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MARINE NOTES

SPOTLIGHT ON MANAGEMENT

Bridging the Gap

Watermen and Scientists on Crabs

BY JACK GREER

Swinging the bow of his workboat into a southerly Chesapeake breeze, Gladston Tyler, Jr. searches in the predawn light for his first line of crabpots. As he usually does "of a mornin'," Tyler put out of Smith Island, Maryland in the dark, joining a ghostly cavalcade of workboats darting through the shallow channels, heading for their hunting grounds. At the helms of those boats are other well known Smith Island captains, like Dwight Marshall, Elmer Evans, Ed Evans and his sons Eddie and Glenn.

Their routine is entrenched, familiar, almost hypnotic. They know these shallow waters the way a trapper knows a marsh. Though hidden from view, the bottom holds all the landmarks of a well-known landscape. The deep lead that comes in off the open Bay. The shallow bars. The nearby fishing reef. The ledge that drops off to the sharp valley of the ship channel.

On this October morning, there is one unaccustomed change. A half dozen of these workboats are carrying unusual passengers — fisheries scientists and other experts who have come to learn firsthand about crabbing from Smith Island's seasoned watermen. Their presence here is part of a long-term project sponsored by the Bi-State Blue Crab Advisory Committee, with help from Maryland Sea Grant, to better integrate the voices of watermen into the management of the Chesapeake's important blue crab fishery. The watermen have helped to set up this exchange, and have invited each of the experts to join them for a day of crabbing and, after that, for several hours of frank conversation.

As the boats navigate toward their crab pot buoys, those aboard can see few reference points — the dim lights of Smith Island dropping behind to the east, the vague outline of a wrecked ship, used for target practice by the military, to the north. This is the widest part of the Chesapeake Bay, with the yawning mouth of the Potomac River to the west and the long arms of the estuary stretching out of sight to north and south.

"I hope it'll be cam for ya," Tyler says, smiling. "Cam," the local pronunciation of "calm," means that the wind will not rise and kick up the steep chop for which the Bay is well known. Tyler's smile is broad and clean, and like his tan skin bespeaks a life spent out of doors, a hard working life, but one full of simple pleasures. "Look a' that," he sings out when a pot comes aboard with an especially large crab. "Do we got ourselves a winner?" he asks his mate, Jerry. A

Fisheries scientist Tom Miller, who has played a key role in the effort to set new targets for Bay blue crab harvests, trav - eled to Smith Island to talk with commer - cial crabbers. Miller, of the University of Maryland Center for Environmental Sci - ence, was joined by other biologists, ecolo - gists, economists, anthropologists and pol - icy makers in this effort to exchange ideas and experiences with working watermen.

winner this season means a crab over nine and a quarter inches, the biggest crab caught so far during this fall run. Jerry tosses the big crab into a special basket near the stern for later measuring. During the morning, other large males (or Jimmies) will join him, until the bushel basket is full of large crabs — forty-two to be exact. Crabs so large that only forty-two of them will fill a bushel basket, though at around eight inches or so, no record breakers.

Most of the other crabs are mature females (or sooks) and smaller. This is the fall sook run, when female crabs from throughout the northern and central reaches of the Chesapeake respond to an ancient call to head south toward the estuary's mouth. They will be followed by far fewer Jimmie crabs, many of which will never make it very far south, bedding down wherever the cold weather finds them. Then another Chesapeake crab season will end, except for a winter dredge fishery in the lower Virginia portion of the Bay.

Today the crabbing has been good. Every dripping pot comes up with crabs, about a dozen or so on average, mostly sooks, for which there is no size limit. "Sooks are small and uneven," Tyler says, and he would oppose putting a size limit on them. The five-inch limit on Jimmies, or even a slightly larger size limit, doesn't bother him, he says.

"We're not out here to get rich," Tyler says. "We just want to make a decent living. We just want to work."

This refrain runs through his comments on the crab, the weather, the season. Even the eight-hour workday imposed by the state hasn't concerned him much. He's able to work his pots, some 400 or so, though he and other watermen worry that time limits might narrow their options and force them to make difficult choices — about whether to pass up a day's wages or to risk dangerous winds and waves on bad weather days.

Without time restrictions the watermen could wait and go out later in the day, after a storm has passed, for example. As it is now, they must stop crabbing seven and half hours after sunrise, no matter when they go out. This year, as October ends, the crabbing season will also end, due to a last-minute state decision to close the month of November — the result of bitter wrangling between state officials and some watermen over proposed regulations, including the eight-hour workday.

The Great Divide

For many years decisions about fisheries regulation and management have led to bitter disputes between the state and those who work the Chesapeake's rich fishing grounds. Watermen often argue that the state is trying to cut them off from making an honest living, threatening a way of life that has come to characterize the Bay for generations. Those in government argue that the Bay belongs to all the state's citizens, and elected officials and resource managers not only have the right but the duty to enforce effective conservation measures.

That divide has grown wide during the past several years, when first independent scientific indices and then commercial crab harvests began to trend ominously downward. Though it is well known that crab populations swing in dramatic cycles, many worry that the current downturn has dropped too far and stayed too long — a warning that the crab stock may be facing a precarious future.

To help define the precise nature of the uncertainties surrounding blue crab stocks, the Bi-State Blue Crab Advisory Committee formed an independent Technical Workgroup, comprised of more than two dozen scientists and fisheries experts. This workgroup examined all facets of the issue and concluded that current fishing pressure must drop to preserve the crab's spawning stock. In an effort to set a sustainable target for the fishery's long-term health, the jurisdictions of Maryland, Virginia and the Potomac River Fisheries Commission all adopted plans to reduce fishing effort by about fifteen percent (based on averages from the late 1990s). That fifteen percent cut has hit hard at full-time watermen who depend on crabs for the majority of their income.

While watermen's groups participated in the consensus-building process, including the need for some further control of the harvest, when time came to make those cuts, some watermen rebelled.

"Everybody knows it's not going to do a thing," says one watermen over Tyler's constantly crackling VHF radio. "They'd better wake up."

Reaching Across the Chasm

Both sides have their piece of the truth in this bitter debate. Watermen argue not only that they have the right to make a living from the Bay but also that they have many years of experience and observation that help them to understand whether or not the crab is in trouble. On the other hand, scientists and other technical experts point to years of data collection and analysis that indicate rising and falling trends, and for the past decade, those trends — smaller crabs, fewer females — have pointed downward.

The Crab Harvest in Maryland

As the 2001 commercial crabbing season nears its end, preliminary figures indicate that in Maryland watermen caught an estimated 15.5 million pounds of crabs (both hard and soft) — well below the seven-year September average of about 24.6 million pounds. Last year (2000) Maryland crabbers landed about 20 million pounds for the entire season, far below the long-term average of some 33 million pounds.

In the Potomac River, where there is a much smaller hard crab fishery, watermen brought in about 42,900 bushels through September, slightly better than last year's 38,500 bushels. These harvests are still far below a 15-year average of 109,400 bushels for Potomac hard crabs.

For peelers, the Potomac saw a decline this year, from 77,967 pounds in 2000 to 52,350 in 2001. Unlike hard crabs, however, these figures are not far off the 15-year average of 64,000 pounds for peelers in the Potomac. Soft crabs, a small fishery in the river, came in at about 3000 pounds in both 2000 and 2001.

Beyond this, there are vast cultural differences between the two groups, differences in the communities they come from and in the ways they gather the knowledge they need, even in the way they communicate that knowledge.

On this bright fall morning, with the sun just coming up over the Eastern Shore, this group of scientists, watermen and others are working hard to try to close that gap a little.

Waving from one workboat, driven by Captain Ed Evans, is Ann Swanson, the Executive Director of the Chesapeake Bay Commission. On Captain Dwight Marshall's boat is Anson "Tuck" Hines, a marine biologist and ecologist from the Smithsonian Environmental Research Center who has studied crabs for more than two decades. On yet another boat is Doug Lipton, an experienced marine economist and head of the Maryland Sea Grant Extension Program. A total of six experts of various kinds have come as representatives of the Bi-State Blue Crab Advisory Committee's technical workgroup to see firsthand how crabbing is going in this part of the Bay and, more importantly, to get to know the watermen who work these waters and to hear their observations, their suggestions, their theories.

"During the past several years the Chesapeake Bay Commission has worked hard to bring scientists together to share information about the blue crab," says Ann Swanson, who chairs the bi-state technical workgroup. "Now we really need to reach out to the watermen, to make certain that we benefit from their knowledge, and to help make them more of a part of the whole process of managing the blue crab."

"It's good you all came down," says Glad Tyler, as he fishes his pots. "It's a good thing you're here."

Narrowing the gap between watermen and technical experts will not be easy, but on this day on Smith Island there is a willing spirit.

And a helping hand. Biologist Tuck Hines culls crabs for Dwight Marshall, who has lost his mate for the day. Lipton culls crabs as well, and others in the group pitch in to help on their boats. In a sense, today everyone is working the water.

Searching for Common Ground

That night, sitting around a collection of tables pulled together in the center of Smith Island's Bayside restaurant, all the watermen and technical workgroup members who spent the day crabbing together compare notes and views. They are joined by Tom Miller of the University of Maryland Center for Environmental Science and Yonathan Zohar of the University of Maryland Center of Marine Biotechnology, who have made the long trip down to Smith Island to participate in this roundtable dialogue.

Unlike many public hearings, where accusations fly, this conversation aims at understanding, at explaining.

Unlike many public hearings, where accusations fly, and the atmosphere is tense, this conversation aims at understanding, at explaining. For example, some watermen tell of how they have seen razor clams become a kind of super bait that can draw crabs into pots for days at a time. "They can wipe out a whole area," Ed Evans says, speaking of watermen who have turned to using razor clams instead of the traditional menhaden, or "bunker" as it is known here.

"The way we fish we feed the crabs," Elmer Evans says, noting that Smith Island crabbers tend to rebait their pots with menhaden every day, throwing the day-old bait overboard, where, they believe, it settles to the bottom and helps fatten the crabs. "You've seen how we do it," he says, and all those who have spent the day crabbing nod.

The watermen make it clear that they feel that they are taking care of the resource, in fact improve it, by feeding crabs and by avoiding techniques they see as harmful.

The watermen have stories to tell. Of how crabs migrate up and down the Bay in their chosen season. Of how they saw an oyster dredge pull up a "buster" in the dead of winter, when no one would expect to see a crab shedding its shell. The scientists also tell their stories. Of putting tiny radio transmitters on crabs so they can track their movements, not only in the rivers but up and down the estuary.

"Such attempts [at building bridges between watermen and scientists] signal that fisheries management must no longer simply be a matter of 'counting crabs.' "

"According to some preliminary experiments," says Hines, "crabs seem to crawl along the bottom when they migrate, rather than swim." This observation runs counter to both Hines's original hypothesis and to the watermen's general belief, that crabs heading south will largely swim rather than crawl. Radio transmitters attached to crabs and closely tracked by Hines and his colleagues have so far suggested that crabs crawl more than swim — perhaps good news to watermen with pots lying on the bottom.

There is more research on these behaviors to be done by scientists, and more observation to be carried out by watermen, but at the moment, sitting around the table at the Bayside restaurant, they are sharing their interest and wonder at the mysteries of the blue crab, which no one at this table claims to understand.

At one point Elmer and Ed Evans are talking about how they watch the crabs move up the Bay each spring as the weather turns and another crab season begins. Hines joins in the conversation and suggests that perhaps instead of watching individual crabs make their way up the Bay, the watermen may be seeing the effects of a temperature change moving up the estuary, as waters grow warmer, from south to north. In other words, rather than moving up the Bay, many crabs are simply coming out of the mud, as the warm water moves north.

For More Information

For more information about the blue crab visit the following web sites:

Maryland Sea Grant
www.mdsg.umd.edu/crabs

Chesapeake Bay Program
www.chesapeakebay.net/blue_crab.htm

Maryland Department of Natural Resources
www.dnr.state.md.us/bay/science/savecrab.html

Virginia Institute of Marine Science
www.vims.edu/adv/ed/crab/general.html

National Aquarium in Baltimore
www.aqua.org/animals/species/bluecrab.html

Chesapeake Bay Commission
www.chesbay.state.va.us/crabs.htm

Chesapeake Bay Foundation
www.cbf.org/notebook/cn_2000_12_05.htm

"We wondered about that," Elmer Evans says, nodding. "You may be right about that."

Among those seated at the table are the local pastor, Rick Edmund, and an anthropologist, Michael Paolisso. Though they have just met today, both these men have come to understand the deeply spiritual connection that many, perhaps most, watermen feel with the Chesapeake Bay.

"There is a strong element of trust in God among watermen," says Paolisso. "They believe that whatever science may say, the Bay will provide for them and for their families, as it has done for generations."

Paolisso, on the faculty of the University of Maryland's Anthropology Department, has been observing and interviewing commercial crabbers for a full year and more. He and his colleagues have even rented a small house in Deal Island, just north of Smith Island, where they have spent many days with watermen, going out on their boats, culling crabs, or just chatting with them down at the local Arby's restaurant.

"Watermen have told me that numbers cannot explain the behavior of the blue crab," he says. Instead,

he notes, watermen depend on years of personal observation to describe and explain blue crab behavior.

Ann Swanson notes, "Scientists have spent years trying to understand the nature of the blue crab population, and watermen have spent years watching and observing the blue crab. The truth is that both these kinds of knowledge are valid — scientists and watermen just have different ways of measuring the truth."

By all accounts, dialogues like the one held on Smith Island (and another, similar dialogue held in September on Virginia's Tangier Island) need to happen more often.

As the Bi-State Blue Crab Advisory Committee moves to continue building bridges between scientists, managers and watermen, they will benefit from the work of anthropologists and others who study different cultures and varying ways of knowing.

Paolisso, whose work has been supported by the National Science Foundation and others, will receive a $60,000 award from the Maryland Sea Grant College in 2002 to study the underlying cultural models that inform the beliefs and opinions of watermen and their communities.

Says the Bay Commission's Ann Swanson, "This dialogue between watermen and scientists on Smith Island — and one we have carried out on Virginia's Tangier Island — are serving as pilots, as experiments. We want to work with Michael Paolisso and others to continue to build these bridges, and to deepen our understanding."

Such attempts by the Bi-State Blue Crab Advisory Committee, and funding from the National Science Foundation, Sea Grant and others, signal that fisheries management must no longer simply be a matter of "counting crabs."

"We want to find a way to validate the information that watermen have to bring to the table," said Paolisso at the Bayside restaurant, and Ann Swanson agreed. "We need to find a better way to bring that information into the process," she said. "And that's what we're trying to do."

UMES Receives Award for Living Marine Cooperative Science Center

The Commerce Department's National Oceanic and Atmospheric Administration (NOAA) has targeted $2.5 million to the University of Maryland Eastern Shore, Princess Ann, as the lead institution in establishing a Living Marine Cooperative Science Center. The award is part of NOAA's new Educational Partnership Program with Minority Serving Institutions (EPP/MSI). The new initiative will award approximately $15 million in FY2001 funds for programs aimed at atmospheric, environmental and oceanic sciences and remote sensing research and educational programs.

The new Living Marine Cooperative Science Center at UMES will work with partner MSIs to conduct ecological research on marine and estuarine systems while promoting education, research and advancement opportunities in marine science for students in traditionally under-represented groups.

"This new education initiative is a special partnership effort between NOAA and several academic institutions to expand education, research and professional opportunities in NOAA-related sciences," said Commerce Secretary Don Evans.

"This center, by itself, is important to University of Maryland, Eastern Shore. We are also going beyond, with the construction of the $3 million Coastal Ecology Teaching/Research Laboratory, which will be completed in early 2003. These two events will place University of Maryland, Eastern Shore in a unique position to provide significant opportunities to minority students for pursuing careers in the marine sciences," said Dr. Jackie Thomas, interim president of University of Maryland, Eastern Shore.

NOAA's EPP/MSI initiative is designed to support the development of quality education for students at minority serving institutions while meeting the prescribed goals of NOAA and the nation.

While four Cooperative Science Centers are designated, a total of 17 MSIs will be funded and participate as partners at these centers. Cooperative Science Center partners, located in New York City, Maryland, Virginia, Delaware, Georgia, Florida, South Carolina, Mississippi and Puerto Rico, focus on remote sensing, environmental sciences, atmospheric sciences and living marine resources.

The EPP/MSI initiative also calls for the development of an Environmental Entrepreneurship Program, an Undergraduate Scholarship Program and a Graduate Sciences Program for students attending MSIs in NOAA-related sciences.

The Environmental Entrepreneurship Program provides funds through a competitive process to support education and training to strengthen the capacity of MSIs. Thirteen grants are awarded annually to MSIs that support program development and environmental restoration activities with the aim of increasing the entry of individuals from under-represented groups into environmental fields.

The Undergraduate Science Program offers students a 10-week paid internship program with NOAA and provides scholarships during the academic year. Students who continue training during the academic year in a NOAA-related field and maintain an acceptable GPA will be offered an opportunity for a second 10-week internship at a NOAA field site the following summer.

The Graduate Sciences Program provides financial assistance to six MSI students for graduate-level training in NOAA-related occupations. Students accepted in this program are hired as NOAA employees and commit to a tenure of service with the agency. For more information on NOAA's Educational Partnership Program with Minority Serving Institutions, visit www.ofa.noaa.gov/~sbd/EPPS1.htm or contact the program manager at (301) 713-9437.

Maryland Sea Grant: *New Faces*

Maryland Sea Grant welcomed two staff members this year in College Park and a Sea Grant Extension faculty member at the UMCES Horn Point Laboratory. Says Maryland Sea Grant Director Jonathan Kramer, "The new members of Maryland Sea Grant's family all bring tremendous enthusiasm and capability to our program. Their contributions will help us extend our reach and serve all of our stakeholders in the years to come. I'm genuinely excited to welcome them aboard."

Fredrika Moser became assistant director for research in August. Moser brings a broad background in estuarine and coastal science, policy and management. Her policy research interests have included aquatic invasive species, land-based sources of pollution to the marine environment, marine sciences and oceans and human health.

Moser received undergraduate degrees in earth sciences and environmental studies at the University of California, Santa Cruz in 1979. She received an M.S. in geological sciences at Rutgers in 1985 and her Ph.D. in environmental sciences, also from Rutgers, in 1997. Her doctoral research centered on geochemical and biogeochemical processes in Barnegat Bay, particularly the spatial and temporal depositional histories of estuarine sediments and associated contaminants, and nitrogen cycling and benthic infaunal communities in contaminated sediments.

Before coming to Sea Grant, she served as a marine science policy analyst at the U.S. Department of State where she helped develop and negotiate U.S. policy positions in international marine affairs. Other past work experience included a postdoctoral fellowship in which she initiated a biodiversity program at the Bermuda Biological Station for Research, as well as six years with the New Jersey Department of Environmental Protection, Division of Science and Research, where she oversaw interdisciplinary research and public policy programs that focused on local marine and coastal issues.

Moser says she's "excited about the unique opportunity that Sea Grant offers for combining my interests in estuarine science, public policy and environmental education."

Andy Lazur joined the Sea Grant Extension Program as finfish aquaculture specialist in July; he holds a joint appointment as associate professor at the UMCES Horn Point Laboratory. Lazur came to Sea Grant from the University of Florida Department of Fisheries and Aquatic Science where he was an associate professor for eleven years. His recent research includes the aquaculture of Gulf of Mexico sturgeon and hybrid catfish, characterization and management of effluents from aquaculture ponds in Florida and integrating

aquaculture with commercial citrus best management practices.

Lazur has an undergraduate degree in biology from the University of South Carolina, and Masters and Ph.D. degrees in Aquaculture from Auburn University. His current areas of research interest are food and baitfish culture; integration of aquaculture with agriculture for nutrient reduction; effluent and water quality management; production, marketing and economic evaluation of alternative aquaculture species; culture systems technology; and fish restoration.

In his new position, Lazur will look at recirculating aquaculture systems for alternative species in Maryland, both for food production and restoration. Says Doug Lipton, director of the Maryland Sea Grant Extension Program, "Maryland has some of the finest aquaculture research in the nation; Lazur's expertise in running aquaculture facilities in Florida and elsewhere makes him ideally suited to help apply this research to aquaculture efforts in the state."

Rosalie Lynn began working as the administrative assistant to the director in May. Before taking a position with Sea Grant, Lynn was assistant director of Malta House, an assisted living facility in Hyattsville. Prior to that, she worked for ten years on campus in several departments, including the Office of Procurement and Supply, English, Systems Administration, Poultry Science and Four-H. While she worked on campus, she completed her bachelor's degree at the University of Maryland, College Park, in behavioral and social sciences with a concentration in gerontology and health, graduating in 1999. One of Lynn's personal passions is singing — she has sung semi-professionally at weddings, funerals and other events. One recent highlight of her singing career was auditioning and being selected as a vocalist to sing with a full orchestra at her university commencement.

Remote Sensing on the Web

The Maryland Sea Grant web's Bay Science Gateway offers diverse information on topics such as blue crabs, oysters, non-indigenous species and contaminants. Recently the site added a remote sensing node that focuses on new technologies introduced over the last decade to study the Chesapeake Bay. They have made it possible to measure key properties of the estuary with much-improved resolution compared to traditional approaches. Remote sensing instruments mounted on aircraft, satellites, buoys, and towed bodies now provide important data and information. The site includes photographs, articles, reports, links to current research and access to real time data. Visit the site at www.mdsg.umd. edu/CB/nodes.html.

End Notes

Publications

■ **REU Students Present Research Results.** Leslie Brandt and Amy Long, two undergraduate students in the Sea Grant-sponsored Research Experience for Undergraduates fellowship program this summer will be presenting the results of their research at the annual meeting of the American Society for Limnology and Oceanography in Hawaii.

Brandt, a senior at Gustavus Adolphus College in Sheboygan, Wisconsin, worked with Evamaria Koch at the Horn Point Laboratory, part of the University of Maryland Center for Environmental Science, on how ultraviolet B radiation affects epiphytes that grow on submerged grasses. Her paper is "Epiphytic Algae as UV-B Filters on Leaves of the Seagrasses *Zostera marina* L. and *Ruppia maritima* L." Amy Long is a senior at the University of Pittsburgh; working with Larry Sanford and Diane Stoecker at the Horn Point Lab, she was studying the effects of varying levels of shear stress on the growth of *Pfiesteria piscicida*.

The REU program is supported by a National Science Foundation grant to the Maryland Sea Grant Program. Over the last 13 years, 160 students have participated in the program, working with researchers at UMCES (Horn Point Laboratory and the Chesapeake Biological Laboratory) and the Academy of Natural Science Estuarine Research Center. To learn more about the history of the program, student participants and abstracts from this summer's students, see www.mdsg.umd.edu/Education/REU/index.html

■ **Boater Spending.** A recently published report from Maryland Sea Grant titled "Boating 2000: A Survey of Boater Spending in Maryland," presents the results of a survey that sought to estimate the impact of boater spending in Maryland. Douglas Lipton, professor of Agricultural and Resource Economics at UMCP and director of the Maryland Sea Grant Extension Program, received funding to conduct the study from the Maryland Department of Natural Resources, the Marine Trades Association of Maryland, Maryland Sea Grant and the Maryland Cooperative Extension Service.

According to the report, recreational boaters spend more than $2.3 billion for purchases of new equipment and for annual boat- and trip-related expenses. Though some 95% of these purchases were made in-state, a significant portion was spent in other states and countries. When this is accounted for, says the report, about $970 million directly impacts Maryland recreational boating and related businesses, which in turn purchase goods and services from other in-state businesses.

In addition, Maryland boater spending directly or indirectly creates income for individual workers and business owners which is spent in other Maryland industries throughout the economy. When this amount is taken into consideration, the report concludes, the impact of the Maryland economy from boater spending in 2000 was about $1.6 billion. Recreational boating also directly accounts for 19,990 full-time equivalent jobs in Maryland and, through indirect and induced effects, a total of 28,200 jobs.

For a free copy of the six-page report, contact Maryland Sea Grant at (301) 405-6376 or visit the web at http://www.mdsg.umd.edu/Extension/recboat.html.

■ **Student Ocean Conferences Focus on Marine Conservation.** To educate the public about marine issues and the need to protect and manage marine resources, Coastal America established a national network of Coastal Ecosystem Learning Centers in 1999, including one at the National Aquarium in Baltimore, Maryland. Coastal America is a unique partnership of federal agencies, state and local governments, and private organizations. The partners work together to protect, preserve, and restore our nation's coasts. The network of Learning Centers combines the resources of existing educational centers of excellence, namely aquaria and marine research centers, with federal Coastal America partners. The federal partners contribute expertise, equipment, educational material and other forms of expert assistance to the Learning Centers.

Through a grant from the National Geographic Society's Geographic Education Foundation, the Learning Centers are working with the Sustainable Seas Expedition and Coastal America to host an array of Student Ocean Conferences at Learning Centers around the country. There will be a conference at the National Aquarium in Baltimore during January/February 2002. The conferences aim to educate and empower students to protect the marine environment and to expose them to the wide variety of marine career opportunities.

For more information, contact Betsy Salter or Julianna Wyman at Coastal America, (202) 401-9928.

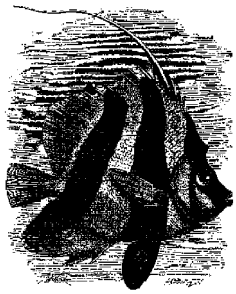
Abstracts

■ **International Coastal Conference.** The Coastal Society invites papers, posters and proposals for sessions for its 18th international conference to be held May 19-22, 2002 in Galveston, Texas. Titled Converging Currents: Science, Culture and Policy at the Coast, the conference will explore interrelatinoships among the physical, ecological, cultural and political currents that converge at our nation's coast. Those interested in submitting abstracts and proposals are encouraged to do so online at www.thecoastalsociety.org/tcs18/. Those unable to submit online may e-mail, mail or fax their information to Kristen Fletcher, Director, Mississippi-Alabama Sea Grant Legal Program, The University of Mississippi, Law Center, Room 518, P.O. Box 1848, University, MS 386-1848; e-mail kfletch@olemiss.edu; phone, (662) 915-7775; fax (662) 915-5267. The deadline for receipt of materials is November 30, 2001.

Conferences, Etc.

November 26-December 1

Orlando, Florida — Second International Conference & Trade Show on Marine Ornamentals. The aquarium hobby is second only to photography in popularity in the United States. The vast majority of ornamental marine specimens are harvested from the wild. The long-term goal is to develop culture protocols that can be used by industry to reduce harvest pressure from worldwide reef ecosystems. This conference will address efforts toward accomplishing that goal.



Over 300 industry representatives, scientists, students, agency representatives and interested citizens attended the first international Conference on Marine Ornamentals in Hawaii two years ago. Marine Ornamentals 2001 will build on this effort by continuing the conference focus on all aspects of the collection, culture and conservation of marine ornamental species.

For more information, visit the conference web site: www.ifas.ufl.edu/~conferweb/MO.

January 6-9

Cumberland College, Vineland, New Jersey — A relatively new marsh invader *Phragmites australis* appears to be degrading essential marsh functions over much of its range. But is *Phragmites* the "villain that many say it is? Or does it have redeeming features worth an adaptive management approach?" Forum themes will focus on new research and critical revews addressing *Phragmites* role as a "noxious weed." For more information, contact Michael P. Weinstein at mweinstein@njmsc.org or (732) 872-1300 ext. 24.

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