment for oysters (Ewart, 2013).

The loss of native oyster (*Crassostrea virginica*) populations within the Delaware Inland Bays is a recognized problem. Prior to the arrival of European settlers, oysters abounded throughout the Delaware Inland Bays. Delaware's Inland Bays have been virtually free of a natural population of oysters for more than thirty years.

The ultimate goal of this research is to create a self-sustaining habitat with natural oyster sets in the Delaware Inland Bays. To support this goal, the availability, distribution and settlement of naturally occurring spat throughout the Delaware Inland Bays must be determined.

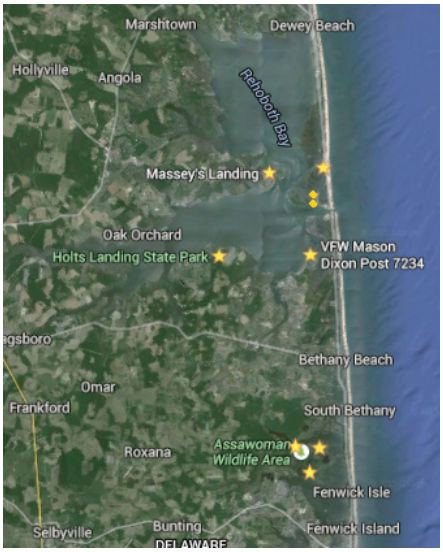


Delaware Inland Bays courtesy of the Delaware Center for the Inland Bays

www.inlandbays.org/about-the-bays/maps/inland-bays-watershed/

Site Location

In order to evaluate the production of spat in the Delaware Inland Bays, three locations were selected in each of the Inland Bays (Rehoboth Bay – Massey's Landing, Savages Ditch, and the Rehoboth Bay side of Burton's Island; Indian River Bay – the Indian River side of Burton's Island, Marshy Hope Way in Ocean View, and Holt's Landing State Park; and, Little Assawoman Bay – Sassafrass Landing, Strawberry Landing, and Mulberry Landing in the Assawoman Wildlife Area). These locations were chosen based on their proximity to natural sets of oysters on rip-rap, that were easily assessable by car, and were either state owned or private land in which permission was granted to set up the collectors.



Sites for deployment of spat collectors in the Delaware Inland Bays

(maps.google.com)

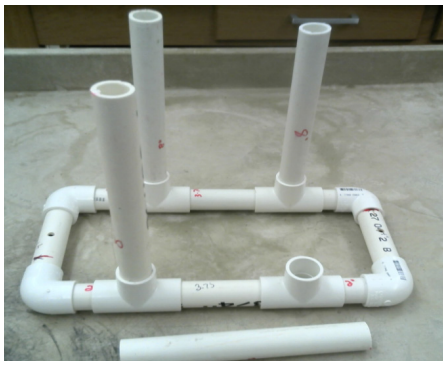
SPAT COLLECTION METHODS

Materials needed to build the frame of the spat collector

Spat Collector Construction

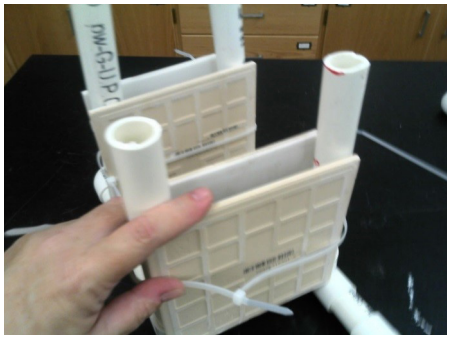
Spat collectors were constructed based on the "Spat Rack" design used by the University of North Carolina — Wilmington's Oyster Spat Monitoring Project (www.ncoystermonitoring.org). Each collector consisted of the following materials:

- 4 ceramic tiles
- ¾" PVC pipe
  - 4 – 2" pieces
  - 4 – 8" pieces
  - 2 – 4" pieces, with holes drilled to allow the spat collector to sink.
  - 2– 3 ¾ " pieces
- 4 – ¾" elbows
- 4 – ¾" Ts
- 8 – 16" cable ties
- 2 cinder bricks



Assembling the frame — adding support posts for the ceramic tiles

Two ceramic tiles were attached to each post, with the smooth side facing in and the rough side facing out.

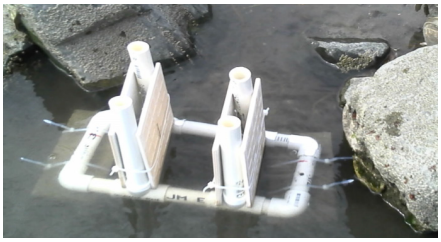


Cable ties were used to attach the tiles to the support posts.

The completed spat collector was attached to 2 cinder bricks in order to help anchor it into position.

Completed spat collector

Strawberry Landing – Little Assawoman Bay



Burton's Island – Indian River Bay

Burton's Island – Rehoboth Bay

Marshy Hope Way, Ocean View – Indian River Bay

Spat Collector Deployment

Eighteen spat collectors were deployed at low tide on June 22, 2015 at the Rehoboth Bay and Indian River Bay sites and nine on June 23, 2015 at the Little Assawoman Bay sites in the intertidal zone adjacent to the shoreline of areas consisting of marsh grass, rip-rap, or pilings. They were exposed to the air during the low tide, and submerged during the high tide.

Retrieving the Spat Collectors

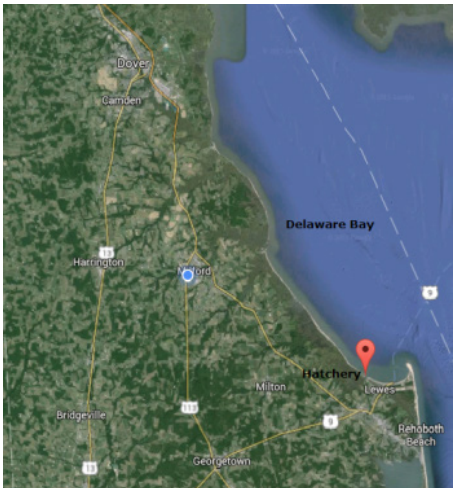
In Delaware, oysters spawn in early July. In order to maximize the settling of spat on the collectors, and minimize the predation of these spat by predators (ie. common mud crabs, Atlantic oyster drill), spat collectors were retrieved from their deployment sites after approximately 33 days (July 22 – Rehoboth Bay, July 23 – Indian River Bay, and July 24 – Little Assawoman Bay).

After retrieval from the water, the spat collectors were labeled with flagging material, and each set of 3 collectors from an individual site were placed in a plastic storage tote (34-7/8" x 16-5/8" x 6-1/8"), dampened with water from the bay, and covered with a plastic tarp. The spat collectors were then transported to the University of Delaware Oyster Hatchery Facility in Lewes, Delaware, near the mouth of the Broadkill River.

Spat collectors were housed in a 12'x3' tank, and supplied with water via a flow-through system.

Care of Spat on Tiles

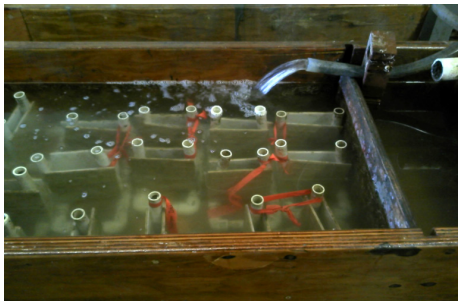
Weekly, accumulated sediment was gently rinsed from the spat collectors with a hose, sea squirts and other encrusting organisms removed, and the tiles and frames checked for evidence of spat. The progress of the spat was also documented.



University of Delaware Oyster Hatchery, Lewes, DE, and a map showing the Broadkill River in relation to Delaware Bay

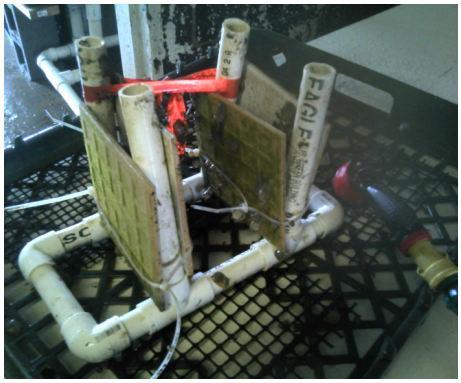
(maps.google.com)

Spat collector retrieved from deployment site



Spat collectors housed in the tanks

Spat collectors in the tanks



Cleaning the spat collectors

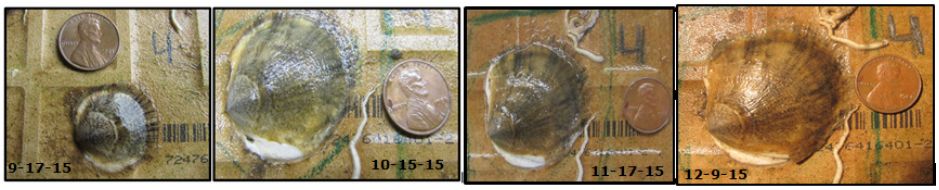
RESULTS

On August 15, 2015, spat were found on tiles from Massey's Landing, Burtons Island, Marshy Hope Way, Holt's Landing, and Mulberry Landing. The spat were photographed, and their presence on the tiles documented.

The presence of new recruits of spat from oyster spawning in the Broadkill River was also recorded.

Spat were photographed each month, and growth was documented.

Oyster spat on collector



Burton's Island Mid – Tile 4 Indian River Bay – growth over 4 month period

Further Research

Spat collectors will be deployed in additional locations in each of the Delaware Inland Bays to continue the evaluation of spat production in the Delaware Inland Bays.

If spat settlement is sufficient, experimental oyster gear will be placed at several locations in the Delaware Inland Bays and oyster settlement and growth monitored.

Genetics studies will be performed on the spat collected from the Inland Bays in order to determine if the oysters set on the collectors are the offspring of oysters in nature or the disease resistant strain of oysters from Rutgers University, Haskin Shellfish Research Laboratory used in the Delaware oyster restoration project.

Oyster growth over 5 month period

Two oysters from spawning in the Inland Bays are indicated with green outlines. All others are from spawning in the Broadkill River.

References

- **Ewart, J. 2013. Shellfish Aquaculture in Delaware's Inland Bays Status, Opportunities, and Constraints.** July 2013. Delaware Sea Grant Program, Lewes, DE 43p.
- **Delaware Sea Grant. NOAA.** 2003. National Oceanic and Atmospheric Association Publication. http://www.seagrantnews.org/news/delaware.html
- **University of North Carolina Oyster Spat Monitoring Program.** http://www.ncoystermonitoring.org/protocol.php

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