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Menhaden Researchers Pay Big Attention to a Small Fish

An interdisciplinary group of VIMS researchers is busy studying Atlantic menhaden, small schooling fish that play a big role in Chesapeake Bay ecology. The group's research will help inform the debate that is currently swirling around this fish, its commercial harvest, and the recreational fisheries that target menhaden predators such as striped bass.

Researchers at VIMS and other institutions are working to determine the abundance of menhaden in the Bay, to quantify the role that menhaden play in filtering water and sustaining predators, and to better understand the process by which young menhaden are "recruited" into the adult population.

Dr. Rob Latour, who leads the project to estimate the Bay's menhaden population, says that research at VIMS will "help provide the data needed to manage Chesapeake Bay menhaden stocks in a sustainable manner."

VIMS Dean and Director John Wells notes that the menhaden projects "are a good example of the key role that VIMS plays in fulfilling its state mandate of providing unbiased scientific advice on sometimes contentious resource issues."

To date, reliable data on the potential effects of commercial fishing on the Bay's menhaden population have been lacking. The Atlantic States Marine Fisheries Commission (ASMFC), the regulatory body charged with managing East Coast menhaden stocks, noted in an October 2005 addendum that "Sufficient scientific data are not available to satisfactorily address the potential for localized depletion in the Bay..."

The 2005 ASMFC addendum also instituted a harvest cap on the commercial menhaden fishery in Chesapeake Bay at the average landings from 1999-2004. The cap will extend from 2006 to 2010.

The status of the harvest cap is currently unresolved. Virginia's Attorney General ruled in January 2006 that the ASMFC had exceeded its regulatory authority when adopting the cap. Subsequently, during the 2006 legislative session, the Virginia General Assembly killed or withdrew four bills to implement the cap.

If Virginia takes no other action to implement the cap before the July 1 deadline, the ASMFC Menhaden Management Board will rule on Virginia's possible non-compliance at its August meeting.

Atlantic menhaden *(Brevoortia tyrannus)*, which inhabit near-shore waters along the Atlantic seaboard from Nova Scotia to Florida, support one of the most commercially important fisheries on the Atlantic Coast, providing fish meal, fish oil, and bait for other

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Sea Grant Renews Collaborative Effort to Manage Cownose Rays

A multi-agency effort to restore native oysters to a Chesapeake Bay tributary suffered a setback on May 18th when cownose rays ate more than 90 percent of the 775,000 oysters that researchers had planted in the Piankatank River between early April and mid-May.

This and other similar episodes during the last few years have encouraged a collaborative team of marine scientists, resource managers, watermen, and seafood-industry representatives to renew their efforts to develop effective methods for sustainably managing cownose rays in Chesapeake Bay.

The current effort, spearheaded by Bob Fisher, a Commercial Fisheries Specialist in the Virginia Sea Grant College Program at VIMS, builds on previous attempts to manage rays in Chesapeake Bay and other estuaries along the Atlantic seaboard and Gulf Coast. Those efforts stretch back to the early 1970s.

Fisher is more hopeful this time around, believing that a unique juncture of events—a renewed emphasis on restoration with disease-resistant oysters, more venturesome chefs, and new technologies that provide easier penetration of international seafood markets—will provide the impetus, funding, and political will needed to effectively manage cownose rays.

"Timing is everything," says Fisher.

Well-known Virginia Chef John Maxwell prepared a ray dish that was eagerly consumed by workshop participants, confirming the consistently favorable impressions of ray meat revealed in previous taste tests. He says that rays could be the "next big thing" in culinary circles.

The ray team, which held a two-day workshop in Yorktown in early June to catalyze future efforts, is considering a wide variety of possible management measures to help reduce the rays' predation on oysters and other commercially valuable shellfish.

Workshop participants discussed two main approaches: reducing ray numbers by developing a commercial or recreational fishery for the species, and excluding rays from shellfish beds by fences, cages, or chemical repellents.

Fisher and others stressed throughout the workshop that any measures to fish the rays would have to proceed in a sustainable manner. Rays, like their cousins the sharks, grow slowly and have very low reproductive rates. They are thus particularly susceptible to fishing pressure.

"The best available data suggest that cownose rays mature in five to seven years and only produce one pup per year," says VIMS shark expert Dr. Dean Grubbs. "This makes them inherently susceptible to over-fishing, and presents special challenges in managing a sustainable fishery."

People have been interacting with cownose rays since long before Captain John Smith's infamous encounter near the mouth of the Rappahannock River in 1608 (he was stung by a ray while trying to spear it with his sword, nearly died from the injury, then recovered to eat the ray for dinner). Archeologists have

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found ray teeth in Native American sites dating back to the pre-colonial period.

Today, the ray-human conflict hinges on the rays' appetite for shellfish species that people also like to eat, including soft and hard clams, oysters, and bay scallops.

Jim Wesson of the Virginia Marine Resources Commission and other workshop participants suggested that the apparent increase in ray-human conflicts is largely due to the demise and contraction of shellfish resources.

Sea Grant Commercial Fisheries Specialist Mike Oesterling noted that oyster growers lodged their first major complaints of ray predation in the mid-1970s, shortly after Tropical Storm Agnes drastically reduced the number of soft clams (*Mya arenaria*) in the Bay. Soft clams are the rays' preferred prey.

Workshop participant Dr. Pete Peterson, of the UNC Institute of Marine Science, also attributes the conflict to increasing ray numbers, arguing that ray populations are growing due to recent declines in shark stocks. Coastal sharks such as the dusky, bull, and great hammerhead are the main predators of migrating rays.

Grubbs agrees that shark populations have declined—data from the VIMS Shark program indicate that the dusky shark population declined by about 90% during the 1980s and currently hovers around 20% of pre-exploitation biomass—but he hesitates to link the sharks' decline to any increase in the ray population. In fact, Grubbs contends that there is no hard evidence for a growing number of rays in Chesapeake Bay.

During the workshop, Grubbs presented data—both anecdotal and scientific—suggesting that cownose rays have always occurred in large numbers in Bay waters. Fossil ray teeth are common in sediments around the Bay, Capt. John Smith's crew "took more [rays] in an hour than [they] could eat in a day," and a North Carolina researcher reported the capture of 200,000 cownose rays in the Potomac River in 1964.

For ray recipes, visit www.vims.edu/rayrecipes

More recently, a 1988 aerial survey by VIMS graduate student Robert Blaylock revealed a school of cownose rays near the Bay mouth that covered more than 1,000 acres and held an estimated 5,000,000 animals.

Learning more about the current status of rays in the Bay—their abundance, migratory patterns, and life history—is, along with marketing studies, at the heart of Fisher's current effort.

"Lots of things have changed in the Bay since the last major study of cownose rays in the 1970s," says Fisher. Changes include the demise of the Bay's soft clams, continued declines in oyster populations, reductions in water quality, and the onset of aquaculture for hard clams, and increasingly, oysters.

Fisher has begun collecting rays from throughout the Virginia portion of the Bay with an eye toward answering the many outstanding questions concerning ray ecology. Study of the first specimens, which he gathered near the Bay mouth in May—just as the rays began their summer migration into Bay waters—shows that ray schools contain about equal numbers of males and females, and that all the rays are hungry.

"They're showing classic migratory behavior," says Fisher. "Their stomachs were absolutely empty when they arrived in the Bay." Many animals do not eat while migrating.

A better understanding of basic ray biology will help regulators manage rays more effectively if current efforts to develop a ray fishery prove successful.

Longstanding obstacles to developing that fishery—the difficulty of handling an animal with a venomous tail barb, the animals' patchy distribution, the bloodiness of their meat, and relatively high production costs—remain. However, Fisher and other workshop participants believe that demand from existing and emerging markets may help overcome these barriers.

During the workshop, Shirley Estes of the Virginia Marine Products Board reported on the success of her recent efforts to gain the attention of seafood markets in South Korea, which currently import $18 million in ray meat per year. She also described the emerging Asian market for ray skin, which is increasingly being used to craft high-end products such as wallets and handbags.

A panel of watermen described how cownose rays affect their business. Mike Peirson of Cherrystone Aqua Farms, the largest grower of littleneck clams in Virginia, says that use of mesh nets effectively deters predation by rays. However, he notes that his company devotes about 30% of its labor costs to uncovering clam beds that rays bury with sediment while digging up soft clams that grow in the aisles between the planted beds.

"It's a major source of extra expense," says Peirson.

Fisher closed the workshop on a promising note, describing a series of experiments he plans for later this summer to test chemical repellents for cownose rays. He's collaborating in the experiments with Shark Defense, Inc., a New Jersey company that has successfully developed chemical repellents for blacktip reef sharks and other species.