

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
Bureau of Commercial Fisheries

BRIEFING BOOKLET

PROGRAM REVIEW

Biological Laboratory, Woods Hole, Massachusetts

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## SUGGESTED SCHEDULE OF TOPICS

1. Welcoming Remarks. Consideration of time schedule.
2. History and development of the Laboratory Program. H. W. Graham.
3. The hydrography of our area of interest. Dean Bumpus and J. B. Colton.
4. Benthic studies program. R. L. Wigley and A. S. Merrill.
5. Sea scallop program. J. Arthur Posgay.
6. Groundfish ecology program. Raymond L. Fritz.
7. Cod program. Albert C. Jensen
8. Flounder program. Fred E. Lux
9. Haddock program. Marvin D. Grosslein.
10. Hake program. Bradford E. Brown.
11. Redfish program. George F. Kelly.
12. Population dynamics program. Richard C. Hennemuth.
13. Assessment of effect of foreign fishing program. Robert L. Edwards.
14. Experimental studies. Kenneth B. Cumming.
15. Resumé and recommendations for reorganization and further work.  
H. W. Graham.
16. Committee discussion.

**Habitat Improvement** Just as man can spoil the habitat for fish and shellfish resources, he can also alter it in ways that would support larger and more productive resources. So wise use should also include habitat improvement.

**Biological Research Problems** It is easy to state the principles governing wise utilization of living resources but extremely difficult to apply them. It is difficult because we do not have enough facts about most fishery resources or the environment in which they live to manage them intelligently. These facts are hard to get because most of them are hidden beneath the surface of the water and concern the subtle relations between aquatic animals and their environment.

Five broad categories of knowledge are needed, and the state of present knowledge ranges from good to poor approximately in the order listed:

1. Life histories--spawning times and places, ages and rates of growth, ages at first maturity, and migration patterns.
2. Population units--the extent of independent or degree of mixing between stocks of fish of the same kind.
3. Population renewal characteristics--effects of various rates of fishing on ability of stocks to replenish the supply.
4. Fluctuations due to natural causes--fluctuations in success of spawning and survival, and fluctuations in "availability" to the fisherman (vagaries of "fishing luck").
5. Environment requirements--what alterations in the environment increase or decrease its capacity to produce. This problem requires detailed study of lakes and oceans.

**Life Histories** For most important kinds of fish and shellfish, the principal life history features are fairly well known or will be well known within a few years as a result of projects now underway. Knowledge in this field is fundamental to all other fields, and the Bureau's plan proposes to continue life history studies on an adequate scale to complete them promptly. Many important details remain unknown, however, for even the best known species, and continuous effort will be necessary to bridge these gaps.

**Population Units** Research in population units is in a developing state. For example, the populations of Pacific salmon are reasonably well known in river phases and knowledge is accumulating rapidly on their distribution and mixing on the high seas. In a similar state is knowledge of Atlantic and Pacific herring, halibut, and sardines, Atlantic flounders, menhaden, and several others. The Bureau's plan gives priority to completing these studies in areas where the Government has primary responsibility.

**Population Renewal** Population renewal characteristics have been determined for only a few of the important sea fishes, halibut, salmon, haddock, and even here only partially. Halibut research by the International Pacific Halibut Commission of which the United States is a member has demonstrated dramatically the beneficial effects of controlled fishing on the increase of weight of fish through growth. The effects of renewal through reproduction have not yet been determined, owing in part to the slow growth and long life of this species. For most major Pacific salmon stocks, the Bureau has demonstrated the

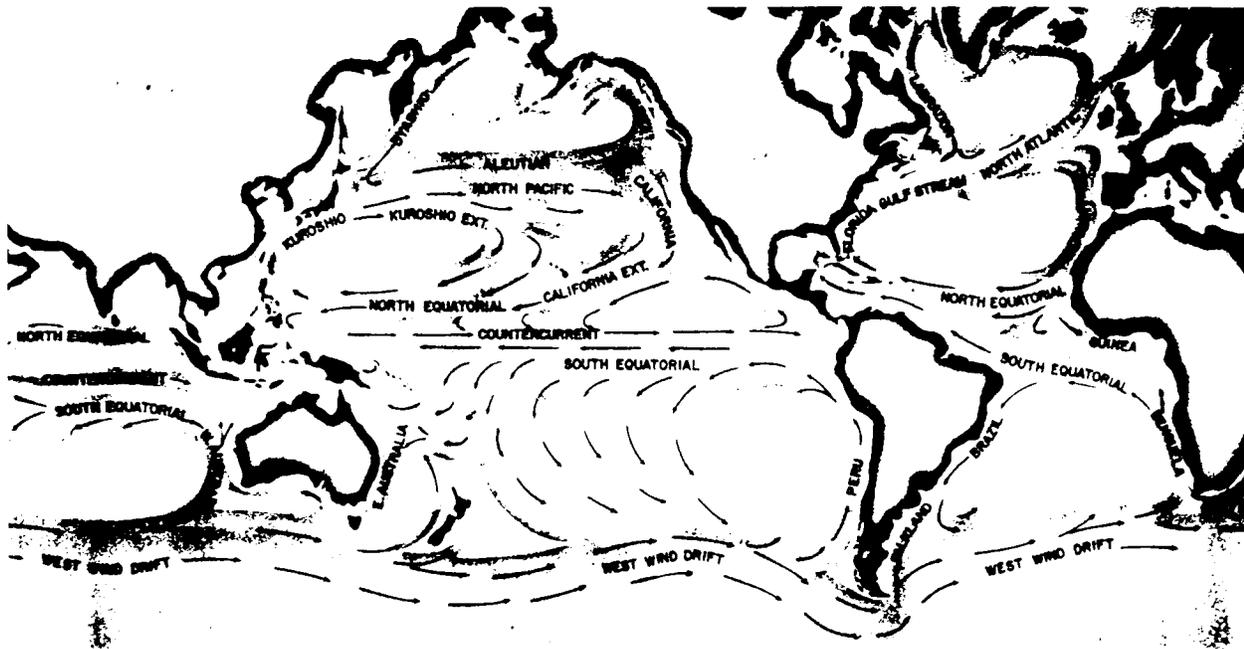
relationship between numbers of spawners and numbers of adults that return to support the fishery or to renew the supply, and thus has improved vastly our ability to restore these valuable resources to levels of maximum yield. This is necessary if the conditions for abstention by foreign nationals from fishing certain stocks of fish in the North Pacific Ocean are to be upheld. For haddock, under study by the Bureau in discharge of its obligations under the International Commission for the Northwest Atlantic Fisheries, small fish are being protected through controlled mesh-size of trawl cod ends. Preliminary results show a gain of 20 percent in productivity from this control measure alone. The effects on renewal through reproduction will not be known for some time. Even with respect to the above-mentioned species, knowledge is yet far from perfect. Much more information is needed about the optimum population renewal for most species, even those which have been studied for many years.

Research for Management

These two long-pursued researches demonstrate several very important principles. First, different kinds of fish require different kinds of management. Radically different treatments were necessary to provide favorable results. Second, extensive research led to proper choice of treatment. Third, salutary management results can be obtained as soon as research is able to estimate the response of each fish stock to various rates of fishing.

Research Takes Time

Progress in this kind of research is slow because observations must extend through several generations of fish and because natural fluctuations obscure the effects of fishing. Progress has been slower than it will be in the future if adequate support is given to the employment of more well-qualified personnel and to the use of modern instruments and modern machine methods of handling data. The Bureau plan promises this needed support and proposes to give priority to those resources for which the Federal Government has primary responsibility and which are in greatest need of research.



The World Ocean, covering 73 percent of the earth's surface, will be called upon in the future to produce an ever-increasing quantity of human food.

## Natural Fluctuations

Natural fluctuations in abundance and migrations of fish stocks are so little understood that they must receive substantial attention in Bureau plans. However, in this field the Bureau has begun to explore methods of attacking this problem. At its La Jolla laboratory, where the Bureau participates jointly with four California public and private institutions, and at its Woods Hole laboratory, where it is investigating North Atlantic fisheries in cooperation with 12 other nations, the Bureau is attacking the problem as it is manifested in two species, the pelagic sardine and the demersal haddock, about both of which much is already known biologically. A much smaller but equally important project conducted directly by the Bureau is the study of broad-scale oscillations in meteorological and oceanwide sea conditions in the Pacific and Atlantic Oceans in relation to the fluctuations of any fisheries for which sufficient biological and historical data exist.

## Estuarine Protection

Many people think that only the rivers are affected by man's activities. But bay and estuarine fisheries for species such as the clam, crab, oyster, and shrimp are also affected by changes in the amount and quality of river flow. Further, their habitat is being increasingly altered by dumping of wastes and by engineering works in the estuaries and bays. Thus inshore waters are affected by pollution, by silting, and by physical changes such as channel dredging and "reclamation" of vast tidal areas. Natural conditions for the productivity of fish and shellfish in these waters can be improved after finding out what conditions are favorable for these fisheries. Then those conditions can be produced in bays and estuaries. The Bureau believes work in this field is most urgent and can be most rewarding in waters which are readily altered by man.

## Pesticide Research

Pollution of our natural waters, including that from pesticides, poses a serious threat to the commercial fisheries of the U.S. This is true of the freshwater fisheries of the Great Lakes and the Mississippi River, the growing expanse of reservoirs created by dams; fisheries for salmon, shad, striped bass, and other important fishes which spawn in fresh water but live most of their lives in the sea; fisheries for shellfish or migratory marine or estuarine fishes of our coastal waters; or even the rapidly developing distant water high seas fisheries of the world.

That part of the Department's pesticide research program carried on by the Bureau of Commercial Fisheries has two objectives: To determine how chemicals can be used with advantage to improve fishery harvests and to guard against the adverse effects of pesticides in the aquatic environment, whatever their source.

Pesticides can be an important tool in controlling undesirable competitors and predators on important food fishes. Research is needed to study chemicals which attack certain animals, such as the pesticides which have been developed to kill larval sea lamprey in the Great Lakes. These chemicals are quite specific for the sea lamprey larvae and can be applied at very high dilution rates. Other examples are the specific chemicals which have been discovered to be effective in killing predators of oysters on oyster grounds. Obviously, adequate testing of these specific pesticides is necessary in order to protect the public welfare. Nevertheless, there are great advantages to be gained by the use of chemicals in undesirable species without harm to those that are desirable.