

PRESSURES ON FISHERIES RESOURCES

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Abstract: Fisheries resources are profoundly influenced by decisions made outside the direct purview of the fisheries scientist. Contemporary society has and will continue to impose greater burdens on the resource. As a common property, public policy makers have an obligation to recognize fishery resources as an inherent value to protect when using water for other purposes. This often has not been done in the past and will not in the future without a better understanding of and a more vocal voice in behalf of fisheries resources. Unilateral action by the fishery scientist will not achieve adequate protection of aquatic resources. Sympathetic and informed citizen involvement in questions of water policy, water law, and water management in relation to fishery requirements is needed. The fishery scientist should actively seek and encourage citizen conservation groups and join with them in an alliance in the decision making process.

The subject on which I've been assigned to comment leaves one with an immediate challenge. Where do we start? Expertise for such a subject must come from many fields and our time is limited. We can, however, touch on some major factors which I believe to be pertinent to the question.

Since a later paper is scheduled to cover "Pressures on Ocean Resources" I will confine my remarks essentially to the freshwater environment.

In talking about fishery resources it seems appropriate to establish certain elemental but basic points of reference.

First, the legal status of this resource in its natural state is one of common property. It belongs to all the people and its exploitation for any purpose is regulated by government as the steward. Its reduction to private property is legally achieved only as prescribed by regulation, statute, or treaty. As a public property there is an inherent obligation to maintain this resource as a continuing value in our society.

Second, its existence is, in the first instance, dependent upon the continuing

availability of a suitable aquatic environment. Without this fundamental need, this resource cannot continue to exist. Therefore, both the quantitative and qualitative character and availability of water is paramount. This suggests that the major thrust in fisheries effort be directed at existing and pending water policy, law, development, and use.

Third, fisheries science per se is sufficiently advanced to provide a continued and dynamic fishery because the tools are available and the resource itself is enormously productive. This state of the art, however, does not relieve the professional from continually improving the competence of the profession.

Fourth, distress to the resource, where this has occurred, is largely a product extraneous to the direct omissions or commissions of the fisheries manager within his own discipline; it is, however, partly a product of too narrow a horizon on the part of the profession.

Assuming the foregoing premises are valid it would seem appropriate to examine briefly some of the contemporary and potential factors in our society which relate to these premises.

According to an Associated Press report under date of January 1, 1970, the United States gained almost 25 million people in the decade of the 60's. The U. S. Census Bureau estimates that from the 204 million population base of 1970 we will experience a possible 14% increase during the 70's, reaching at least 225 million and possibly 250 million by 1980. More people simply means more pressure both directly and indirectly on all resources, of which certainly fisheries will be included.

Water is a fundamental requisite in most of man's economic enterprises and in his day-to-day living. Expansion of industry means increased water requirements. We have the dubious privilege of being party to a Gross National Product syndrome in which we seem to require an ever ascending production to thrive. Current forecasts tell us our economy will grow at an annual rate of 7% during the first half of this decade and reach a Gross National Product of \$1.4 trillion by 1975. Industry requires water and lots of it. A ton of processed aluminum needs 32,000 gallons of water; a ton of paper from pulpwood up to 184,000 gallons; a ton of synthetic rubber 660,000 gallons, and so on. A one-family house with four people living in it uses 550 gallons of water every day of the year; an apartment complex housing 1,000 people requires 50,000 gallons a day; a 400-bed hospital must have about 100,000 gallons a day. In the mid-50's irrigation, our heaviest user of water, represented 60% of our total water use -- and much of this firmly established by law under the western water Doctrine of Appropriation, in which first in time is first in right. Use of water spray for frost control now poses another demand in agricultural production.

You are all familiar with this region's energy needs. They are equally formidable nationally. Local utilities are confronted with a compelling requirement to double their generating capacity in the next eight years. In other regions it is not much better, with a doubling within a decade in their forecasts. By 1980, it is contended that one-fifth of the available fresh water of this country will be required for cooling in the generation of electricity. Suffice it to say that energy need is a

major pressure factor often inimical to some fish resources.

As you all know, our water supply is a fixed amount. Simply stated, it is merely recycled in a continuing rhythm from the ocean to the atmosphere to the land and back to the ocean either over the land or in subsurface flows. We have just as much now but no more than we ever did. Except through the technology of water management, land management, or by weather control and desalination, we will not have more of it in useful form. In this context there are two paths of interest in which professional fishery workers need to get more directly involved. Past water development and use activities have often done great violence to indigenous fishes and related aquatic resources. With increasing frequency other water user-interests are likewise reflecting on and reviewing past water development programs with a view to up-dating water management programs, in order to improve the yield and increase the efficiency of use of water. There are, I am sure, opportunities inherent in such concepts wherein physical modification of existing structures, reallocation of water in which fish are legally provided for, and advancing the many disciplines embraced in fisheries science with their prompt application in management.

Although it is necessary and desirable that those vocationally engaged in working in the vineyard of a particular profession maintain continuous communication with their immediate associates, this is not enough. Many of the past brutalities imposed on aquatic resources were done unbeknownst to the engineer, miner, contractor, or agriculturist. A stream, natural lake, or estuary means different things to different people. To an economist it may be one thing, to a farmer another, and to an aquatic biologist yet another. It has only been in recent years that serious efforts have been made to coalesce related disciplines in major resource questions. No place is this more important than in the early planning stages and before a final and irrevocable decision has been made with respect to water use. It is not enough to consider a water development project strictly from the standpoint of economics and engineering. Nor is simply the addition of aquatic biologists to planning staffs adequate, although it helps. A composite of many considerations and concepts need be cranked into such a process.

Within the continental context of water resource development, considerable thought and planning is being given to the interbasin transfers of water. More than one plan has been reduced to a schematic design. Some envision major transfers of large volumes of water great distances to supplement local water supplies. The major thrust of these studies have, insofar as I can ascertain, dealt primarily with the engineering and economic aspects. It does not appear, at this time at least, that serious environmental or biological inquiries have been made an integral part of such studies. If this be the case, yet another pressure will be imposed if such major projects were to ever become reality.

Regional river basin commissions have evolved, covering the major natural drainages of the nation. These are congressionally constituted creatures and are developing a great deal of data which in due course will influence policy with respect to water resources. Among the various values to which these bodies address themselves is that of fish and wildlife. A technical committee develops the data on fish and wildlife, as is done with such subjects as water supply, pollution, hydrology, power

planning, and other values. Final recommendations, however, will be made by the policy commission. The extent to which fishery values are recognized on a regional basis at the policy level can be markedly influenced by the positive degree of recognition given to this value by a commission of this type. During the past 60 years over 20 national commissions have also addressed themselves to the subject of water problems. Two are currently underway and have been soliciting views from all areas of interest. Historic contributions from past water study groups are not encouraging, insofar as fish are concerned.

There are, as you all know, a myriad of both state and federal laws dealing with water, its supply, quality, and use. They all, in one way or another, influence pressure on fish and hold a vital place in the future destiny of fisheries resources. In large measure, the degree to which fisheries resources are, now or in the future, recognized in basic water law will determine the extent to which pressures on the resource can be managed and maintained for fish.

Some authorities have observed that pollution is the greatest problem of our age. Certainly, it is one of the most formidable to fisheries. This group is abundantly aware of it as a major factor in fisheries management and no great revelations would be achieved by discussing it in its various and many forms to this group. From lake eutrophication, accelerated by more people and methods of land treatment on the uplands, to heat dissipation from thermal discharges, it presents a frighteningly complicated array of factors which can depress, favor, modify, amplify, or eliminate fishes of a given environment. The customary water resource practice of converting more and more of our free-flowing streams into slow-moving impoundments, thereby triggering massive ecological changes, proceeds without letup. The release of an estimated 260,000,000 pounds of phosphorus and 511,000,000 pounds of nitrogen a year in the form of municipal sewage to surface waters is an example of too much of a good thing.

One might ask, what does the foregoing have to do with pressures on fish resources? I believe it has almost everything to do with it. From a fishery standpoint industry and people have historically meant reduced quantities of water in stream environments, massive and brutal disruption of the delicate ecosystems in the watershed and stream itself, and degradation of water quality. This trinity of factors, although having a direct and often violent impact on aquatic resources, arise from forces, concepts, and objectives which often have been regarded as outside the purview of the fishery worker. Most of our energy and attention, even today, is directed at the nuts and bolts of management and biology. There are outstanding exceptions, however, and no place are they more conspicuous than right here in California. In a state faced with formidable water problems for all purposes, some of the finest examples of vigorous, thorough, and able cases for fisheries resources have been made. The painful necessity of having to consider the fisheries resource in the complicated and urgent water manipulation programs is eloquent testimony to the dedication and courage of those charged with the welfare of this resource.

It is one thing to recite ad infinitum those factors which one may regard as significantly constituting pressures to fisheries resources. It is something else, however, to relate those to future opportunities of enhancing the resource.

Generally speaking, the desires or needs that we demand as a society determine in a large measure the nature of the environment which we either have or create. The resulting environment also determines the character of values we pass on to succeeding generations. Aquatic resources constitute one of those values which are profoundly influenced by our wants. It logically follows then, it seems to me, that there must be a major effort in behalf of fisheries resources in the arena of public debate and in public policy. Without it there is both a lack of public understanding and public concern, and in their absence the chances of accomplishing major fishery objectives are made most difficult.

Like all resource values, there are both conceptual and technical aspects to questions dealing with the place of fish in the scheme of things. There is an abundance of competent technical literature in the fisheries field and this is essential. On the other hand, little popular material is available, outside the interest of the angler or processor, which catches the fancy or helps the understanding of the average citizen. For example, the diverse and fascinating aquatic communities of a given stream are little known by the general public. The exquisite beauty and fascinating biology of invertebrate life below the surface of the water is largely unknown to more people than we realize. The profound dependence of some forms of aquatic organisms upon estuarine environments in their life history needs more public understanding. These characteristics of fish environment need many apostles and there are none better equipped to help in this than the fishery biologist.

In summary then, it seems to me that we must address ourselves to a dual set of objectives. The continued scientific excellence of the profession almost goes without saying. Of equal importance is the deliberate, positive, and able representation of the fisheries resources in policy planning, water development and use, and the law as legitimate components of our environment. Without the latter no amount of fisheries expertise will save or maintain the essential habitat upon which the resource depends.

For many reasons, among them too few professional fishery workers, one could properly inquire just how can we assure fishery considerations in water policy. Most important resource decisions are a product of citizen involvement. Such involvement relies strongly on counsel from technical or professional sources. It has been my experience that most water development projects, for example, are buttressed by a strong and vocal voice from community groups. Whether it be a reclamation project, a flood control dam, or a drainage scheme, the support of citizen groups is the rule rather than the exception. Seldom have projects or policies occurred as accomplished fact without some citizen organization urging the construction. With equal regularity, information, concepts, and technical advice are abundantly available from professional disciplines within agencies directly related to a project.

In like manner, citizen groups oriented to fishery needs are, in my view, as essential in fishery affairs as anywhere else. Through citizen groups, if afforded the technical assistance of the professional, much not otherwise possible can be accomplished.

Because the most serious pressures on fisheries resources arise from forces and interests outside the traditional realm of fishery management it is imperative that

there be a close and continued alliance between the fishery scientist and individual and citizen groups. In today's pressures for all resources the decision-making process embraces factors beyond and in addition to purely technical matters and scientific expertise. A strong and sustained bond between the scientific community and interested citizen groups is needed. Indeed, without it we will accomplish far less than is possible with it. In the final analysis, the yardstick of competence of the fisheries profession is measured best by the condition of the resource. Assistance from the guy who is interested and wants to help is as important to your profession as it is to any other. The opportunity is abundantly available. It should be fostered by all professional fishery and wildlife workers.