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## FUTURE OF VIRGINIA FISHERIES EXPLORED

"Man makes attempts to control the natural environment, but generally is only successful at excluding it, for example, by building a well-insulated home," observed Dr. Herbert M. Austin, Assistant Director of the Virginia Institute of Marine Science. Austin discussed major environmental impacts on marine resources from the scientist's perspective at the December 1979 Conference on Virginia Fisheries and the Environment. Other Conference participants presented the views of commercial fishermen and government regulators.

The Conference, funded by the Virginia Environmental Endowment, was sponsored by the Marshall-Wythe School of Law with the cooperation of the Virginia Marine Resources Commission and the Virginia Institute of Marine Science.

The consensus of the participants was that marine resources have been given a piecemeal management approach for too long. With increasing man-made insults and continuing natural stresses on marine ecosystems, a more unified approach to controlling man's impacts is essential. Austin identified one of the major dilemmas facing the scientific community: "Man has trouble identifying natural environmental fluctuations, much less controlling them, yet the effects of man-made hazards can be exacerbated or mitigated by these natural fluctuations." Overfishing is the most significant man-made hazard affecting fisheries, he said.

Another man-made hazard was described by James Chambers, Chief of the Environmental Impact Division, National Marine Fisheries Service. He pointed out that the Portsmouth oil refinery to be built at the confluence of the Elizabeth and James Rivers will be upstream from 21,000 acres of oyster seed beds as well as the wintering area of female blue crabs. The anticipated spills of 1,000 barrels of oil every three years will create an environment toxic to both oysters and crabs. The lower James River will require 10 years to recover from such an environmental insult, Chambers said. In addition, spills of 5,000 barrels are anticipated every five years. Over the long term, these repeated spills could reduce significantly oyster and crab populations in the Chesapeake Bay.

Dr. L. Eugene Cronin, Director of the Chesapeake Research Consortium and Chairman of the Maryland Legislative Advisory Commission on the Chesapeake Bay, said the lack of data on fisheries hinders management efforts. There are no data on the fish stock of many species nor any data on the demands for certain species by commercial and sport fishermen, he said. Cronin used two examples to illustrate his point. At one time the James River had the greatest seed oyster productivity in the world, but productivity has declined in recent years. Shad and alewives are no longer plentiful in the Bay, yet no one knows why.

Cronin and Austin agreed that scientists should not select standards for management; the scientist and the agency decision maker must use a systems management approach. Virginia decision makers must include input from Maryland and Pennsylvania, as the activities of these states affect Virginia's fisheries. Austin

emphasized the decision maker's responsibility to use the best scientific information available, taking into consideration its limitations. He provided a chart of environmental problems Virginia decision makers must address (see box).

Part of the problem of managing marine resources is trying to regulate the fishing industry. Luie Fass, President of Fass Brothers fishing fleet, discussed some of these problems. Regulation has helped fishermen by providing investment tax credits and accelerated depreciation rates for boats, he said, but it has hurt fishermen by making them "cheaters" when they exceed regulated catch limits to make enough money to meet expenses. Fass saw economic conditions, such as rising fuel costs, as more effective in limiting foreign fishing on the west side of the Atlantic Ocean than treaties or legislation. He did see a need for incentives to develop fleets for harvesting each species to improve the cost effectiveness of operations.

The dangers of over-regulation of the fishing industry were addressed by Dr. Jackson Davis, Chief Scientist with the South Atlantic Fishery Management Council. Davis focused on regulating the benefits of resources, rather than regulating the finiteness of resources. This approach would avoid proliferating regulations which would not accomplish the long term goal of balancing the seasonal harvesting of fish with each species' reproductive limitations, according to Davis. Decision makers are going to have to stop "looking for a solution to please" and start "looking for one that will work," he said. As examples he outlined schemes to reduce economic incentives to harvest by limiting the season for a species, to further limit catches, and to reduce the number of people harvesting fish by issuing a limited number of licenses.

Another problem with developing a systematic framework for managing fisheries resources arises from the divided jurisdiction among agencies charged with management responsibilities. In addition, species which spend much of their life cycles at sea can only be managed effectively under international agreements. Mid-Atlantic Fishery Management Council member, William M. Feinberg, pointed out that "treaties and custom shape international law as well as unilateral action by a nation." At the national level the National Marine Fisheries Service has a legislative mandate to manage living marine resources, yet the Environmental Protection Agency sets national water quality standards. At the state level, the Virginia Marine Resources Commission manages fish and shellfish, but the State Water Control Board and Department of Health regulate the discharge of pollutants into state waters. Austin pointed out one effect of jurisdictional splits is that fisheries managers have little or no control over the water quality of the habitat, which is necessary for proper management.

According to John Wedin, Congressional Affairs Specialist for the National Oceanic and Atmospheric Administration, the Fishery Conservation and Management act (FCMA) of 1976 is one of the more workable statutes. By extending United States jurisdiction over coastal waters to 200 miles from shore, U.S. fishermen have first opportunity to harvest the fish within those waters, Wedin said. The FCMA was not intended to establish resource banks, Wedin said, so "if we can't harvest a crop, we can't deny the right to harvest to another country." The most valuable result of the statute, according to Wedin, was establishing the eight regional management councils to get the decision makers out of Washington, D.C., and into the regions affected by the Act.

The consensus of participants was that establishing the regional management councils under the FCMA was a positive step toward resolving the problems of coordinating resources management with industry regulation. The long term solution may be, as Dr. Austin suggested, that "we need to control not only the number of fish taken and the amount of chemicals in the water, we need to control the number and activities of people in the coastal zone."

S.C.W.

SPECIFIC MAN-MADE ENVIRONMENTAL IMPACTS			
<u>Problem Area</u>	<u>Problem in Virginia</u>	<u>Source</u>	<u>Biological Effects</u>
Pesticides Herbicides (direct purposeful injection to environment)	high near agricultural activities	<ul style="list-style-type: none"> <li>. agricultural run-off</li> <li>. spills</li> <li>. sewage treatment plants</li> </ul>	<ul style="list-style-type: none"> <li>. reduces photosynthetic abilities</li> <li>. impairs enzymatic activities</li> <li>. upsets nerve functions</li> <li>. closes fisheries</li> <li>. interferes w/crustacean molting</li> </ul>
Sewage	localized but chronic serious in some areas (25% of fresh water in James is sewage)	<ul style="list-style-type: none"> <li>. rural septic system leakage</li> <li>. urban sewage plant discharge</li> </ul>	<ul style="list-style-type: none"> <li>. chlorination toxic to larvae</li> <li>. bacteria cause fishery closures</li> <li>. eutrophication (see <u>nutrients</u>)</li> <li>. biological oxygen demand (B.O.D.)</li> <li>. toxic wastes, including heavy metals</li> </ul>
Temperature	localized	<ul style="list-style-type: none"> <li>. power plant effluents</li> </ul>	<ul style="list-style-type: none"> <li>. pumped entrainment causes physical damage to plankton</li> <li>. sudden temperature changes</li> <li>. migratory fish get trapped in warm water</li> </ul>
Petrochemicals	increasing	<ul style="list-style-type: none"> <li>. transportation routes</li> <li>. terminals</li> <li>. sewage</li> </ul>	<ul style="list-style-type: none"> <li>. lighter aromatic fractions are toxic</li> <li>. "taints" flavor</li> <li>. chromosome damage</li> </ul>
Heavy Metals	localized but potential problem	<ul style="list-style-type: none"> <li>. sanitary landfill run-off</li> <li>. antifouling paints</li> <li>. sewage</li> </ul>	<ul style="list-style-type: none"> <li>. lesions on internal organs</li> <li>. bioconcentration cause "tainting" (up to 2X weight)</li> </ul>
Nutrients	increasing in rivers	<ul style="list-style-type: none"> <li>. sewage</li> <li>. agricultural run-off</li> <li>. poor land management</li> </ul>	<ul style="list-style-type: none"> <li>. biostimulation of phytoplankton and aquatic "weeds" (causes blooms with large diurnal O<sub>2</sub> fluctuations)</li> <li>. changes food web structure</li> </ul>
Synthetic organics (PCB's, Kepone, plastics) (no direct purposeful injection)	Kepon in James PCB's relatively undocumented	<ul style="list-style-type: none"> <li>. accidental spills</li> <li>. manufacturing effluents</li> <li>. illegal dumps</li> <li>. landfill leachates</li> </ul>	<ul style="list-style-type: none"> <li>. inhibits zooplankton reproduction</li> <li>. bioaccumulation up to 50,000 times</li> <li>. direct toxicity to fish eggs</li> <li>. fish gill lesions</li> <li>. liver degeneration</li> </ul>
Freshwater diversion or inversion	in Potomac below Washington	<ul style="list-style-type: none"> <li>. metropolitan Washington (diversion)</li> <li>. sewage (James River)</li> </ul>	<ul style="list-style-type: none"> <li>. reduces available water flow, causes stagnation</li> <li>. reduces/increases salinity in estuary</li> </ul>
Radionuclides	potential	<ul style="list-style-type: none"> <li>. shipment</li> <li>. nuclear power plants</li> </ul>	<ul style="list-style-type: none"> <li>. radiation poisoning</li> <li>. genetic changes</li> </ul>
Dredging Dredged spoil erosion	significant in local areas	<ul style="list-style-type: none"> <li>. dredging</li> <li>. poor land use</li> </ul>	<ul style="list-style-type: none"> <li>. smothering of gill filaments</li> <li>. covering of benthic habitat</li> <li>. resuspension of toxics</li> <li>. chemical oxygen demand (C.O.D.)</li> </ul>

Source: Adopted from National Academy of Science/National Academy of Engineers, 1970.