

# CHESAPEAKE QUARTERLY

MARYLAND SEA GRANT COLLEGE • VOLUME 2, NUMBER 3



*Following Those Who  
Follow the Water*

# Bringing Anthropology to the Bay

Skip Brown



Chemistry. Biology. Physics and fluid dynamics. We need all these scientific disciplines and more to understand the complexities of the Chesapeake Bay and its estuarine ecosystem. For those who want to understand the Bay not only as a system but as a place, we will need other disciplines as well — including the branch of human studies we call anthropology.

In this issue of *Chesapeake Quarterly* we take a look at what anthropologists can tell us about the watermen communities that for generations have depended on the Bay for a livelihood.

Tense disputes among watermen and those charged with managing the region's fish and shellfish resources have pointed to often stark contrasts in the world views each party brings to the negotiating table. While some may dismiss watermen as "greedy" or scientists as "out of touch," the truth is that each group brings with it a set of values and precepts — tools for measuring what is right and what is good.

In "A Life Among Watermen," we follow the work of Michael Paolisso and his team at the University of Maryland as they set out to experience the Bay — and the world — as watermen see it, part of their effort to compare watermen's world views with those of scientists, resource managers and other technical experts.

Paolisso's research among Bay watermen, his coming to know many of them and his deepening understanding of their culture, has led to a unique human experiment that could have important implications for the way fisheries management in the Chesapeake Bay is handled in the years to come. Beginning with a series of extensive interviews and surveys of Eastern Shore farmers and watermen, his research has uncovered very basic differences in outlook among these groups. After initial work supported by the National Science Foundation, Paolisso received funding from Maryland Sea Grant to conduct a series of structured "dialogues" — conversations that have brought watermen together with scientists, environmentalists and resource managers to explore their differences in outlook and, he says, their similarities.

Will these dialogues and other exploratory efforts help to clarify disagreements among those who use the Bay and those who study and manage it? We explore the possibilities uncovered by anthropologists as they follow those who follow the water.

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### Chesapeake Quarterly

Volume 2, Number 3 October 2003

*Chesapeake Quarterly* is published four times a year by the Maryland Sea Grant College for and about the marine research, education and outreach community around the state.

This newsletter is produced and funded by the Maryland Sea Grant College Program, which receives support from the National Oceanic and Atmospheric Administration and the state of Maryland. Managing Editor and Art Director, Sandy Rodgers; Contributing Editors, Jack Greer and Merrill Leffler. Send items for the newsletter to:

*Chesapeake Quarterly*  
Maryland Sea Grant College  
4321 Hartwick Road, Suite 300  
University System of Maryland  
College Park, Maryland 20740  
301.403.4220, fax 301.403.4255  
e-mail: mdsg@mdsg.umd.edu

For more information about Maryland Sea Grant, visit our web site: [www.mdsg.umd.edu](http://www.mdsg.umd.edu)



Cover: *Getting ready for the start of crabbing season, watermen Roy Ford and son Ryan stand in the doorway of the shanty where they shed soft crabs.* Opposite page: *David Horseman, near the harbor in Chance, Maryland, takes a break from his work preparing his crabbing boat the Becky Rae for the upcoming season.* Photos by Skip Brown.





# A LIFE AMONG WATERMEN

BY JACK GREER

Despite the cold on this early spring morning, David Horseman is down at the marina in Chance, Maryland, working on his boat, the *Becky Rae*. Named for his first two daughters, Rebecca and Rachel, she is a low-slung workboat, with blue bottom paint and a red waterline, some 43 feet long and 16 years old. According to Horseman, she has seen more than one diesel engine come and go, and he has done most of the diesel work himself. Not to mention the carpentry.

This year he's replacing some of the boat's "ceiling" — "What you'd call the floor," he says, smiling.

Horseman, who has lived his whole life in the small community of Chance on Maryland's lower Eastern Shore, will fish for hard crabs coming out of their winter sleep — then he'll switch to peelers, blue crabs ready to molt. Most watermen in this area pot for hard crabs or peelers, and only a couple run long bait lines, called trotlines. By mid-May they will be into the spring

*What watermen from a remote Chesapeake community have to say to an anthropologist from the other side of the Bay could change the way we study and manage blue crabs.*

peeler run. Some watermen will have set aside male crabs (jimmies) to place in peeler pots. Female crabs (sooks), ready to shed and to mate, will climb into the pots, caught as they try to reach the male crabs.

The seasonal run of peelers forms part of a rhythm tied to the water, to the weather, to cycles that watermen have watched and followed for decades, for generations. But there are other people watching blue crabs as well: scientists and resource managers tracking trends in the blue crab fishery and in the Bay's abundant but ultimately finite crab population. They have found that the taking of soft crabs, for example, has grown Baywide in the past decade or so. During this same period, their scientific surveys show that the abundance of mature females in the Bay has dropped dramatically.

As the twentieth century drew to a close and the twenty-first century began, scientists warned that their data documented an ongoing decline in numbers of crabs in the Bay. For watermen, like Horseman and Roy Ford, these warnings meant the threat



*Son of a waterman, Ryan Ford (top) culls crabs as his father Roy pulls in the next pot. Soft crabs bring good money on Maryland's lower Eastern Shore, where watermen often land three-quarters of the state's soft crab harvest. A crab boat heads into harbor at Wenona. Roy Ford (bottom) was one of the first watermen to take anthropologist Michael Paolisso out crabbing on the Chesapeake. Photos by Skip Brown.*

of more rules and tighter restrictions on how many crabs they could catch. It also meant a storm of controversy that would divide watermen from natural resource managers and from scientists who, through their studies, provided much of the information used to guide decision makers.

Preparing to cut fresh plywood for *Becky Rae's* new ceiling, Horseman looks up at the bow of his boat as if in anticipation of the new crab season just starting. He has no way of knowing how the cold and wet will hang on this spring, right through much of summer. He has no way of knowing that come September a different kind of storm named Isabel will find its way from the western coast of Africa to the Eastern Shore of the Chesapeake Bay. This morning the sun is out, and soon, as happens every year, there will be crabs to catch.

### The Conflict over Crabbing

It was the gathering storm over blue crabs that brought Michael Paolisso, a researcher who had never studied crabs, to the lower Eastern Shore to meet watermen like Horseman and Ford. New to the crab wars, Paolisso is an anthropologist, not a biologist, and he came here to study not the crabs, but the crabbers.

Paolisso has made the three-hour, 150-mile trip from his home in Washington, D.C. more times than he can count. The long drive delivers him to what seems another world — from an often frenetic pace amidst thick traffic to a slower-paced life in the communities of Deal Island, Chance and Wenona.

Surrounded by water, these Bayside villages seem set apart, isolated from the rest of Somerset County by broad tidal marshes to the east, and from the rest of the world by the wide open stretches of Tangier Sound and the Chesapeake Bay to the west. Paolisso, an Associate Professor of Anthropology at the University of Maryland College Park, has been coming here to speak with watermen and their families, to learn how they think, to better understand just who they are.

Like other researchers, Paolisso is

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*Paolisso came to the lower Eastern Shore to study not the crabs, but the crabbers.*

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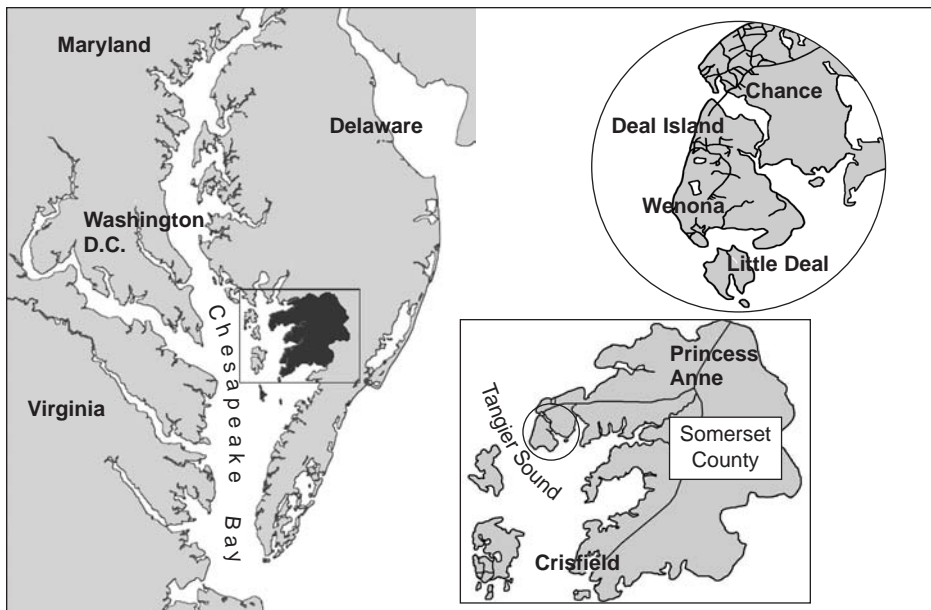
engaged in an experiment. Can the tools of modern anthropology, he asks, be used to examine the growing conflict between watermen who catch crabs and the scientists and technical experts who track the ups and downs of the Bay's crab stock? Can those tools help to address, in some way, a troubling blue crab controversy that has led to law suits, economic uncertainty and political fall-out?

Paolisso refers to himself and his colleagues as "applied anthropologists." In their own way, they follow a path blazed by 20th century anthropologists like Franz Boas, Margaret Mead and Claude Levi-Strauss — researchers who lived for years among remote cultures, studying and learning local languages, rituals and myths, living day to day alongside their subjects in order to explain the distinctiveness of often closed societies. Those early anthropologists provided a mainstream lens through which to see what makes a culture unique, to better understand those who differ from us and yet who may have something in common.

The anthropological studies undertaken by Paolisso and his colleagues are "applied" not only because they focus on the practical concerns of their subjects, but also because they examine the potential for change. Among the crabbers of Deal Island, he found a blue crab debate that was at its roots not only a scientific but a cultural conflict.

When Paolisso began interviewing watermen in earnest, he walked into a world where things were not going very well — at least not where blue crabs were concerned. Harvests were declining, independent surveys were showing a shrinking crab stock, and some watermen were working harder to earn less. Whether or not the Bay blue crab was in trouble was, however, the subject of con-





siderable disagreement. Some watermen, including many on Maryland's lower Eastern Shore where crabbing had remained strong, questioned whether there really was a crisis which would serve as justification for more regulation.

For all these reasons, frustration among many watermen was rising like a tidal surge, and a good deal of anger was aimed at "the State." When watermen speak of the State they are most often referring to the Department of Natural Resources (DNR), the agency charged with managing Maryland's recreational and commercial fisheries.

"There were some pretty harsh words," says Paolisso, who listened carefully to watermen both in private interviews and at public hearings designed to gather stakeholder input.

At many of these public forums — especially those held near commercial fishing communities — Paolisso witnessed deep divisions between watermen and managers and a broad sense of mistrust. In some cases watermen accused the State and the scientists who advised them of "lying," presumably to push through their regulatory program.

"What I wanted to do," says Paolisso, "was to understand the nature of these disagreements, to understand better what was dividing them." In his view, each side was, for the most part, acting in good faith. The scientists were presenting the

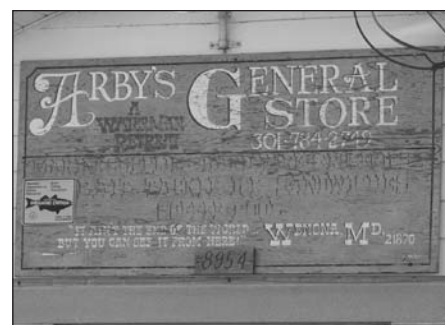
best analysis of the blue crab data they had collected. The watermen, on the other hand, were countering with opinions shaped by observing blue crabs up close during long days and years of working the water.

Yet the conclusions reached by each group were not only different, but seemed to focus on different kinds of information, seemed to place emphasis on different parts of the problem. Paolisso wanted to understand those differences.

This, then, is largely why Paolisso has come to the lower Eastern Shore — to discover not only the rough wisdom of Chesapeake watermen, but what he calls their "cultural models."

Cultural models, explains Paolisso, are perceptual frames we carry with us wherever we go. No matter what picture the world presents, he says, that picture will be filtered through a frame — a system of deeply held beliefs and values that shapes the way information comes to us.

Poets and philosophers have long understood this dynamic. We "half create" and half perceive, wrote the English poet William Wordsworth two hundred years ago. In fact, much of modern philosophy has dealt with precisely this problem — the struggle to determine and articulate the degree to which what we perceive is shaped by what we expect to see, by beliefs and assumptions we bring with us. Even in science, the most objective of



*Awash in wire pots, Wenona (top) lies near the heart of Tangier Sound's rich crabbing grounds. For nearly twenty years, Arby Holland has run the local general store in Wenona, at the island's southern tip. Taking a break in Arby's cozy back room (bottom), Arby Holland joins watermen (from right to left) Paul Holland, Ted Webster (standing) and Albert Hoffman for a game of "58."*  
Photos by Skip Brown.

disciplines, philosophers like Thomas Kuhn have argued that day by day most scientists work within the context of prevailing ideas, or “paradigms” — the lenses through which hypotheses are made and experiments structured. At intervals, Kuhn argues, these paradigms shift, as when the Italian astronomer Galileo (1564-1642) presented convincing evidence for the Copernican view that the earth revolved around the sun (and not the other way around). Or when Albert Einstein argued that space could curve and light could bend. For those clinging to the old paradigms, such “redefinitions” can appear cataclysmic.

For applied anthropologists like Paolisso the question is not so much a philosophical as a practical one. For example, precisely how do the cultural models of watermen differ from those of farmers, or scientists, or resource managers? What fundamental beliefs, based on personal knowledge, religious faith and experience, underlie a waterman’s model of how nature behaves, or of how people should behave? What fundamental beliefs, informed by academic training, affect the way a scientist approaches the natural world and the people who harvest its resources? In what ways are these beliefs connected to particular groups living in particular places — whether they are scientists, who come from academic and perhaps even urban backgrounds, or watermen, who are most often tied to the coastal communities and local rivers where they live and work? Finally, given these differences, can watermen and scientists ever understand each other?

## A Place Far Removed

David Horseman will tell you that he does not live in Deal Island, though the map may suggest that he does. “I live in Chance,” Horseman says, smiling with patience for those unschooled in local geography. Chance lies at the end of a long road heading west and south toward the Bay from Princess Anne, Maryland. At Chance a slender concrete bridge connects the mainland to Deal Island and then, as the island reaches its end, another



Skip Brown

*Looking for a better season, workboats rigged for oystering wait in Wenona harbor. With the decline of the Bay’s oyster stocks, watermen have banked their hopes on the blue crab, the Chesapeake’s last great fishery.*

small bridge graces the remote harbor of Wenona, a kind of land’s end for this part of the Eastern Shore. To further confuse matters, Chance was once called Rock Creek, and the local church is called the Rock Creek United Methodist Church.

For Horseman, and for most who grew up here, the bridges that connect them also define some very distinct divisions. When he was young Horseman’s mother warned him, “Don’t go across the bridge.” But if Chance or Wenona or the community of Deal Island cling to their differences, they also see themselves as closely linked through work, marriage and local social life, particularly in contrast to larger communities — including the growing suburban enclaves that increasingly surround the Chesapeake. Like many traditional communities, the watermen and their neighbors on Tangier Sound are facing a tough challenge: making a living from an increasingly populated Chesapeake Bay.

A faded sign above Arby’s, the local general store in Wenona (no relation to the fast food chain) says, “It’s not the end of the world, but you can see it from here.” The remoteness of the Deal Island area has provided Paolisso with a valuable field setting where watermen communities have, over time, been less influenced

by outside attitudes. The communities are, in a sense, less “assimilated,” and if there is any part of the Bay likely to escape the uncertain change brought by development, it may be here.

Not only do the waters of Tangier Sound and the Chesapeake surround Deal Island, but in many places even the landscape lacks substance and definition. With its long low points of land, the Deal Island area shares less with the region’s farm fields, highways and chicken houses and more with the tidal marshlands and countless guts and creeks that reach far up Fishing Bay and nearby rivers — the Honga, Nanticoke and Wicomico. Like its sister islands, Deal answers to the tide and, as it has for centuries, to the rising sea.

In this marshy outpost, Paolisso has discovered a distinct and for him very different culture, the culture of Chesapeake watermen. “They draw a very clear line when it comes to who is a waterman and who isn’t,” says Paolisso, though for an outsider it may be hard to say exactly where that line falls. A part-time crabber may or may not be a waterman, he says, depending on background, experience, attitude — a host of subtle attributes.

Though not everyone works the



water here, water dominates the island's identity, as witnessed by the sign welcoming travelers to the "Home of the Skipjacks" — the rake-masted oyster sloops native to this region. Deal Island serves as one of the last remaining ports for the Bay's aging fleet of skipjacks, honored as Maryland's official state boat. Alongside the low-slung workboats so characteristic of Bay watermen, skipjacks like the *City of Crisfield*, the *Somerset*, the *Fanny Daugherty*, the *Caleb Jones* and the *Ida May* often adorn the harbors of Deal Island and Wenona. Come oyster season, these old sailboats leave home, driven north to search out the few remaining oysters in the upper Bay.

With the demise of the oyster fishery, crabbing is now king in this part of the Chesapeake. Soft shells are by far the most lucrative catch, bringing watermen a good dollar or more per crab. According to the Maryland Department of Natural Resources, in 2002 soft crabs made up only five percent of Maryland's blue crab harvest, but some twenty-two percent of the value. Watermen like Horseman, Roy Ford and others have invested in shanties that house long trays for shedding large numbers of peeler crabs. As Ford points out, this is a full-time family business during the season, with wives and children playing a key role by monitoring trays (still called "floats") and picking out crabs after they shed and before the other crabs can eat them or bad water can kill them.

With each of Deal Island's three communities claiming about 300 people, this is a tight-knit world. Time seems to stand still here, though clear evidence of its passing has marked some of the island's structures — like one of the island's few brick buildings, the Deal Island bank, long abandoned, with vines climbing the walls, its empty windows counting seasons come and gone.

According to Paolisso, Deal Island presents a welcome contrast to city living — there is no constable, he says, or other symbol of authority, only a Lions Club and a volunteer fire department. And any visitor will notice the number of church-

## Anthropology Close to Home

Once anthropology brought us glimpses into cultures far away and very unlike our own. Now anthropologists also study groups and behaviors closer to home and more familiar — anthropology today is often studying not "them" but "us."

Anthropologists carry out their investigations in the field of human endeavor, in this case working with watermen on their boats, speaking with them, conducting intensive interviews. Like researchers in other disciplines, Michael Paolisso and his colleagues have developed a tool kit of analytical methods and techniques to evaluate the data they collect. For the most part, those data are derived from recorded language and the ideas that language represents. For example, Paolisso and his team use a computer program (called Atlas.ti) that allows the researcher to search and code transcribed interviews for key terms and phrases and other important language patterns — patterns that may reveal base assumptions or underlying beliefs.

While field studies undertaken by Paolisso and his academic colleagues may result in scholarly articles in such journals as *Human Organization* and *American Anthropologist*, as applied anthropologists their aim is also to form a deep connection with the communities they study.

"There is a debate among anthropologists," says Erve Chambers, past president of the Society for Applied Anthropology and chair of the Anthropology Department at the University of Maryland. "In fact you could say it divides the discipline." That divide separates those who hold that anthropologists should record their observations at a distance from those who want to become more engaged. The first group argues that anthropologists should, like their colleagues in the physical and biological sciences, be careful not to affect the outcomes of their objective experiments. The second group holds that human communities are, finally, human, and involvement is not only inevitable but desirable. Paolisso and Chambers describe themselves as belonging squarely in this second camp — among those who work closely with their subjects and want their work to be relevant to pertinent issues, issues such as blue crab management in the Chesapeake Bay.

As has often been said, fisheries management is less about managing fish than it is about managing people. The challenge facing resource managers in the Chesapeake Bay remains how to use the knowledge of both scientists and watermen to assure a sustainable blue crab spawning stock. Work by anthropologists is helping to suggest ways in which these groups — managers, scientists and watermen — might work more closely together to break through historical barriers and find new ways to achieve their common goal of a thriving blue crab population in the Chesapeake.

Paolisso's work follows on other anthropological studies of fishing communities, such as James M. Acheson's *The Lobster Gangs of Maine* (1988) and Bonnie McKay's study of the oyster fishery in *Oyster Wars and the Public Trust* (1998). As Acheson noted in his study of lobstermen, his education as a social anthropologist helped him "to look at my own state as any anthropologist looks at a society to be studied." Acheson spent years studying the lobster fishery, and found communities of lobstermen very hierarchical, with a kingpin or "king" often "running things" in any given harbor. Paolisso's work seems to find less hierarchy and more individualism, the kind of individualism suggested in lyrical and insightful descriptions of watermen by such writers as William Warner in *Beautiful Swimmers* (1976) and Tom Horton in *An Island Out of Time* (1996).

What separates Paolisso's work from other writings about Chesapeake crabbers is the analytical framework he brings to the subject and the cultural models he is trying to construct to describe how, for watermen, the world works.



Skip Brown

es, all quite separate, not only the one frequented by those of African descent, but several others as well, mostly Methodist, but all distinct. According to Paolisso, three of the churches use the same minis-

ter, who will preach a sermon at one church, and then move on to the next. "They are very independent," he says.

While the people of Chance, Wenona and Deal Island are friendly, the bound-

# Nature and Science: The Watermen-Scientists Dialogues

In a meeting room at the Wye Research and Education Center, a University of Maryland facility near Queenstown on the Eastern Shore, watermen gave up several days of work to attend three meetings last year to meet with Paolisso and his team. Scientists gave up those same days, coming from the University of Maryland Center for Environmental Science (UMCES), the Virginia Institute of Marine Science (VIMS), the Smithsonian Environmental Research Center (SERC) and other marine laboratories. Technical experts from the Maryland DNR also came, hoping for a more constructive conversation than often occurs at public hearings.

At the first meeting considerable uncertainty filled the air. What exactly was this all about? Would it prove a waste of time?

"We wanted to see if we could get beyond surface disagreements to the underlying values that they all share," said Paolisso. He began with an exercise that "mapped" on a large piece of paper the various crab-related issues that watermen and scientists found especially important — then the group aggregated these key issues around basic concerns or "interests."

"By getting people to look beyond issues — where they may often disagree — to their underlying interests, we can get them to understand not only what they believe, but why they hold those beliefs."

While a number of watermen complained that their knowledge is often not appreciated by others, scientists too expressed some frustration at being misunderstood. Anson "Tuck" Hines, a long-time crab researcher at SERC, commented that most people don't understand how scientists work. "They usually work to disprove something," he said, not necessarily to build a case for a particular way of doing things. That, he argued, is just how science works.

When it comes to a better working relationship among watermen, scientists and management agencies, Hines said, "Non-cooperation hasn't worked. So that has been 'disproved.' So how do we test whether cooperation works?"

Hines and others also described the difficulty of getting grants and running research laboratories and the constant worry about adequate funding. Watermen seemed to understand the themes of hard work and financial worries. They also listened with a sym-

*"We wanted see if we could get beyond surface disagreements to the underlying values that they all share."*

thetic ear as staff from the Maryland DNR described the difficulties they face trying to work on the complex and politically charged blue crab issue.

Rom Lipcius, a well-known crab expert from VIMS, added that around the country and even around the world scientists are being asked to be more proactive, to identify warning signs more loudly when they spot them.

Hines agreed, and pointed to the collapse of ground fisheries on Georges Bank as a prime example. In that case, he said, "scientists didn't advocate

clearly enough."

"If blue crab stocks were to collapse in the Chesapeake Bay," said Lipcius, looking at his fellow scientists, "we would feel this as a personal failure."

According to Smith Island waterman Eddie Evans, "It all comes down to trust. Can I trust Tuck? Will he trust me? Will managers trust what scientists tell them?" The key, he said, "is being honest."

Though he is still analyzing the transcripts, Paolisso saw an apparent progression during the three meetings. In the first, he says, participants — especially watermen — stated their grievances and argued their case. At the second gathering, participants began to listen to each other, and the scientists seemed more willing to open up. By the third meeting the conversations came fast and fluid, and those gathered around the table seemed to address each other more as individuals, in an easy, informal manner.

As part of his effort to build understanding, Paolisso has encouraged workplace exchanges between watermen and scientists. Some of the participants have taken up this offer and now feel they have a better sense of what kind of work the others do. "I didn't know who they were," says Evans, speaking of scientists like Hines and Yonathan Zohar, who directs the University of Maryland Center of Marine Biotechnology. Evans has now seen how fast crabs can grow in the laboratory, and this squares well with his own observations about crabs.

Seeing the kind of work they each do and understanding where their information is coming from has helped to build a bridge between participants with very different backgrounds. Says Evans, "That's how you gain respect."

aries marking their water-borne geography are tightly drawn, and winning their trust can prove difficult for an outsider. No doubt Paolisso's genuine interest and easy manner played a role in his ability to befriend David Horsemen, Roy Ford and the others here. His enthusiasm is boyish and forthright. It is clear that he really wants to learn — about culling crabs, about how shedding floats work, about what watermen think and believe.

To draw a coherent picture of the waterman's world view, his "conceptual

model," Paolisso had to collect and categorize his data in a rigorous and systematic way. He began with informal conversations, then he and his team moved into more highly structured interviews designed to target, for example, certain underlying assumptions about government, about pollution, about nature. The team also circulated surveys that raised particular questions about beliefs and values — some of those surveys were distributed by school children as a way of encouraging more participation. The anthropologists closely analyzed tran-

scripts of surveys and interviews, at times using specially designed computer software programs employed by researchers to track repeated words and phrases, as well as recurring themes.

For Paolisso the world view of Chesapeake watermen, as revealed in their choice of words, represented a new, uncharted territory.

## Mapping the Gulf

Paolisso's work could not have come at a more difficult time for the blue crab fishery. Not only were harvests faltering,



but the Chesapeake Bay Commission's Bi-State Blue Crab Advisory Committee (BBCAC) was then moving into high gear, trying to determine the true status of the crab stock and to recommend new targets for how many crabs watermen could catch.

When Paolisso first encountered the blue crab committee, the scientists working with its Technical Work Group had already set their sights firmly on establishing a maximum fishing threshold for crabs Baywide, something never before achieved in the Chesapeake. The Work Group, after much intense discussion and debate, reached a consensus on those limits, leading to a commitment on behalf of Maryland, Virginia and the Potomac River Fisheries Commission to reduce fishing pressure on the crab stock by some 15 percent.

Most working crabbers, however, disagreed with that consensus. Those who witnessed the public hearings or spoke privately with watermen and their families realized that decision makers faced a very tough challenge — in part because they lacked credibility with the crabbers they were charged with regulating. Watermen seemed to dismiss out of hand the data researchers had carefully collected and analyzed, in some cases accusing the scientists of ineptitude or outright lying. What, Paolisso wondered, was driving this mistrust, this apparent inability to communicate? How could a more technical world view be reconciled with one based more on tradition and personal experience?

When Ann Swanson, chair of the blue crab Technical Work Group, heard there was an anthropologist spending time living among the watermen, she invited Paolisso to join her technical team — the first time an anthropologist had been brought into this inner circle of marine biologists, ecologists, population dynamists and other “hard science” researchers.

“After hearing from their constituents, the members [of the Chesapeake Bay Commission] made it clear that stakeholders needed a voice in these deliberations,” Swanson says. It was clear,

she says, that there was a serious level of miscommunication.

Paolisso's joining the Technical Work Group met with some skepticism. Compared with the quantitative models used in stock assessment, the anthropologist's science seemed less clear. After his first formal presentation to the group, however, their attitudes appeared to change. Discussion was lively. The cultural model that Paolisso presented based on his research — illustrating watermen's conceptualization of how nature, science and regulations combine to manage the blue crab fishery — drew intense interest from the other researchers, who were accustomed to constructing models of their own. In some way, it seemed, he had been accepted into their ranks. Just as he had built a relationship with watermen on the Eastern Shore, Paolisso was building another bridge — to the scientists, many of whom had spent years, perhaps even their entire careers, studying the blue crab, *Callinectes sapidus*.

His next challenge was to put the watermen and scientists in the same room, to have them explore not only their differences but their common interests. Following on two meetings between watermen and scientists on Tangier and Smith islands, sponsored by the Chesapeake Bay Commission and BBCAC, Paolisso set up a series of three structured dialogues, funded by Maryland Sea Grant. Here watermen and scientists could, with the help of Paolisso's facilitation team, share observations and opinions, working to get beyond the issues that so often divide them. Using both free-wheeling conversation and more structured exercises aimed at uncovering beliefs and assumptions, Paolisso worked to move the group from uneasy mistrust toward shared understanding. (See *Nature and Science: The Watermen-Scientists Dialogues*.)

“We were not expecting for one side to convince the other that they were right,” Paolisso said. “We were just hoping to build a better level of understanding, of communication among groups that had not been communicating very well.”

## Toward Cultural Models

Early in the new crab season, about a dozen watermen, tired after a long day's work in the sun, drive over at dusk to the Rock Creek Church in Chance to hear Michael Paolisso speak about his findings. In the activity hall next to the Church, they find women preparing food and Paolisso and his assistant hooking up wires and cables on a digital projector. Seeing the fried chicken, potato salad and desserts spread out on long buffet tables, the watermen seem immediately hungry.

The anthropologists clearly feel comfortable in this community, but here in this church hall they face something of a moment of truth. For many months they have conducted interviews, surveys and other forms of data gathering. They have rented a house on the island, and spent many days and nights visiting and talking and learning. They have worked to bring watermen together with scientists and natural resource managers in three structured dialogue sessions. Tonight, they will represent some of their results to the very group they have been studying. How will this group react? Will they say, in effect, “Don't go across that bridge?”

It's an informal setting for a science presentation. In the back of the hall someone plays ping pong with one side of the table propped up on a floor that slants like a sloping deck. In the front of the room, watermen and anthropologists line up at the buffet and fill their plates. The spirit of a picnic fills the air, until everyone finds a seat, the ping pong stops and the anthropologists begin their talk.

They start by sharing some of what they've learned about watermen. They report that of the watermen surveyed in the Deal Island area, the average age is 48, with some watermen over 75. Of those surveyed, the average waterman in this area has been crabbing for 32 years. One person has been crabbing for 65 years — so Paolisso concludes that he must have started around age 10.

The watermen seem interested in these facts, and nod in agreement that most who work the water for a living are getting grayer.

Then Paolisso begins to report on some of the more fundamental findings. The majority of watermen responding to the survey said that they “agree” or “strongly agree” with these propositions:

- We should just let the Bay’s natural cycles follow their own rhythm.
- Scientists should focus their research energies on pollution in the Bay.
- “Effective management” should not be based only on science.
- “Nature’s unpredictability” provides the greatest assurance that natural resources like crabs will not be overharvested.
- God and Nature are the best “managers” of natural resources.

By contrast, scientists and professional environmentalists often “disagreed” or “strongly disagreed” with these statements. From the watermen and their wives in the room there are nods or shaking heads as Paolisso reports his findings. With these kinds of questions and answers, Paolisso can begin to outline the key beliefs of watermen’s view of the natural world — and spotlight the key reasons watermen and scientists seldom communicate well.

The survey, the anthropologists report, also reveals some common ground. For example, both the watermen and the environmental professionals agreed that working watermen’s knowledge of the Bay is important for sound management, and both groups agreed that it is important for watermen and scientists to share their knowledge about the blue crab.

After Paolisso’s presentation, a silence falls over the empty paper plates and plastic tablecloths. The watermen and their wives have listened attentively, and appear genuinely interested in the results, but some seem puzzled. Roy Ford says he is “surprised” that scientists don’t understand the role of God and Nature and unpredictability in the cycles of blue crabs. “They’re thinking inside the box,” he says.

Ford argues that if scientists got out on the water more — if they caught

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*Researchers see a lack of opportunity for scientists, watermen and other stakeholders to come together to share their knowledge about the blue crab.*

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crabs in pots, for example — they would see things first hand. He points to the impact of predators like croakers that have turned up in great numbers during the past several years and are found inside crab pots.

Waterman Grant Corbin — who made a memorable appearance in William Warner’s Pulitzer Prize-winning book, *Beautiful Swimmers* — adds that many scientists may not have seen what he’s seen following the harsh winter of 2002. According to Corbin, 50 to 70 percent of crabs in less than 10 feet of water died. Speaking of recent regulations meant to protect the spawning stock, Corbin says that “we saved the crabs just to have them die.”

As the watermen speak, they reaffirm what Paolisso has heard in countless interviews: that in the end Nature, and not man, will determine how many crabs — or fish or shellfish — will be in the Bay. Paolisso tells the group that scientists understand that natural cycles do influence crab abundance, but that scientific models attempt to offer predications on what Nature is going to provide.

Some watermen shake their heads, but David Horseman, who has participated in the watermen-scientists dialogues organized by Paolisso, speaks up. “It’s where scientists come from,” he says. “They’re drilled on black and white evidence. Faith is a bad word for them. We rely on faith. This is God’s Nature. They [the scientists] come from a different world. But I see a lot of common ground.”

Horseman, who has listened to scientists speak about their work during the structured dialogues, tells the group that

one thing he has learned is that the scientists are “dedicated.”

“They are trying to do a good job just like we are,” he says.

Paolisso tells the group that everyone he’s talked to and worked with wants to protect the blue crab and the watermen who catch them.

A waterman notes that “we [the watermen and environmental professionals] have common goals but different methods.”

Paolisso nods. This is, in part, what he has hoped for — that while not necessarily agreeing with each other the different groups begin to understand that they each are “dedicated” in their own way, that though they have different vantage points, they do in fact have central goals in common.

Researchers who have participated in the dialogues also say that they have learned from these discussions. Jacques van Montfrans and Rom Lipcius, both of the Virginia Institute of Marine Science, see a lack of opportunity for researchers, watermen and other stakeholders to come together to share their knowledge and opinions about the blue crab. “It’s too bad that the states [Virginia and Maryland] haven’t continued to fund the Bi-State Blue Crab Advisory Committee,” says van Montfrans. Researcher Tom Miller from the University of Maryland Center for Environmental Science agrees, saying, “It’s a shame. A golden opportunity lost.”

Miller goes on to say, “I think these [dialogues] have been incredibly useful.” Miller, who was instrumental in analyzing current efforts to limit fishing pressure on the Bay’s crab stock, says he feels that some of the watermen have begun to see that “decisions are not based on smoke and mirrors” but on “reasonable judgments.”

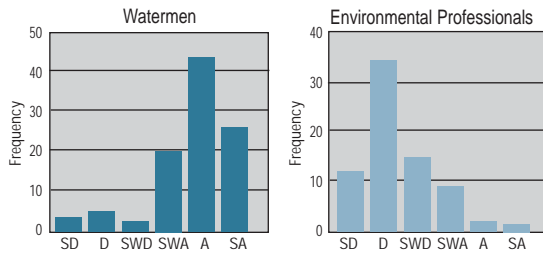
Within the responses of the researchers lies evidence of another set of core beliefs. Scientists, whatever their religious affiliation, also have a faith, as Albert Einstein said, in the divine order of things, a faith that careful scrutiny and an open mind will lead to revelations of elemental truth.



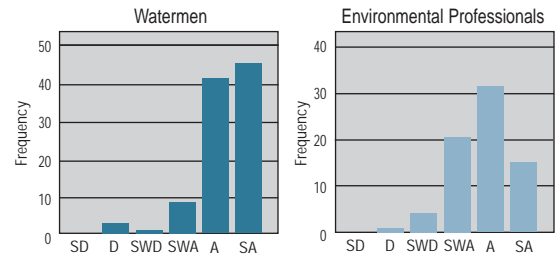
# Seeking Basic Beliefs: Surveying Watermen and Environmental Professionals

Teasing out basic beliefs, Paolisso and his team posed a long list of questions to watermen and environmental professionals (researchers, technicians, natural resource experts). On some issues the two groups largely agreed — including the importance of watermen's experience for assembling "scientific" knowledge about the environment. The two groups strongly disagreed, however, over very fundamental statements, such as, "God and Nature are best managers of natural resources." *Graphs redrawn from Michael Paolisso 2003.*

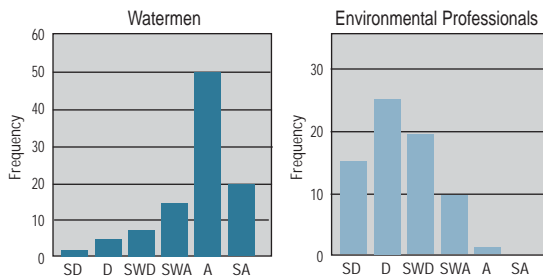
Periods of reduced harvests (crops, fish, crabs and oysters) are due primarily to natural cycles.



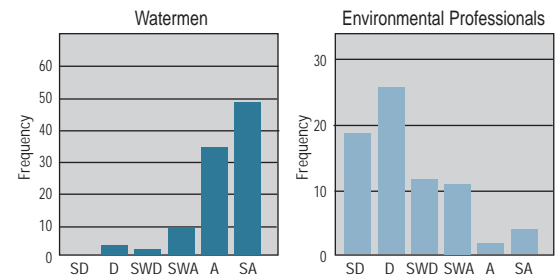
The knowledge of people whose livelihood directly depends on working the land and water is essential to scientific knowledge of the environment.



Unpredictability is nature's own way of ensuring that natural resources are not overharvested.



God and Nature are the best managers of natural resources.



SD=Strongly Disagree D=Disagree SWD=Somewhat Disagree SWA=Somewhat Agree A=Agree SA=Strongly Agree

It is this belief in the scientific process — a conviction that at the end of honest inquiry the truth will out — that propels science and scientists forward into the uncertain worlds of physics, chemistry and biology. In a sense, the scientist lives with the uncertainty of unanticipated results, just as the waterman lives with the natural world's uncertain seasons.

There lies, it seems, a kind of faith at either end of the bridge, and anthropologists like Paolisso are trying to draw conceptual maps to help us understand the terrain of those very different landscapes.

## Crossing the Bridge

As the summer of 2003 drew to a close, the watermen of Chance, Deal Island and Wenona broke with the normal rhythms of September. They pulled their pots and moved their workboats far up river, away from the open waters of the Bay. Hurricane Isabel had formed in the Atlantic, and meteorologists picked

the region around North Carolina's outer banks, just south of the Bay's mouth, for landfall.

Building to the strength of a category 5, Isabel threatened the kind of devastation brought by Hugo in South Carolina in 1989, or by Andrew in Florida in 1992. But luck was largely with watermen and others along the Atlantic seaboard — Isabel dropped from a category 5 to 4 to 3 to 2. Even so, its storm surge and strong easterly winds (in the storm's most dangerous northeast quadrant) brought rising waters well up the Bay, along with gusts strong enough to knock down trees and power lines, leaving some without power for days, or even weeks.

All up and down the Chesapeake Isabel's high winds and a record-breaking surge flooded streets and homes. At the Virginia Institute of Marine Science in Gloucester Point, buildings were flooded, piers and hatchery tanks destroyed. In Baltimore and Annapolis roads flooded

and shops filled, leaving merchandise ruined. Homes along so many Bay rivers and coves saw tidal waters rise and rise until waves washed into living rooms and bedrooms. On Deal Island, wind and water took away crab shanties and damaged homes and docks. "Some people [in the Deal Island area] had 17 inches of water in their house," says Horseman.

Then in a somber tone he says, "It was the worst on Hooper Island. They lost the road. Houses flooded. We heard picking houses were destroyed." He also heard that Tangier Island, about twenty miles south across the Virginia line, was hard hit, with power lines down and crab shanties in splinters.

But in Chance, David Horseman was lucky.

"I thought my shanty would be the first to go," he says — but it wasn't. With his shanty intact, his boat safely moved far up the Wicomico River to Salisbury and his home on higher ground than some,

*Continued on page 14*

# PROFILE AN ANTHROPOLOGIST'S JOURNEY

BY JACK GREER

Born on a farm in Indiana, Michael Paolisso soon moved to Southern California, where he grew up — about as far from the Chesapeake as one can get in the continental United States. Though originally heading for law school, Paolisso found his interests gravitating toward the study of people and their behavior. Above all, he wanted to study people who work directly with nature, like farmers and fishermen.

“I find them very courageous,” says Paolisso, who admires the ability of farmers and fishermen to live by their wits in the midst of considerable uncertainty.

After receiving his doctorate from the University of California-Los Angeles (UCLA), the young anthropologist's early work took him to East Africa, Nepal and Latin America. In Honduras, for example, he studied the interplay between gender and the use of natural resources, focusing on the role of women, often in the context of significant environmental degradation. After academic appointments at Smith College, George Washington University, and the International Center for Research on Women, he arrived at the University of Maryland College Park in 1997.

For someone interested in studying fishermen and farmers, 1997 turned out to be a particularly significant year in Chesapeake Bay country — during that August fish kills and human health problems, especially among some watermen, brought headlines announcing a novel marine dinoflagellate called *Pfiesteria*. Soon a firestorm of controversy broke out between scientists, between watermen and farmers, between state agencies and environmentalists. Paolisso and Erve Chambers, now chair of the Anthropology Department at College Park, could see immediately that “people were coming to this debate with very different perceptions, very different cultural models.”

Paolisso saw a special opportunity — he wanted to know what those “cultural models” were.

“We came to Somerset County, because that's where the poultry farms are,” he says. Those poultry operations were suspected contributors to over-nutrition, and therefore, the theory went, potentially to the emergence of *Pfiesteria*. And so it was *Pfiesteria* and its possible connection to phosphorus from poultry waste that initially brought Paolisso to Maryland's lower Eastern Shore.



Much of his initial work, funded by the National Science Foundation, focused on farmers, and then on the differences between farmers, fishermen and environmental professionals. His research team surveyed a range of individuals from each group, examining how they reacted to such terms as “pollution” or “government” or “nutrients.”

“Because we wanted to work with watermen as well as farmers, we drove down to Deal Island,” Paolisso says. In 1998 the anthropologists rented a small house on the road between Princess Anne and Deal Island; then in 2000 they moved into a rented house on Deal Island proper. When Paolisso attended a

Lion's Club meeting in Chance, he met David Horseman, Roy Ford and others. Paolisso had begun to develop a keen interest in the watermen's community there, and that interest has continued to grow.

Blue crabs, he found, were a very hot topic, especially with new regulations looming on the horizon. The watermen peppered him with theories, opinions and prognostications. He realized at once that blue crabs would provide him a valuable window into perceptions of environmental issues and into an understanding of the differing cultural models each group brings to those issues.

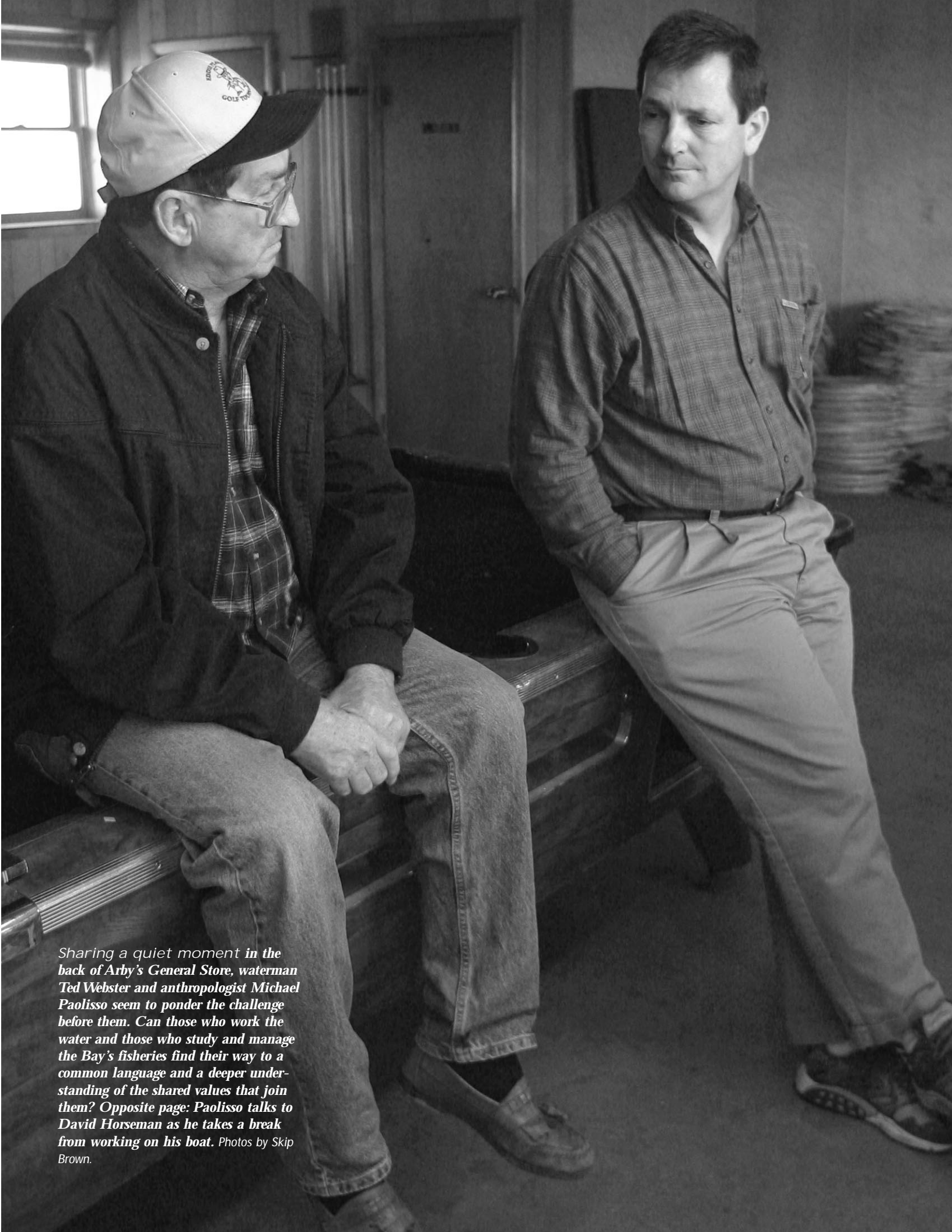
Paolisso then focused his efforts more squarely on the Chesapeake Bay blue crab and the watermen of Deal Island.

The first waterman to take Paolisso aboard was Roy Ford, who showed him how to tong for oysters. By now Paolisso has gone out with a half-dozen watermen or more, oystering, crabbing — often helping at the culling board to separate the oysters and crabs they can keep from the ones they have to throw back.

“At first David Horseman was hesitant to speak with me,” Paolisso says. “It took four or five phone calls.” Then Horseman and his wife Linda invited him over, and they sat around the dining room table and talked. “It was a great talk,” he says, “that covered a wide range of issues. Since then there have been many wonderful talks and dinners around that same table.”

In the end, Paolisso says, he found not only a cultural model, but a group of hard-working people, generous of spirit, who took him into their confidence and taught him a lot about what it means to live and work in step with the unpredictable rhythms of the Chesapeake Bay.





*Sharing a quiet moment in the back of Arby's General Store, waterman Ted Webster and anthropologist Michael Paolisso seem to ponder the challenge before them. Can those who work the water and those who study and manage the Bay's fisheries find their way to a common language and a deeper understanding of the shared values that join them? Opposite page: Paolisso talks to David Horseman as he takes a break from working on his boat. Photos by Skip Brown.*

## Watermen, from page 11

Horseman and his family came through fine. “We never even lost electricity,” he says. There is in his voice a hint of disbelief as he says, “I never had no problem at all.”

He says he hates to talk about his good fortune when so many others lost shanties, boats, homes. But for Horseman all in all this was a good year. The supply of soft crabs was “steady” and the price stayed high. “The price is so good now. With soft crabs the price is always good. We’ve been getting a couple dollars for a jumbo [soft shell],” he says. “And you can keep ‘em [frozen],” he adds, selling them well into winter. They’re “just like gold.”

Though crabbing has taken all his time during the summer, this fall Horseman will travel that long road between Chance and the Bay’s western shore, heading in the opposite direction. He will travel to College Park, to talk to Paolisso’s class at the University of Maryland. “Most people regard watermen as old dummies that can only catch crabs. But inviting me up to speak at a college, it’s an honor,” Horseman says. “It’s a real honor.”

He has also traded workplaces with some scientists. Researcher Tuck Hines came down to Chance just before the spring peeler run, looking to catch certain sizes of crabs. Horseman went out with him and they fished the banks, talked about soft crabs. Horseman also visited Hines’s laboratory, the Smithsonian Environmental Research Center in Edgewater, to learn about the research underway there.

Have these dialogues and workplace exchanges — what Paolisso calls a collaborative learning project — helped to build bridges? “Absolutely,” Horseman says. “There is absolutely a better connection with the scientists. First we all stood our ground. Now there is mutual respect.”

“I don’t believe everything he [Hines] says, and I know he doesn’t believe everything I say. But we have mutual respect.”

You can tell, says Horseman, by the different way the watermen and the sci-

entists in this group now talk to each other. When he was explaining some of his observations about blue crabs, the scientists seemed very interested. When Hines was explaining the crab’s migration and life cycle, he in turn found this very interesting. “He was telling me new stuff,” Horseman says. “It’s been very positive.”

There have been changes among managers as well. At the Maryland Department of Natural Resources, programs have begun to engage watermen in recording data based on crab catches. The DNR has also launched a new Blue Crab Task Force to gather greater input into the management of the fishery, where they will no doubt face the same challenge of linking watermen’s knowledge with that of scientists and technical experts.

For Paolisso, such dialogues among stakeholders have to continue, no matter what the venue. “We have to keep these conversations going,” he says. “We have to get the different parties to see beyond their varying positions to their common interests.”

Says Ann Swanson, “Michael Paolisso’s work gave us another avenue for learning about their [the watermen’s] concerns, and at a much deeper level.”

For Horseman, traveling the long and challenging road toward mutual understanding has been worth it. “Even if it [Paolisso’s project] doesn’t go any further, it’s still positive,” he says. “Absolutely what we need — he’s not pulling for either side, but he’s showing everybody’s side. Not only the watermen and the scientists but the DNR, the environmentalists, everybody.

“Nobody else could have done it,” Horseman says. “If the DNR or the scientists did it, well, we’d of had our doubts. The University of Maryland did it. If you’d asked me, I didn’t think it could be done.”

“It’s just an open-minded thing,” concludes Horseman. “You don’t have to think about it. You feel it.”

## For More Information

### Video Clips

To see video clips about anthropology and the Chesapeake, visit the electronic version of the magazine, *Chesapeake Quarterly Online*, at [www.mdsg.umd.edu/CQ/](http://www.mdsg.umd.edu/CQ/).

### Books

The Lobster Gangs of Maine. 1988. James M. Acheson. Hanover, New Hampshire: University Press of New England.  
Oyster Wars and the Public Trust. 1998. Bonnie J. McKay. Tucson: University of Arizona Press.  
The Estuary’s Gift: an Atlantic Coast Cultural Biography. 1999. David C. Griffith. University Park, Pennsylvania: Pennsylvania State University Press.  
An Island Out of Time: A Memoir of Smith Island in the Chesapeake. 1997. Tom Horton. New York: Vintage Books.  
Tourism and Culture: An Applied Perspective. 1997. Chambers, Erve, (ed.). Albany: State University of New York Press.

### Articles

Stalking the American Lobster. 2002. Trevor Corson. *Atlantic Monthly*, April 2002. Pages 61-81.  
Blue Crabs and Controversy on the Chesapeake Bay: A Cultural Model for Understanding Watermen’s Reasoning about Blue Crab Management. 2002. Paolisso, Michael *Human Organization* 61(3): 226-239.

### Web

Culture and Resource Management on the Chesapeake Bay. Michael Paolisso, Department of Anthropology, University of Maryland – [www.bsos.umd.edu/anth/chesapeake/home.htm](http://www.bsos.umd.edu/anth/chesapeake/home.htm)  
Maryland Watermen’s Association – [www.marylandwatermen.com](http://www.marylandwatermen.com)  
Lower Eastern Shore Heritage Committee – [skipjack.net/le\\_shore/heritage/](http://skipjack.net/le_shore/heritage/)  
Chesapeake Bay History and Culture, Maryland Sea Grant – [www.mdsg.umd.edu/CB/history.html](http://www.mdsg.umd.edu/CB/history.html)  
Selected Bibliography of Bay Literature, Maryland Sea Grant – [www.mdsg.umd.edu/CB/literature.html](http://www.mdsg.umd.edu/CB/literature.html)



### A National Agenda for Oyster Research

In its ongoing efforts to combat oyster disease and ensure the safety of public health in oyster consumption, the NOAA National Sea Grant College Program has been supporting two long-term research programs, the Oyster Disease Research Program and the Gulf Oyster Industry Program. Both have led to some notable success; for example, the development of disease-tolerant strains of *Crassostrea virginica*, the oyster native on the Eastern seaboard from Canada to the Gulf of Mexico. Despite research advances that have made their way into the field, difficult challenges remain, from restoring sustainable oyster populations in the mid-Atlantic to uncovering the causes of “summer mortalities” on the west coast to minimizing the impacts of Juvenile Oyster Disease that afflicts hatchery-reared oysters in the northeast.

To assess the progress of both the ODRP and GOIP and develop a set of research priorities that addresses issues of disease and health in the nation’s oyster producing regions, the Maryland and Virginia Sea Grant programs, in coordination with National Sea Grant, brought together scientists, resource managers and industry representatives from around the country. Participants attending the conference on “Oyster Research Restoration in U.S. Coastal Waters” in Annapolis broke into workgroups to reach consensus recommendations for research needs in the following areas: (1) oyster fisheries management and restoration, (2) genetics and oyster populations, (3) frontiers of disease research, (4) aquaculture and hatchery issues, (5) public health and processing. A draft report is now in review and will be released before the end of the year.

To obtain a copy of the report or to be notified when it is available on the

web, please contact Maryland Sea Grant at 301.403.4220, x 22, or write [con-nors@mdsg.umd.edu](mailto:con-nors@mdsg.umd.edu).

### Coastal Technology

In response to a special request for proposals for the development of innovative technologies that link research to product development, Maryland Sea Grant is funding three projects that promise to do just that. “Our aim,” says Fredrika Moser, Assistant Director for Research, “was to catalyze novel technological efforts that might not ordinarily have fit under our core research objectives but that could have important implications for applied science and for Extension.” The three proposals selected for funding are:

- Patricia M. Glibert and Louis A. Codispoti, UMCES, HPL, Producing

and Deploying an Autonomous Urea Monitor

- Shao-Jun Du, COMB, Enhancing Fish Muscle Growth through Blocking Myostatin Function
- David R. Tilley and Andrew Baldwin, UMCP Hyperspectral Reflectance of Freshwater Tidal Emergent Macrophytes as a Remote Sensing Tool for Assessing Wetland Nitrogen Status

“We were pleased by the response from the research community,” Moser says, “and especially by the submission of proposals from principal investigators who had never requested Sea Grant support. To ensure the finest marine research,” she adds, “we need to encourage participation from scientists throughout the state.”

For more information on these awards and on funding for Maryland Sea Grant research, please contact Dr. Moser at 301.403.4220, ext. 16, or write [moser@mdsg.umd.edu](mailto:moser@mdsg.umd.edu).

## New Seafood Cookbook



North Carolina Sea Grant has produced an attractive new cookbook, *Mariner's Menu: 30 Years of Fresh Seafood Ideas*, that offers more than just recipes. Since 1973, representatives from home extension clubs in Carteret County, North Carolina, have met each month in a Morehead City kitchen to test new ways of handling, storing and preparing local fish and shellfish. Their thirty years of seafood wisdom are gathered in this comprehensive cookbook and guide for cooks who want to know more than just how to bake or fry fish.

Written by Joyce Taylor, a seafood specialist with North Carolina Sea Grant since 1974, *Mariner's Menu* contains more than 160 original seafood recipes developed by the dedicated testers and tasters of the Seafood Lab kitchen. Many of these recipes, such as broiled tuna Provençal and steamed clams in wine broth, use easily available ingredients and require little preparation. Separate chapters instruct cooks on broiling, grilling, frying and steaming. Important preparation techniques such as deboning fish, deveining shrimp and cracking crab are illustrated in detailed drawings by Morehead City artist Connie Mason.

To order a copy of the book, which sells for \$25.00, visit the University of North Carolina Press site at <http://uncpress.unc.edu/books/T-7465.html>, call 800.848.6224, or fax toll-free 800.272.6817 (24 hours).

## Graduate Policy Fellowships

### Dean John A. Knauss Marine Policy Fellowships, National Sea Grant

**College Program.** Maryland Sea Grant is seeking applicants for 2005 fellowships, funded by the National Sea Grant office and administered through individual state Sea Grant programs. Knauss Fellows spend a year in marine policy-related positions in the legislative and executive branches of the federal government. Past Fellows have worked in the offices of U.S. Senators and Representatives, on Congressional subcommittees and at agencies such as the National Science Foundation and NOAA. Fellowships run from February 1, 2005 to January 31, 2006 and pay a stipend of \$32,000 plus \$6,000 for health insurance, moving and travel.

To qualify for a fellowship, students must be enrolled by April 1st of the year of application in a graduate or professional degree program in a marine-related field at an accredited institution in the United

States. The application deadline is April 6, 2004, but those interested in applying for fellowships should check with the Maryland Sea Grant office by mid-February for guidance and application details.

For general information, please check the web at [www.mdsg.umd.edu/Policy/knauss.html](http://www.mdsg.umd.edu/Policy/knauss.html) and [www.nsgo.seagrant.org/Knauss.html](http://www.nsgo.seagrant.org/Knauss.html). For application details, contact Susan Leet, Maryland Sea Grant College Program; phone, 301.403.4220, ext. 13; e-mail, [leet@mdsg.umd.edu](mailto:leet@mdsg.umd.edu).

## Summer Fellowships

### Research Experiences for Undergraduates, National Science Foundation.

Maryland Sea Grant will offer fourteen undergraduates the opportunity to conduct marine research on the Chesapeake Bay this summer — the fifteenth year of the program. Supported by the National Science Foundation, the program is especially designed for students majoring in such fields as biology, chemistry, ecology, physics, engineering,

mathematics and marine and environmental science.

Over 12 weeks, from May 24th to August 16th, each student will work with an advisor on an individual research project at one of three labs located on the Chesapeake Bay: the University of Maryland Center for Environmental Science's Chesapeake Biological Laboratory at Solomons, Maryland, or the Horn Point Laboratory at Cambridge, Maryland, or at the Academy of Natural Sciences Estuarine Research Center in St. Leonard, Maryland.

Many students in the Maryland REU program have gone on to M.S. and Ph.D. degrees in marine and environmental science. We encourage undergraduates with an interest in marine science to visit our Research Experience for Undergraduates website to learn about research areas, past student projects, advisors and the laboratories as well. The deadline for applications is February 16, 2004. To learn about the program, visit [www.mdsg.umd.edu/Education/REU](http://www.mdsg.umd.edu/Education/REU). For further information, contact Dr. Fredrika Moser, 301.403.4220, ext. 16, or [moser@mdsg.umd.edu](mailto:moser@mdsg.umd.edu).

*Chesapeake Quarterly* is also available on the web at [www.mdsg.umd.edu/CQ](http://www.mdsg.umd.edu/CQ)

Maryland Sea Grant College  
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