9-7-1983

Ecosystem Management, an Alternative to Fisheries Management

Herbert M. Austin
Virginia Institute of Marine Science

ECOSYSTEM MANAGEMENT, AN ALTERNATIVE TO FISHERIES MANAGEMENT

BY

HERBERT M. AUSTIN
VIRGINIA INSTITUTE OF MARINE SCIENCE
COLLEGE OF WILLIAM AND MARY
GLOUCESTER POINT, VA. 23062

7 SEPTEMBER 1983

Marine Resource Report #83-10

ECOSYSTEM MANAGEMENT, AN ALTERNATIVE TO FISHERIES MANAGEMENT

Most states delegate habitat and living marine resource management to two or more different agencies. This split jurisdiction results in no centralized focus on resource management. There is either fisheries management, or habitat management. It is this constraint that is the basis for the discussion of this paper. The policy issues are: 1) Fisheries Management is exerted through a direct control on the harvester of the stock by limiting his catch; control is on the internal user, the person bound to the impacted resource. 2) Habitat management is unrelated to stock management. Most considerations are focused on physical-chemical alterations, generally with human health at the criteria for standards. Control is exerted on a non-user of the resource, a land based industry, for example.

A fishery has many components and problems; and each, be it Pacific Northwest salmon, Caribbean spiny lobster or Chesapeake Bay blue crab, is composed of both common (a stock and fishermen) and geogsaphically unique components and problems. The first component is the stock the species that is harvested.

The second component, the harvester, whether commercial or recreational, has the most direct of man's impact on stocks; and it is the interaction between stock and harvester that forms the true fishery. Many of management's most difficult and unpopular decisions are those that deal with the allocation of a stock of finite size between an apparently infinite number of harvesters. Both Maryland and Virginia have at least some idea of the number of commercial harvesters, primarily through the number of licences issued. Neither has much more than a general, probably vague, underestimation of the number of recreational harvesters.

The third component is the processors. While they do not have a direct impact on stocks, they must be considered, generally from an economic point of view. To some extent the processors influence the level of commercial effort as they are often the segment that sets prices, regulates the flow of products, and as the initial buyer, establishes demand. Their influence on the legislative process is significant in many instances, and because of this they can play important role in management.

A fourth, and often neglected component, is the habitat. The quality of the habitat, as demonstrated by water quality, is not fully considered. For example, wetlands and various construction permits over sub-aqueous bottoms are regulated, but fisheries management agencies have no authority to manage water quality. This is the purview of another

agency, in most cases. For example, when the Virginia Marine Resources Commission enacted regulations conforming to the proposed interstate management plan for striped bass, it asked the State Water Control Board to take similar action. The SWCB refused, preferring to wait until the EPA Chesapeake Bay Study made recommendations. The EPA study however, may not address the kind of specifics needed to protect the striped bass spawning grounds.

Most Chesapeake Bay commercial and recreational fin fish species are transient in the Bay and do not spawn here, although the anadromous species do. Most are only present during the spring-fall; and even anadromous species like the striped bass only spend 4-6 months in the Bay. Chesapeake Bay conservation efforts directed toward control of fishing pressure or habitat management can only be as effective as the weakest measures effected by neighboring states or the Regional Fisheries Management Councils.

The blue crab poses an interesting management problem as they are in the Chesapeake Bay system throughout their life cycle; but may be sufficiently density-independent (i.e. recruitment is independent of spawning stock size) as to defy traditional management. Reductions in available juvenile habitat could result in a reduction in stock viability inspite of interstate or bi-state stock management efforts.

Bay bivalve species, principally the oyster and hard

clam, are managed by internal state agency regulations or legislation; and although not subject to interstate management are an important considerations here. Transplantations can spread MSX, and local or state water quality standards, set with shellfish in mind, can influence the habitat quality for other species.

Stock management requires data and information on the current and future levels of abundance for each harvested stock. Long term stock assessment programs (monitoring) provide information on recruitment levels, and catch statistics give an indication of rates of mortality. Stock-Recruitment models have served managers for several decades as indices of future harvestable stock levels. More recently natural environmental variables have been documented as causing fluctuations in year to year recruitment success and are being incorporated into the spawner-recruit models. Anthropogenic pertubations are not currently considered in stock models, although water quality modeling is in many ways more advanced than the biological.

Three factors are responsible for abundance and fluctuations of fishable stocks: Fishing pressure, natural environmental variability (climate changes), and the problems associated with poor water quality, or pollution. No single factor can usually be singled out in the highly variable and impacted estuarine systems such as the Chesapeake Bay, yet fisheries management is often conducted as if the effects are

seperate, distinguishable, and controllable.

A major consideration of the following discussion is the dichotomy between those charged with managing resource stocks, and those charged with managing the habitat. The management of the living marine resources of each state is vested with the marine resource management agency, the Maryland Department of Natural Resources, and the Virginia Marine Resources Commission. Each fishery management agency manages the resource by exerting control over the harvester. This harvest control is effected through season, size, gear, and catch limitations. It is not always biologically based, as socio-political criteria often play a dominant role.

Habitat requirements vary during different life stages, and from species to species. Most species have differing requirements of temperature, salinity, and forage on their spawning and nursery grounds than on their wintering or summer foraging grounds. Further, their abilities to tolerate fluctuations change as they grow. For example, most juveniles can tolerate fairly large fluctuations in salinity, but are intolerant to low Oxygen. Adults, on the other hand, may be fairly intolerant to salinity fluctuations, but tolerate lower Oxygen, or are capable of local migrations to seek optimal conditions.

Considerable concern has been generated during the last decade over changes in the water quality of the Bay and

its tributaries. Bivalves, good environmental integrators, are generally incapable of adjusting to changes through migration, and can only relocate through passive transport of spawning products. Marine spawning finfish, although generally no more tolerant of pollution, are less impacted as their oceanic spawning grounds are not polluted. Further, their residence time in polluted waters is less as they migrate seasonally. This is further modified by the abilities of some to depurate. Anadromous spawners, on the other hand, spawn in those very areas were man's estuarine impacts are often the greatest; and their young often spend the first one to two years in the system. These areas, in the fresh water just above the estuarine salt wedge, were at one time more attractive to industry than as esthetically pleasing areas to fish, boat, or persue other forms of aquatic recreation. The consequence has been a long term degredation of the biologically active areas of the riverine system, critical to th early life history of the anadromous spawners. A trend that is hard to reverse, even aftr recognized.

Habitat management can be far more difficult and complicated than stock management. A major difference is that control is exerted on an "external user". Fisheries management, discussed above, is effected by direct control of the industry, the fisherman. Habitat management on the other hand is affected by controlling an external industry, removed from being economically dependent upon the living marine resource. Farmers for example, are not directly nor

economically dependent on the living marine resources of the Bay, nor are the sanitation district plants with treated sewage outfalls. Yet these external users, who exert pressure on the stock through their negative effects on water quality, can potentially neutralize the regulatory efforts of living marine resource management agencies, or legislative actions by the states' legislative bodies.

Control of point or non-point source pollution is difficult. Marine Police can arrest an offending waterman, but when a multi-million dollar corporation pollutes a river, and causes an unnoticed mortality, there is often no penalty. Controlling the harvest level of a stock is a method of rapidly reducing mortality and potentially increasing recruitment, it has been demonstrated in the James and Hudson Rivers that reduced harvest level resulted in an increase in the stock (evidenced by increased or steady juvenile indices) inspite of the historic and highly publicized pollution problems.

In fact, in most instances control of the harvester is the only avenue available to the state Fisheries Management agency; and it has been shown to be effective, particularlly when a stock is "seriously" depressed as the striped bass and shad are currently. Striped bass fishing pressure must be relaxed immeadiately. Concurrently however, and for the long run, the spawning and juvenile habitat must be improved.

There is no panacea, and in all honesty it must be pointed out that pollutant impacts on biota, particularly the abundance of harvestable stocks, are hard to document. Reduced water quality or toxic burdens can be shown correlatively to impact a stock, but often the causative relation is absent or unclear. Further, improvements in habitat quality, expensive economically, are hard to quantify, consequently harder to effect. The synergistic effects of over-harvesting, climate, and reduced habitat quality and area further complicate quantification of cause and effects.

The criteria for many water quality standards are based on human health. Can we drink the water, can we eat shellfish from the water, can we swim in the water? The question, can fish, oysters, or crabs spawn in the water is generally not asked. Anthropomorphically we express the concern whether or not a neighborhood is a good place to raise children, but we do not express sufficient concern over the possibility of a Chesapeake Bay tributary not being a good place to raise rockfish. Water sanitized to drinking standards may be toxic to fish eggs or larval oysters.

A <u>policy issue</u> to be raised by these proceedings is the need for additional water quality standards, from the occupants' perspective. These standards should become a part of each fishery management plan, in-state, bi-state, or inter-state. Certainly a good place to start is the <u>formulation of a statement of policy on the management of the</u>

living marine resources of the Chesapeake Bay. A clearly stated set of goals or objectives and standards by which to measure progress . Through the Bi-state Agreement the Governors agree to management of the living marine resources of the Bay, not as if they live in a vacuum, but as part of the ecosystem. Plans for their management would be part of an integrated ecosystem or "water shed" management plan that would define Maximum Habitat Yield. This would include consideration toward balancing agricultural yield or producion, industrial output, and yield from living marine resources. For example, a farmer along the spawning reaches of the Rappahanock River might be encouraged to place additonal acerage in the PIK program if he normally sprayed herbicides duing the peak of striped bass spawning. In fact, some farmers may not even be aware of what their neighboring marine resources are doing.

Perhaps the Sea Grant advisory agents need to get out and talk to the Land Grant extention agents. Sea Grant and Land Grant advisory agents, working together, could provide an educational forum for farmers to promote a better understanding of the marine impacts of modern agricultural practices.

Legislative mandates to resource and habitat management agencies would require that habitat requirements be part of any Fishery Management Plan; and conversely, that "occupant" habitat requirements be considered in any Water

Quality Management Plan.

Nothing happens overnight, consequently a stepped, orderly implimentation needs to be effected over time. Three recommendations are suggested:

1. Bistate Fishery Management Plans should be drawn up following the general format of the current Interstate Fishery Management Plans (ASMFC), or Regional Fisheries Management Plans (MAFMC), modified to include habitat requirements and standards of control. Trade-offs between marine and terrestrial resources or industry will undoubtably be common. Consideration should be given to eventually managing by fishery rather than stock. In otherwords, a Pound Net Fishery Management Plan or a Gill Net Fishery Management Plan would be developed as these fisheries take several species simultaneously.

2. Eventually, by the end of the decade, the management plans should be by ecosystem or watershed. For example, a York River Drainage System Resource Management Plan or a Choptank River Drainage System Management Plan. The existing Bistate Fisheries Sub-Committee, already in place and active, would be a good focal point to initiate the effort, augmented with represntatives from state Water Quality and land use agencies.

3. The Maryland and Virginia representatives to the

Atlantic State Marine Fisheries Commission should be directed by the Governors to support inclusion of state agencies water quality representatives on the Scientific and Statistics Committees that are currently charged with initial Interstate Fisheries Management Plan development.

A statement of policy, by the Governors, that fisheries management will take habitat quality requirements into consideration; and that water quality standards will take living marine resource requirements into account is the only way that the various state agencies, with differing criteria for standards, can arrive at ecosystem management for the Chesapeake Bay.