



... the newsletter of the Albemarle-Pamlico Estuarine Study

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CCMP schedule extended to allow further review

The Albemarle-Pamlico Estuarine Study's Policy Committee, with the support of the N.C. Department of Environment, Health and Natural Resources (DEHNR), voted in February to seek an extension on development of the Study's Comprehensive Conservation and Management Plan (CCMP). The request has been forwarded to the U.S. Environmental Protection Agency, which must approve the revised schedule.

If approved by the EPA, the extension would postpone completion of the CCMP from March 1993 until December 1993. The Policy Committee decided to seek the extension for three primary reasons:

1) It felt public interest in the CCMP warranted taking it through another draft and round of public review. The original CCMP schedule called for two drafts and review periods (the second of which ended February 15), but several groups expressed concern that they did not have time to fully evaluate the second draft. Adding to a third draft ensures adequate time for review and comment by all interested parties and will promote more widespread awareness of its recommendations.

2) The extended schedule will allow for greater analysis of research now being completed, including studies on nutrient loading, more selective fishing gears, and evaluation of economic impacts of the CCMP.

3) And the postponement will also give recently-appointed officials in DEHNR a chance to better coordinate CCMP recommendations with overall policy goals of the new administration.

The revised schedule calls for the third draft of the CCMP to go out for public review in July. Following that, a final draft will be developed and submitted to Governor Jim Hunt and EPA Administrator Carol Browner. Upon their acceptance, the various agencies or elected bodies responsible for enacting CCMP recommendations would begin discussions on how best to implement them.

The Policy Committee felt the added review period would actually speed the process of implementation by allowing affected groups more participation in the plan's development and therefore enhance their understanding of its intent.

Public meetings on the second draft in January generated considerable comment on several CCMP recommendations. Among the most-discussed issues were the recommendation for a vegetative buffer along shorelines; the recommendation for expanded land use planning in watershed counties; and the recommendation for a new licensing program in both sport and commercial fisheries.

THE ALBEMARLE-PAMLICO ESTUARINE STUDY

Initiated in 1987, the Albemarle-Pamlico Estuarine Study is a five-year program of research and education on the Albemarle and Pamlico sounds and the rivers that feed them. The Study is charged with developing a Comprehensive Conservation and Management Plan (CCMP) to help guide long-term environmental protection of the estuary. The projected schedule for the drafting, review and publication of the CCMP is as follows:

PROGRAM GOAL

First draft of CCMP to committees

Public review and meetings on 1st draft

Second draft to committees

Second draft to public

Public review and meetings on 2nd draft

Third draft to committees

Third draft to public

Public meetings on 3rd draft

Revisions based on public review

Final draft to committees

CCMP approved by Policy Committee

CCMP submitted to Governor, EPA

REVISED SCHEDULE, MARCH 1993

Completed (July 1992)

Completed (July-Sept. 1992)

Completed (Dec. 1992)

Completed (Jan. 1993)

Completed (Jan.-Feb. 1993)

May 1993

June 1993

July-August 1993

August 1993

September 1993

October 1993

October 1993

Coming together is a beginning; keeping together is progress; working together is success

Stocks of several fisheries dipping dangerously low

Data from the N.C. Division of Marine Fisheries, the U.S. Fish and Wildlife Service, and the Atlantic States Marine Fisheries Commission have been compiled to estimate the stock status of important commercial and sport fish species in the Albemarle-Pamlico region.

As the chart below indicates, eight species are listed as depressed (the worst status category), and catches of most species are declining despite increased effort and improved fishing equipment. In addition, the average size of individual fish in many species is shrinking, and the trend in the catches of several species -- particularly spot, croaker and weakfish -- is toward compression in age and size (i.e., the vast majority of the catch is composed of fish of a similar age and size, primarily fish in the 2-3 year age range).

In order to help fisheries populations recover, the A/P Study is recommending: (1) intensified research into bycatch-reducing gear; (2) a cost-share program to help fishermen defray expenses of using more selective gear; (3) improved protection of important fish habitats and spawning areas; and (4) the development of individual state-level management plans for major species.

SPECIES	STATUS	MAJOR CONCERNS
American Shad	stressed	lack of data; obstructions to migration; loss of habitat; water quality
Atlantic croaker	depressed	overfishing; bycatch of undersized fish; lack of stock assessment
Atlantic menhaden	healthy	harvest of juveniles; disease; user conflicts
Bay scallops	depressed	low stocks; poor recovery from '87 Red Tide; harvest impact on habitat
Blue crabs	healthy	disease; effects of trawls on habitat; ghost pots; user conflicts; hypoxia
Bluefish	stressed	reduced landings since '88; user conflicts over access to fishery
Catfish	stressed	insufficient data for management
Hard clam	stressed	lack of data; possible overfishing; shellfish area closures; user conflicts
Mullet	unknown	lack of data; prevention of overfishing; user conflicts (stop nets)
Oysters	depressed	overfishing; disease; shellfish area closures; harvest impact on habitat; lack of data
Red Drum	depressed	overfishing; user conflicts
River herring	depressed	overfishing; obstructions to migration; loss of habitat; water quality
Shrimp	healthy	bycatch of finfish and turtles; user conflicts; harvest impact on habitat
Southern flounder	healthy	bycatch of undersized flounder and blue crabs; user conflicts
Spanish mackerel	healthy	recovery from overfishing; user conflicts; bycatch in offshore shrimp trawls
Spot	stressed	bycatch of undersized fish; lack of stock assessment
Spotted sea trout	unknown	lack of data; user conflicts
Striped bass	depressed	overfishing; user conflicts; loss of habitat; poor water quality
Summer flounder	depressed	overfishing; bycatch of undersized flounder and sea turtles
Weakfish	depressed	overfishing; bycatch of undersized species; user conflicts
White perch	unknown	lack of data; loss of habitat; user conflicts



Learning About the Waters

the estuary, its functions and its issues

Research continues to unravel mysteries of toxic algae

Since its discovery in the Pamlico estuary in 1991, a toxic dinoflagellate algae being blamed for at least 25 percent of the fish kills in the Pamlico and Neuse estuaries has increasingly become a target of research efforts. And, increasingly, researchers are unlocking secrets of the organism's peculiar life cycle.

Drs. JoAnn Burkholder and Ed Noga of N.C. State University, who first described the algae's behavior, have been continuing research with A/P Study funding for the past year. Their ongoing work has confirmed several hypotheses about the algae, and also produced new findings with potentially far-reaching implications.

Name Selected

As Dr. Burkholder suspected, no taxonomy existed for the organism prior to her observation of it; it was an unidentified species from an unidentified genus. She is filing for formal classification of it as *Pfiesteria piscimorte* (*Pfiesteria* for the late Dr. Lois Pfiester, a renowned researcher of dinoflagellates; and *piscimorte*, Latin for "fish killer"). It is placed in a new family called Photamoebaceae, in the order Dinoamoebales.

More Complex - And Common - Than Expected

Initial observations of *Pfiesteria* indicated that it went from a dormant encysted stage to a toxic dinoflagellate stage when it detected fish, then quickly returned to its dormant stage after feeding on tissue sloughed off fish its toxin killed. Since then, however, 15 separate stages of life have been detected, with at least 5 more stages hypothesized. Many of the stages (which are not sequential) are variously-sized amoebas that have been noticed before but have never been identified as being of a single species. Some of these amoebic stages are toxic, but not to the degree of the flagellated stage.

While complex dinoflagellates have been observed in freshwater before, *Pfiesteria* is the first identified in an estuary. Given the variety of its appearances and increases in similar fish kill outbreaks around the world, however, there is a growing belief that related "ambush predator" dinoflagellates are endemic in estuaries and may be starting to dominate phytoplankton communities.

Pfiesteria has already been found in the Delaware Bay and Chesapeake Bay estuaries, and managers from other estuaries all along the Atlantic and Gulf coasts are now watching for it or its theorized cousins.

How It Kills

Although the chemical makeup of *Pfiesteria*'s toxin is not yet known, Dr. Noga has gained a better

understanding of how it affects fish. It strips away outer layers of skin; creates massive hemorrhaging under the skin and lesions in muscle tissue; severely damages the renal system; and brings on paralysis and suffocation by interfering with neurological function. It is lethal to all 18 species it has been tested on, including the A/P's dominant finfish, blue crabs and bivalve shellfish. Tests also indicate that fish which survive the toxin are at a greatly increased risk for the fungal and bacterial infections that have plagued the A/P in the last decade.

Getting *Pfiesteria* Going

Phosphate and some unknown component(s) of fish excreta appear to be the substances that most stimulate *Pfiesteria*. Lab tests show that phosphate promotes production of *Pfiesteria* gametes (reproductive cells). High phosphate encourages the accumulation of a "bank" of gametes, which fuse quickly into active dinoflagellates in the presence of large schools of fish. Fish waste aids *Pfiesteria* by somehow signalling cells in both the dormant and amoeboid stages to enter the active dinoflagellate stage.

Hard to Kill

In addition to its mild-mannered disguises and the fact that it slays fish simply to feed on a few cast-off bits of tissue, *Pfiesteria* has another trait that seems straight out of science fiction: It is remarkably difficult to kill. In fact, its presence was first noted when fish died in an aquarium that had been dried, disinfected, and heat-sterilized after holding some Pamlico River water taken from a fish kill zone. And while tests have turned up three natural predators, the presence of one predator, a protozoan called *Stylonichia*, stimulates conversion of uneaten *Pfiesteria* dinoflagellates into a giant amoeba stage that often preys upon the *Stylonichia*.

Where To Go From Here?

Despite progress in understanding *Pfiesteria*, more needs to be known about its behavior, stimuli, and long-term impact before decisions can be made on how -- or even if -- it should be controlled. In particular, researchers need to determine whether *Pfiesteria*'s presence marks a major change in the traditional food web of A-P waters. If it does, then gradual and unpredictable changes in larger species groups could follow, brought about not so much by the highly visible fish kills, as by more subtle changes like impaired recruitment of juvenile fish into the estuary or shifts in the makeup of phytoplankton communities.

Sound Bites

news and notes about the A-P Study and other environmental issues



POST-APES FOUNDATION CONSIDERED

The possibility of establishing a non-profit foundation or other organization to further the goals of the A/P Study after its conclusion will be considered as the Study moves toward completion of its CCMP.

Mike Orbach, chair of the Public Involvement Subcommittee of the Study's Technical Committee, and Public Involvement Coordinator Joan Giordano, are heading consideration of the idea. They are interested in receiving comments on potential structures and functions of such a group.

Several other studies commissioned under the EPA's National Estuary Program have created post-study foundations. Purposes of the organizations vary, but most serve as educational outlets or issues forums for their estuarine watershed.

A discussion of post-study foundations can be found in the CCMP's Public Involvement and Education plan (Sec. IX, p. 10-13). Direct comments to Joan Giordano, (919) 946-6481; or POB 1507, Washington, NC, 27889.

ADVOCATE MAILING LIST

To get on or off the Advocate mailing list, or to change address, write to: A/P Advocate, POB 1507, Washington, NC, 27889.

REDUCING EROSION WITHOUT BULKHEADS

A new publication on how to control shoreline erosion with alternatives to bulkheads is now available from UNC Sea Grant. With partial funding from APES, Sea Grant studied the erosion control provided by planted marshes and offshore breakwaters. In addition to being beneficial to estuarine function, the study found that marshes and breakwaters minimize erosion on most low-slope shorelines and cost less than bulkheads.

To order Shoreline Erosion Control Using Marsh Vegetation and Low-Cost Structures, send \$2.50 to UNC Sea Grant, Box 8605, NCSU, Raleigh, 27695.

CCMP ECONOMIC CHARACTERIZATION

Economists from Resource Analytics Inc. and N.C. State University are nearing completion of an economic characterization of the CCMP. This research will help establish a framework for measuring the potential economic impacts of CCMP recommendations.

The framework will include methods for examining market and non-market costs and benefits of the plan for private and public sectors. The researchers will also consider economic impacts that could result from a failure to protect the regional environment (e.g., lost tourism and fisheries, contaminated groundwater).

THE ADVOCATE...

is the newsletter of the Albemarle-Pamlico Estuarine Study, a project funded jointly by the US EPA and the State of North Carolina, intended to develop an environmental management plan for the Albemarle-Pamlico sounds system and rivers. The Study is part of the EPA's National Estuary Program. It is being conducted within the N.C. Dept. of Environment, Health and Natural Resources, POB 27687, Raleigh, NC, 27611-7687.

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