

Fisheries Portfolio

BLUE CRABS: THE BAY'S LAST GREAT FISHERY

Blue crab is king in the Chesapeake Bay seafood business. In Maryland alone commercial crabbers can harvest over 50 million pounds in a banner year, with a long-term annual average of some 27 million pounds. Though the dockside value may rise and fall over time, the 2003 harvest brought in more than \$34 million. For the Chesapeake Bay and for Maryland in particular there is no other single species that contributes more to the fishing economy.

Especially since the demise of the Bay's oyster fishery, coastal economies have increasingly counted on blue crab stocks. One recent study showed that two-thirds of the income of working watermen came from crabbing. Beyond this, the blue crab (*Callinectes sapidus*) is tied to the region's identity, to tourism, and to coastal businesses such as restaurants, hotels, boat rentals, and seafood outlets.

There are three central issues facing the Chesapeake blue crab industry. The first concerns the size and health of the stock itself, on which the fishery depends. The second involves the efficiency and economic viability of the industry in a global marketplace. The third, less tangible but equally as important, presents the challenge of not only managing the resource but understanding, communicating and working with those who depend on blue crabs for their livelihood.

Engaging in a Heated Debate

A key question, and the focus of a contentious policy debate, centers on the size and health of the blue crab stock in the Chesapeake Bay, and the pressure placed on that stock by both commercial and recreational crabbers. Underlying this debate are uncertainties about basic blue crab biology, questions about the true state of the stock, and differences of opinion among stakeholders about exactly how to manage the fishery.

The blue crab is managed separately by three jurisdictions: Maryland, Virginia, and the Potomac River Fisheries Commission. Each jurisdiction devises licensing strategies and other controls on the fishery, and each acts autonomously. When four independent scientific surveys began to show a decline in the Bay's crab population, scientists and others began to voice considerable concern about the stock, but there was no ready vehicle to devise a Baywide response or launch a coordinated multi-jurisdictional management strategy.

At this point the Chesapeake Bay Commission, comprised of legislators from Maryland and Virginia (as well as Pennsylvania), formed the Bi-State Blue Crab Advisory Committee (BBCAC) to bring together managers, scientists, commercial crabbers, seafood processors and other stakeholders. The challenge was a difficult one, with clashes not only about data and information but also about credibility and trust. The Commission needed both scientific expertise and informed facilitation skills. They called on Maryland Sea Grant (University of Maryland) and the Institute for Environmental Negotiation (University of Virginia) to help.¹

For more than a year Maryland Sea Grant assisted in facilitating meetings, synthesizing information and preparing documents for a broad public. The leadership provided by the Bay Commission and its Executive Director was remarkable. After many meetings between managers, scientists, watermen and others, the bi-state committee developed an Action Plan for establishing a population threshold and a target for the Bay's blue crab fishery. Never before had such a Baywide threshold or target been set, and much to their credit, all three jurisdictions subsequently set regulations to reduce the rate of crab harvesting. In his book, *Chesapeake Bay*

¹ Throughout this process Maryland Sea Grant partnered with the University of Virginia Institute for Environmental Negotiation in a team effort.

Blues, political scientist Howard Ernst singles out the bi-state blue crab effort as a model for interstate cooperation on an important resource issue.

“Sea Grant can respond quickly to important marine science issues, a special role that bolsters the support of science serving policy,” according to Maryland Sea Grant’s *Strategic Plan* for 2000-2005. There are few examples more compelling than the issue of blue crab management in the Chesapeake Bay,

where Sea Grant mobilized the full range of its program, from research to communications to Extension, in order to assist in a major science-to-policy effort.

Supporting Blue Crab Science

The BBCAC process also revealed important gaps in our scientific knowledge about blue crab population dynamics and life history needed to accurately characterize the health of the blue crab fishery. Maryland Sea Grant recognized the pressing need for a sound scientific foundation to inform management

and the BBCAC process served as a catalyst for future research activities. Over the last five years, Maryland Sea Grant has invested more than \$450,000 of core funding in blue crab research to answer a suite of questions sparked by the policy process — questions such as how many crabs survive through the winter to reach harvestable size the next summer and how to determine an individual crab’s age.

To strengthen the ability of fisheries managers to accurately predict the summer blue crab harvest, researcher Tom Miller, a leading fisheries modeler and participant in the BBCAC, provided new information to inform models on blue crab growth that highlight the importance of differences in Bay geography to the health and success of blue crab populations (R/F-89). To improve tools for estimating blue crab age in the wild, biologist Dave Secor and his Maryland Sea Grant Research Fellow, Brandon Puckett, developed a novel chemical technique that uses chemicals in a crab’s eye (lipofuscin) to provide age estimates and tested the technique by making comparisons with crabs of known age provided from the crab hatchery project at the Center for Marine Biotechnology and grown in research ponds at the Horn Point Laboratory (RF-94).

Since the summer crab harvest depends on how many blue crabs survive the winter in the Bay, it is fundamental to understand the phenomenon known as “winter mortality.” With funding from Maryland Sea Grant, a team of scientists from the Smithsonian Environmental Research Center, UMCES Horn Point Laboratory and UMCES Chesapeake Biological Laboratory teamed up to study how different winter conditions might influence the health of

Playing a Strategic Role in Blue Crab Policy

Maryland Sea Grant’s role in the BBCAC effort was central. Among the many tasks undertaken, Sea Grant:

- Worked with the Commission to devise a strategy for integrating science into the blue crab policy debate.
- Helped to strategize and construct agendas for BBCAC meetings
- Facilitated discussions among BBCAC members and other stakeholders
- Helped to synthesize the findings of two expert charrettes, one aimed at setting thresholds and targets, and one aimed at an economic analysis of the crab fishery
- Wrote and produced a workshop report and a briefing paper for a broad audience on BBCAC and the blue crab fishery
- Helped to write and edit the Action Plan for blue crab management
- Testified alongside the Commission before the Maryland General Assembly
- Analyzed and published a report on the effect of new regulations on the Maryland crab picking industry
- Worked with the Commission to continue the work of the Bi-State Technical Advisory Committee (BBTAC), the group of scientists that advises the Commission on technical matters

crabs (R/F-93). This ongoing research is providing critical data to improve models for predicting the size of the summer population of crabs and will help fisheries managers in setting scientifically sound harvest goals.

Two new projects in 2005 continue our commitment to scientifically rigorous studies to inform ecosystem-based fisheries management. The first is a multi-institutional, regional project supported by Maryland, Virginia and Delaware Sea Grant to address the question of how early-stage crabs (called megalopae) behave in the water column and how currents affect their movement, especially on the continental shelf, as they drift and move back into the Chesapeake or Delaware bays (R/EH-1). The second joins Maryland Extension program leader Doug Lipton with UMCES Chesapeake Biological Laboratory scientist Tom Miller in a study to develop bioeconomic models of the blue crab fishery. This project combines Lipton's expertise as a resource economist and Miller's as a biologist to estimate how changes in fishing effort can effect both the biological success of blue crabs in the Bay and the short and long-term economic integrity of commercial crabbing (R/CR-2).

Connecting with the Industry

In addition to working with the blue crab industry through the BBCAC process, Maryland Sea Grant also focused on two other central issues: the efficiency and economic viability of the industry, and the social fabric of the communities that depend on the blue crab for a living.

To aid the industry's effectiveness, Maryland Sea Grant Extension specialist Tom Rippen worked to address specific challenges to crab processors, chief among them contamination resulting from bacteria such as *Listeria*. This work is so

important to blue crab processors that when the industry recently received federal assistance to offset poor harvests and competitive imports, they elected to pass much of this funding to Rippen so he could expand his efforts.²

To help analyze and address economic issues facing the industry, Sea Grant Extension economist Doug Lipton conducted several important studies, including an analysis of the impacts of new size restrictions on Maryland crab picking houses. The result of this analysis was the report, *The Economic Impact on Maryland's Crabmeat Processing Industry of Proposed Regulations: A Possession Restriction on Sponge Crabs and Crabs Smaller than 5-1/4 Inches*. Lipton also carried out a study on the importance of migrant labor to the crab fishery, and the effects of current immigration policy on the viability of the industry.³ These studies helped to clarify — especially for policy makers — the real state of Maryland's crab industry and the critical impact of policies on that industry.

Reaching Out on Blue Crabs

Maryland Sea Grant has played a key part in working with academic, managerial and legislative partners to address issues facing the Chesapeake blue crab industry. Sea Grant directly assisted in the production of the following products:

- Fact sheet: *Managing and Protecting the Blue Crab*
- Workshop report: *Managing the Chesapeake Bay Blue Crab — A Meeting of Stakeholders*
- Bi-State Action Plan: *Taking Action for the Blue Crab*
- Outreach article: *The Bottomline on Blue Crabs: Setting Thresholds for the Last Great Fishery*
- Status Reports: *Chesapeake Crab Population and Its Fisheries (2001-2004)*
- Analysis: *The Economic Impact of Maryland's Crabmeat Processing Industry*
- Web node: *Blue Crabs in the Chesapeake* (www.mdsg.umd.edu/crabs)

² Tom Rippen's work and seafood processing are discussed further in the Coastal Technologies portfolio.

³ As a result of increased awareness of the importance of migrant labor to the crab processing industry, the federal government altered the scope and timing of quota requirements.

Finally, Maryland Sea Grant has helped to explore the complex but fundamental social dimensions of commercial crabbers and the Bayside communities they call home. With support from Sea Grant and others, anthropologist Michael Paolisso has studied watermen's values and beliefs, and has presented his findings to academic and nonacademic audiences alike, from resource managers to the watermen themselves. Paolisso's method includes "collaborative learning," with watermen, scientists and resource managers working side by side to address difficult issues surrounding the blue crab fishery and even visiting each other in their respective laboratories or on their workboats. By helping to explain basic misunderstandings among varying groups, Paolisso has helped to bridge key communication gaps that have impeded effective management of the fishery.

The Future of Blue Crabs

The long-term fate of the Chesapeake Bay's blue crab stock remains uncertain, but already the bi-state effort in which Sea Grant played a part has been recognized as a model of interstate cooperation and natural resource management. Because the three jurisdictions (Maryland, Virginia and the Potomac River Fisheries Commission) all took concrete actions to reduce fishing pressure on the blue crab, the exercise was far from abstract or academic. This bi-state management effort has demonstrated how science can best guide difficult choices for the Chesapeake's most valuable fishery.

IMPACTS: EFFECTING CHANGE FOR MANAGEMENT

Sea Grant has participated in crab research and management efforts that have led to:

- The first-ever Baywide threshold defining the sustainable limit for blue crab harvests.
- The first-ever Baywide fisheries target aimed at a specific level of harvest pressure.
- The adoption by the Bay jurisdictions of commercial and recreational crab regulations aimed at reducing harvesting pressure by 15 percent. These regulations include restrictions on size, length of workday, and on catch limits for recreational crabbers.
- The elucidation of crab culture methods undertaken in Japan, and their possible implications for the Chesapeake Bay.