The Menhaden Mystery

Hauling up answers to why fewer of this small but important fish are in the Bay

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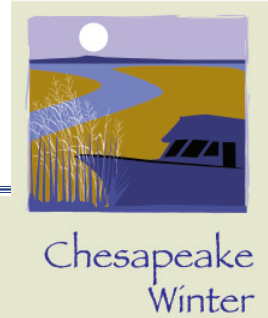


Rocking aboard the 65-foot research vessel Aquarius in the mouth of the Chesapeake, we're hunting for the most important fish in the sea.

Atlantic menhaden are small, oily fishes that nobody eats. But "almost every person in the United States," wrote Rachel Carson, whose centennial we celebrated last month, "has at some time eaten, used or worn something made from menhaden."

Menhaden are big business. In 2005 they gave Reedville, a prosperous-looking Bay town on Virginia's Northern Neck, the United States' third biggest fishing haul and the Bay's biggest fishery. The town's commercial fishermen bring in over half the U.S. East Coast's menhaden catch. The Reedville Fishermen's Museum celebrates the long heritage, displaying Carson's comment on a wall.

Atlantic menhaden also are critical to the Bay's ecology. They are prey for striped bass and other predators. And, like oysters, they are filter feeders, cleaning the Chesapeake as they eat.

Up and down the Atlantic coast, the menhaden spawning stock is adequate. But the 2006 Chesapeake haul, 143 million pounds, was the lowest in decades. No one quite knows why. Or why in 2006 menhaden two years and older waited until July to enter the Bay; they usually enter in early spring. From May to July last year, menhaden were fished mostly outside the Bay.

Juvenile menhaden school in tiny, distinctive ripples.

Controversy grows as valuable predator fish, including rockfish, show signs of stress and starvation.

Biologists also know that juvenile menhaden numbers in the Bay have been down since about 1990.

Which is why we've been watching five scientists on the open aft deck of Aquarius for 12 hours straight. They're collecting tiny menhaden larvae and ocean data to help understand the fish's reproductive success. Menhaden spawn in the ocean, then enter the Bay to grow. Perhaps changes in the Atlantic reduced the Bay's stock. Perhaps changes in the Bay. Perhaps both.

Trawling for Knowledge

We watch the tedious gathering of bits of data, trawl by slow trawl. The 43-year-old boat, its 12-cylinder diesels growling reassuringly on the bumpy sea, takes us north toward Cape Charles, then south toward Cape Henry, back and forth. The Chesapeake Bay Bridge Tunnel is a few miles to our west. Swells roll in unimpeded from the Atlantic Ocean. Except for the occasional freighter, we're alone.

A routine settles in at each of five locations that the boat visits over and over from noon to nearly midnight. Nearing a stop, the two-man crew slows the engines. The exhausted scientists don gear and walk out onto the wet afterdeck.

When the anchor is down, they hook a winch wire to an apparatus that holds sensors and collecting bottles. Timed with the ship's roll, the winch raises the array slightly, then lowers it quickly into the water. The devices obtain depth profiles of salinity, temperature, fluorescence and dissolved oxygen, all basic characteristics of seawater. This information — now being collected monthly — along with the count of larvae and satellite images for recent years, may be the key to trends still unexplained despite three decades of archived data about seawater characteristics.

While the array is on its way to the bottom, an attached pump sends water to the surface through a hose. A young technician uses it to fill three 20-liter flasks with water from different depths ranging from near-bottom to near-surface. She pours the seemingly clear water out of the flasks

through a 35-micron-mesh screen (a sieve whose holes are slightly smaller than a human hair). The screen captures precious zooplankton samples; the discarded water splashes to the deck.

Anchor up, the Tucker trawls — funnel-shaped nets — become the main event. With 280-micron screens (holes the size of beach sand), these trawls, drawn slowly by the boat for four minutes, capture all the tiny creatures in 150 cubic meters of water. Fish bigger than minnows see the net coming and get out of the way.

Putting the trawl over and bringing it back aboard takes four people and is as practiced as a ballet. Two scientists wrestle the trawl itself on the rolling deck. The mate operates the winch. A technician holds an ancient-looking bronze protractor at arm's length to measure the wire angle. The chief scientist records it and the wire length, consults a table and calculates the trawl's depth.

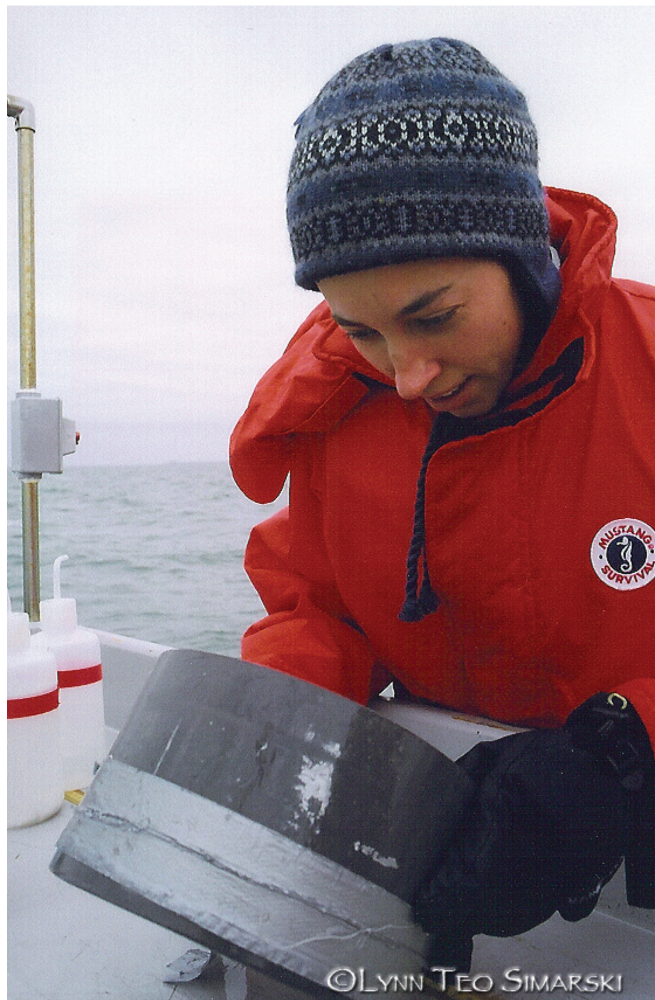
The mate swings the trawl in with winch and boom while technicians grasp its nets and, using a seawater hose, wash the catch down and empty it into a bucket.

At most sampling stations, unwanted jellyfish are the volume leader. One person scoops them out gracefully with a white salad strainer, tossing them overboard. A 35-micron strainer catches what's left. After a wash in ethanol or formalin to arrest deterioration, the haul is put in bottles with computer-generated labels so there's no mistaking what came from where and when.

After 12 hours and 19 stations, with one break to gulp Campbell's pot roast stew, the day's haul is tallied: plenty of phytoplankton that turn instantly from green to tan when hit with ethanol; zooplankton too small to identify without a microscope; one small pipefish; a dozen bay anchovies; and five precious menhaden larvae, none longer than an inch and a half. Over three days of trawling, the March menhaden catch was about 30 larvae. Colder months are better: The February cruise got 900.

Scientific evaluation will go on in Ed Houde's labs at the University of Maryland's Chesapeake Biological Laboratory in Solomons.

The Bay is dark now except for lights on the bridge tunnel and the far shore. The scientists pull off their wet gear one last time, talk about how their haul may answer the burning question of whether the menhaden decline is local to the Bay or more widespread, then sit quiet and worn. The engines rumble steadily during the passage back to a dock in Little Creek, Virginia, and dry beds ashore.



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At the mouth of the Chesapeake Bay, Chesapeake Biological Laboratory researcher Rebecca Wingate seines for baby menhaden on Chesapeake Biological Laboratory cruise.