RESEARCH AND THE FISHERIES SERVICE'S SECOND 100 YEARS

PHILIP M. ROEDEL[1]

A year ago, in 1971, we celebrated the one hundredth year of a Federal fishery service. This was an occasion, depending upon the individual, for self-congratulation, a tabulation of a century of successes, wonderment that so many could accomplish so little in so long, and on the part of a number of us serious thought and study of where the first century had brought us and whence we might wish the second to lead us. What can we learn from the past; how should we change our ways if we are to cope adequately with problems as we see them today and foresee they will be tomorrow?

The first century had its moments of great success, its moments of failure, and we can expect the same in our second, hoping and planning that there will be more of the former and fewer of the latter. This first century began with the era of descriptive ichthyology, with fisheries science as we know it today growing from these beginnings. We can follow the development of the science from one essentially zoological—and a limited range of zoology at that—to one encompassing all aspects of biology, particularly physiology and genetics, and going beyond the biological sciences to oceanography, mathematics, and statistical analysis in our attempts to understand and predict fluctuations in abundance. Rather late in the first century we find food science entering as a partner in fisheries research. Only recently has there been an acceptance, unfortunately still given grudgingly in some circles, of economic, social, and legal research as legitimate fisheries tools.

The first century, until its last decade or two, was one in which the pace was leisurely. There was time for thoroughgoing analysis, for programs that satisfied the scientist's legitimate and proper desire to have a full understanding of the system he was studying before making pronouncements on or recommendations concerning its status or management.

To be sure, it was concern over the status of certain stocks that led to the establishment of the Federal fishery service in 1871, and of, for example, the California State Fisheries Laboratory in 1917, and the International Fisheries (now Halibut) Commission in 1924. The collapse of the Pacific sardine fishery in the 1940's gave warning that the pace of research might be too slow, that scientists might be called upon for recommendations based on—to them—insufficient evidence, that fisheries science could ill-afford internecine warfare, and that a new breed of man, the skilled biopolitician, was desperately needed if the findings of the scientists were to be translated into effective laws in time to do any good for an overfished stock.

It was also forced upon our attention in the remaining two decades of this first century that other nations had indeed developed a new breed of fishermen, one that has changed all the rules of the game.

The tremendous fishing power of the distant-water fleets, their worldwide mobility, and their capability for pulse fishing finally brought home to us toward the close of the first century the fact that fisheries now could be explored, developed, exploited, overexploited, and left to their fate in far less time than traditional methods of stock assessment could give an estimate of optimal yield. We found also that existing political and institutional arrangements were not capable of responding to these new pressures.

To cope with this we must turn to rapid assessment techniques, reliance on data that once would have seemed pitifully inadequate, to "quick

[1] Director, National Marine Fisheries Service, Washington, D.C. 20235.

Manuscript accepted February 1972.
FISHERY BULLETIN: VOL. 70, NO. 3, 1972.

and dirty" surveys that are an anathema to the purist but vital in what we see as the real world today.

This last decade—the 1960's—has also brought forth most clearly that resolution of environmental problems is critical if we are to have any fish left for us—or other nations—to fish or if we are to pursue aquaculture as a significant means of food production. This area of research, tackling as it does matters of environmental quality, of the impact of environmental degradation on living organisms and in turn on man the consumer, and of what can be done about it, must be one of primary concern to us as we move into the second century.

Another set of factors is influencing our course of action most strongly. Fishery scientists and administrators, particularly the latter, have always been cognizant of them but have not as a general rule faced up to them. These factors deal with the common property nature of fishery resources and the economic and legal problems associated therewith. Quite obviously, the finest biological research in the world is of little avail if proposals for utilization or management based on its results cannot be implemented. On the one hand, we have serious problems of allocation of available stocks among political and social entities; on the other we have a series of regulatory systems that tends generally to perpetuate economic inefficiencies and to lead to overcapitalization.

The biologist cannot cope properly with these serious and highly complex problems, though too often he was forced to try in recent decades because the fisheries field simply did not have sufficient professional talent in such areas as law and economics associated with it.

The need for economic research has for some years been recognized as essential, and work in this area is going on apace in both the Federal fisheries service and in several universities. Economics is not, however, the only "new" discipline involved in the fisheries problems we now face. Legal research, particularly in the field of international and constitutional law, is obviously pertinent. It is equally critical as we become more and more concerned with domestic allocation and control of fisheries and the allocation of resources among competing users of the environment. Are estuaries for fish, for industry, for marinas—or for all of them, perhaps plus something else? Is a given species for the sportsman, for the commercial fisherman—or for both of them, perhaps plus someone else? Here we move into a generally unplowed field and that falls partly at least within the purview of still another professional—the sociologist.

In Century I, fisheries science moved from ichthyology into fisheries biology, added other biological disciplines such as physiology and genetics, accepted mathematics and statistics as integral to success, incorporated physical oceanography, engineering, and physics into the fold, touched on meteorology, became deeply involved with biochemistry and food science, and opened the door to economists and lawyers. The future will hold a greater role for the social sciences and the legal profession, but it will remain the fisheries scientist (whatever he may be—some mix of biologist, ecologist, oceanographer, and mathematician) who will provide the requisite scientific data with which other disciplines can interact to provide the final synthesis upon which the administrator can base his decision.

Research in the Fisheries Service at present falls into three major categories: (i) biological, ecological, and oceanographic research of the sort traditionally conducted by fisheries biologists, including fisheries oceanography, population dynamics, inshore ecology, studies of contaminants and disease, aquaculture, a smattering of gear technology and instrumentation, and so on; (ii) fishery technology and marketing research; and (iii) economic research, this of necessity growing to encompass matters of a social, institutional, or legal nature.

All of this is being carried on so that we may fulfill our mission as we see it: to promote the wise use of living marine resources for their aesthetic, economic, and recreational value to the American people. Our basic objectives within the framework of that mission are to understand and protect living marine resources and the environmental quality essential for their existence, and to devise rational schemes for resource allocation and development.

We are thus striving for many things in our research program. If they are to be of maximum value, they must produce results that will assist us in our attempts to keep as many fishery management options open to the Nation as possible.

We need, then, reasonably precise measures of abundance of the living marine resources, and of their response to varying types and degrees of fishing pressure—foreign, domestic, sport, and commercial. We need to know of their distribution in time and space, of the impact on them of environmental changes whether induced by man or by nature. We must cope with a wide variety of technological problems, some of them requiring short-term responses. And economic, social, and legal research must concern itself with a wide variety of programs, ranging from rather basic economic analyses of each fishery, to developing means for overcoming such problems as property rights and split jurisdiction, and determining the economic and social benefits of fisheries resources to the Nation.

It is within this framework and toward resolution of these problems that our programs and efforts are being redirected as the Fisheries Service enters its second hundred years.