

## COMPETITION FOR AQUATIC ENVIRONMENT

By Dr. Roland F. Smith\*

Every day millions of Americans find their existence a little more complicated and unpleasant--even endangered--because of the direct or subtle effects that come from competition for the three primary resources--land, water, and air. Our technologically oriented and affluent society, with its pressures and demands on natural resources, has drastically changed many environments beyond recognition and, in some cases, to the very limits of human tolerance.

Quite literally, every corner of this country has been subjected to environmental change, much of it not even anticipated only two decades ago.

Because of environmental loss and degradation, and because of the many demands for specific environments and their associated resources, there will not be enough of some space and some resources for all. Indeed, our commercial fisheries are already affected by the competition that results--competition for environmental quality, space, and for the fish themselves.

Our high seas fishing fleets find competition from other nations increasing each year and, more recently, even our traditional coastal fisheries are being threatened. As critical as this competition may be, generally speaking, we have been more successful in compromising our conflicts with foreign fishing nations than we have been in solving problems at home.

### Competition for Estuarine Areas

Nowhere is competition for environment and associated resources more acute than in our estuarine areas. These are most threatened by population pressures and technological advances. Their fate has been one of steady deterioration and destruction. Relatively few people fully comprehend how vital our estuarine areas are to the Nation, how varied and complex are man's activities here, nor what their total impact is on the economic and social lives of our people.

Estuarine areas are bounded by land on the one side and ocean on the other. Their exact boundaries are difficult to delineate for they are a complex blending of earth, air, and water; they are a continuous band--a buffer zone--around our coasts, sometimes extending for hundreds of miles either into the land or the ocean. They constitute a variety of environmental systems in a complex interrelationship we are only just beginning to understand. Most of these estuarine areas are extremely productive of a variety of life. They exceed by severalfold the organic production in the richest of farm lands because they are a remarkable system for the containment and efficient utilization of the essential building blocks of organic matter--minerals, water, and sunlight. Ironically, the very forces which make estuaries such efficient nutrient traps also make them effective silt traps and giant septic tanks.

The Bureau of Commercial Fisheries is interested in estuarine areas because about 65 percent of our commercial fishery resources, by volume or value, consist of species which spend at least a portion of their life cycle in the estuarine environment. They support 7 of our 10 most valuable commercial fisheries. Among the 9 important groups of species which are canned, 6 are dependent on the estuarine environment.

### Estuaries Produce Significant Amount of Oxygen

Incidentally, there maybe a more compelling reason for preserving our estuarine areas than that of providing seafood, recreation, hurricane protection, and natural beauty--as important as these may be.

Scientists are becoming increasingly concerned about the rate with which we are using up oxygen in our atmosphere. Indeed, recent estimates suggest that if man is to survive on this planet he will soon have to stop burning fossil fuels. Nearly all of the oxygen in our atmosphere is produced by plants through

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photosynthesis. It is estimated that perhaps as much as 70 percent of this oxygen is produced by microscopic plants (plankton) which live in the ocean.

A recent estimate suggests that the United States is using up more oxygen than our land mass is producing. This means that the United States is already dependent on oxygen being produced by marine plants or on other land masses. A significant amount of oxygen produced in the world oceans may come from estuarine and coastal waters. If we destroy the natural systems that permit such abundant marine plant growth, we may be seriously reducing the total world production of oxygen.

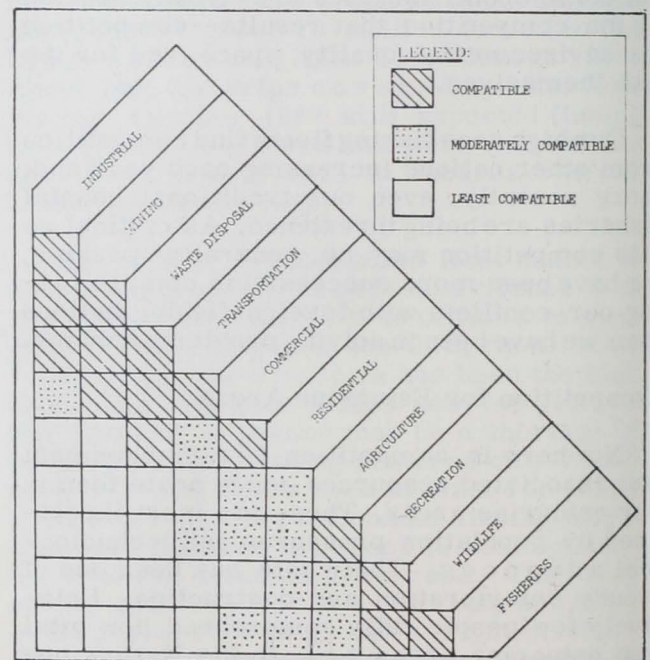
With all these demands on the Nation's coastal and estuarine systems, it is not surprising that they have become arenas where many of our basic philosophies and social institutions clash--where national, State, local, and private interests continually battle for recognition and control. However, there is increasing evidence that the public is getting fed up with the rampant environmental decay and rape of these valuable areas. Responsible administrators, scientists, and legislators are showing increasing concern with confusion that leads only to more chaos. The mass dissatisfaction that this reflects and amplifies may slowly help to evolve a public ethic and a recognition of the need for changes in philosophy and in governmental structures and responsibilities. Certainly, in the face of accelerated demands on coastal areas, we must consider how they can be better managed. But, who is to decide how a given area will be used? And how do we apportion the needs of the many competing and conflicting uses?

Ultimately, many estuarine areas will be administered as regional units, possibly as parts of large river basin complexes. This concept is gradually becoming recognized as perhaps the only logical approach to sound management of coastal areas. Zoning, in time or space, will become a common practice in most estuarine systems.

#### Impact On Commercial Fisheries

How may we expect our commercial fisheries to thrive under a more controlled and intensified management of estuaries and coastal areas? Surely this will be more acceptable than no controls or uncoordinated local actions. However, the problem of justifying the continued existence of specific commercial fisheries will be increasingly difficult in many areas in the face of uses with higher economic or social values. Commercial fishing interests must recognize that they are going to have a tough selling job in many cases. Promotion programs should not only be designed to sell fish, but to sell the public on how they stand to gain by supporting a strong commercial fishery in coastal areas.

Commercial fishing interests must work actively not only with those whose uses of estuaries and coastal areas are compatible, but to willingly seek for compromises with those whose uses may be only moderately conflicting. By joining forces with recreationists, nature lovers, hunters, sports fishermen, planning groups, civic associations, and even waterfront home owners, we have allies with many common goals (see Figure). Thus, we represent a much stronger force against those who would seek to completely destroy our valuable estuarine living resources. There are many excellent examples of how industry support, even leadership, can be especially effective at the local and State levels.



Compatibility of uses in estuarine zones.

#### Responsibilities of U. S. and States

A primary role of government--State and Federal--is to determine what we have, what it is worth, and how we can take care of it. Those agencies with responsibilities for man-



agement of estuarine fishery resources have specific responsibilities, which collectively include 7 major areas of effort:

1. Inventory all estuarine areas showing their condition and potential for supporting valuable fishery resources, what is happening to such areas, how they are being threatened, and what estuarine-associated fishery resources are present.

2. Acquire more specific knowledge about the life histories and environmental requirements of estuarine-dependent species.

3. Expand fundamental research in estuarine systems to include studies in productivity, hydrology, nutrient circulation and transfer, species interaction, and biological indicators of environmental change.

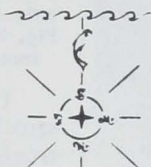
4. Develop a sound basis for determining the economic benefit from natural estuarine areas and their living resources.

5. Eliminate institutional barriers that prevent sound and equitable management of estuarine areas.

6. Develop sophisticated techniques to predict effects of proposed environmental alterations on fishery resources.

7. Develop more sophisticated estuarine husbandry programs, including techniques for increasing fish production by alteration of currents, mitigating effects of environmental alterations, controlled use of water products, control of diseases and predators, and development of genetic studies more suited to moderately disturbed habitats.

Generally speaking, efforts to date have not been adequate, but the problem has been recognized and some effective programs are underway. I am convinced that with increased knowledge, and supported by informal public opinion, we can maintain and perhaps even increase production of estuarine fishery resources. I am also convinced that commercial fishermen can compete effectively for many of these resources, and commercial fishing will be an integral part of most plans for managing coastal areas.



#### ANTARCTICA'S MICROBIAL LIFE

Studies of Antarctica's microbial life are expected to provide information useful in developing life detection equipment for automatic landing devices planned for Mars.

Life in the form of algae and bacteria has been located in a dormant stage at temperatures as low as  $-47^{\circ}$  F.

These microorganisms, dormant during the winter months, have been discovered about a foot beneath the surface in the volcanic soil of Antarctica's ice-free Taylor Valley. They become active only with the summer flow of run-off water from the glaciers located in the mountains above the valley. Algae, which require sunlight as their source of energy, are believed to exist in a dormant stage at temperatures below  $-60^{\circ}$  F. (Reprinted with permission from "Science News", weekly summary of current science, copyrighted 1966 by Science Service, Inc.)