

UNITED NATIONS  
GENERAL  
ASSEMBLY



Distr.  
LIMITED

A/CONF.10/L.2  
15 March 1955

ORIGINAL: ENGLISH

Item 9 of the provisional agenda

INTERNATIONAL TECHNICAL CONFERENCE ON THE CONSERVATION  
OF THE LIVING RESOURCES OF THE SEA

Objectives of fishery conservation

In accordance with the advice of the group of experts convened by the Secretary-General to assist him in the preparation of this Conference, technical papers on certain items of the provisional agenda were invited from a number of authorities. The Secretary-General accordingly has the honour to communicate the following paper by Dr. Michael Graham, Director of Fishery Research of the United Kingdom Ministry of Agriculture and Fisheries.

CONCEPTS OF CONSERVATION

by

Michael Graham

55

55-06701

172

CONTENTS

	<u>Paragraphs</u>	<u>Page</u>
I. Some early history . . . . .	1 - 11	4
II. Development of modern theory and practice . .	12 - 30	6
III. Review . . . . .	31 - 41	11
IV. Conclusion . . . . .	42 - 43	14
Bibliography . . . . .		16

#### ABSTRACT

1. From early times men have realized that enough mature fish must be allowed to spawn and sufficient young fish must be allowed to grow to a satisfactory size. Often, indeed, men have legislated quite prematurely when neither process was yet in danger. On the high seas, the salmon and halibut off the western seaboard of North America have provided object lessons in conservation. Those two examples are not necessarily to be followed blindly; but it is noteworthy that experience of them has led in the New World to emphasis on the maximum sustainable yield as the primary aim of conservation. Historically, the ills that have called for conservation have usually been fallen catch per unit effort, and smaller average size of fish. Evidently, remedying of those ills is expected to be incidental to increasing or maintaining the total yield.

## I. SOME EARLY HISTORY

2. A philosophy of conservation of fisheries is not the monopoly of any single country; but it is convenient to trace the early history of the concepts in one country where it is well documented, namely England, using that history as an example of what doubtless developed in many other parts of the world. We need only a few selected examples, and we may start with what is possibly the earliest example of regulation of fisheries in England, namely, the regulations for salmon fishing submitted to the King by the county of Cumberland in 1278 A.D., and approved. Those regulations included close times, restrictions on the use of nets and the provision of a gap between nets in the river big enough to allow a sow and her pigs to pass - later colloquially called "the King's gap". The preamble read as follows:

3. "Juratores de Lyth et Eskdale et Juratores de Cumberland et Allerdale presentaverunt quod magna destructio fit in aquis de Edene et Esk et in aliis aquis in Comitatu isto de salmonibus tempore quo salmones ascendunt ad friandum et similiter de salmunculis tempore quo descendunt ad mare ad magnum detrimentum totius Comitatus et omnium Comitatum adjacentium."<sup>1/</sup>

4. In 1376 the Commons petitioned the King of England complaining that "where in creeks and havens of the sea there used to be plenteous fishing, to the profit of the kingdom, certain fishermen for seven years past have subtilly contrived an instrument which they called 'wondyrchoun', made in the manner of an oyster dredge but which is considerably longer, upon which instrument is attached a net so close meshed that no kind of fish, be it ever so small, which enters therein can escape, but must stay and be taken. And that the great and long iron of the wondyrchoun runs so heavily and hardly over the ground when fishing that it destroys the flowers of the land below water there, and also the spat of oysters, mussels, and other fish upon which the great fish are accustomed to be fed and nourished.

---

1/ "The jurors of Lyth and Eskdale and the jurors of Cumberland and Allerdale have reported that serious destruction has been wrought in the River Eden and the River Esk, and in other rivers of that county, to salmon ascending to spawn and to salmunculi descending to the sea, whereby that county and all the adjacent counties have suffered grievous harm". Moore and Moore, 1903, p. 172. For full references, see Bibliography on p.

By which instrument in many places the fishermen take such quantity of small fish that they do not know what to do with them; and that they feed and fat their pigs with them, to the great damage of the Commons of the Realm and destruction of the fisheries, and they pray for a remedy". According to Moore and Moore (p. 174), a Commission was appointed to enquire into the matter. The commissioners met at Colchester, and reported inter alia that the net called "wondyrchoun" had meshes (masks) of the length and breadth of two thumbs. It is not recorded that there was any legislation resulting from this report.

5. The Act of 1558 claims, "For the preservation hereafter of spawn, fry and young breed of eels, salmons, pikes, and of all other fish which heretofore hath been much destroyed in Rivers and Streams, salt and fresh, within this Realm insomuch that in divers places they feed swine and dogs with the fry and spawn of fish and otherwise, lamentable and horrible to be reported, destroy the same, to the hindrance and decay of the Commonwealth."

6. According to Moore and Moore (p. 179) the Act of 1714 stated that, "as the breed and fry of sea fish has been of late years greatly prejudiced and destroyed by the using of too small size of mesh, and by other illegal and unwarrantable practices, no one shall use at sea, upon the coast of England, any trawl-net, drag-net, or set-net for catching any kind of fish except herrings, pilchards, sprats, or lavidnian,<sup>2/</sup> which has any mesh of less size than three and half inches from knot to knot, or which has any false or double bottom, cod, or pouch". The Act also specifies sizes for several species below which fish might not be sold.

7. The Act of 1791 was concerned with the maintaining or preserving "the several Oyster Fisheries within this Kingdom" as a great national object, "and whereas the laws now in being are not sufficient effectually to maintain and preserve the said fisheries and to prevent the destroying of the oyster brood".

8. The Act of 1843 was to carry into effect a convention made between Great Britain and France. One of its aims was to prevent collisions between different kinds of fishermen of the two countries, but there were a great many articles

---

<sup>2/</sup> Sand-eel - Ammodytes.

prescribing details of the fishing gears (Moore and Moore, p. 240). These included mesh regulations, for trawls, of one and three-quarter inches bar - that is along one of the four sides of a mesh - for herring fishing one inch and for mackerel one and one-sixth inches, with corresponding French dimensions. Meshes were also prescribed for other kinds of nets. Johnstone (1905, p. 9) states that those regulations were never enforced.

9. In 1868 a great deal of previous legislation was repealed: Johnstone says fifty acts in all. The ideal of unrestricted fishing was realized, and a fisherman was able to pursue his calling on the high seas "how, when, and where he pleased," in Huxley's words.

10. At the International Fisheries Exhibition in 1883 the late T.H. Huxley stated the doctrine that he and others of his generation had been successful in promulgating and which, indeed, has guided fisheries biologists ever since:

11. "Every legislative restriction means the creation of a new offence. In the case of fishery, it means that a simple man of the people, earning a scanty livelihood by hard toil, shall be liable to fine or imprisonment for doing that which he and his fathers before him have, up to that time, been free to do.

12. "If the general interest clearly requires that this burden should be put upon the fishermen - well and good. But if it does not - if, indeed, there is any doubt about the matter, I think that the man who has made the unnecessary law deserves a heavier punishment than the man who breaks it." (Huxley, 1884, p. 18)

## II. DEVELOPMENT OF MODERN THEORY AND PRACTICE

13. A Royal Commission meeting in the same year as Huxley's dictum, 1883, listened to arguments in favour of conservation measures. The evidence of, for example, A.W. Ansell, dealt with a reduction in average catch per trawler of soles and turbot, comparing the 1860's with the 1870's and 1880's. The report of the Commission was to the effect that they could not decide what amount of truth there was in the evidence that had been put to them, namely, that although there might be an increase in the total amount of fish brought to market, the takes of each vessel were smaller in spite of improved fishing gear, and that fish were really scarcer than formerly. (Royal Commission on Trawling, 1885, p. xxvii)

14. However, by 1893 a Select Committee of the British House of Commons was convinced by the evidence of the fall in catch per vessel, especially of soles and plaice, and a great falling off too in the size of the flatfish caught on the older grounds of the North Sea. This was in spite of an admitted increase in the total catch of all kinds of fish landed in England and Wales, for which, however, the fishing craft had to go further afield. (Select Committee on Sea Fisheries, 1893, p. iv)
15. Bompas (1885, p. 423) tells us that in 1880 Frank Buckland, two days before his death wrote the preface to his Natural History of British Fishes, in which we find (p. ix), "How are we to devise a mesh of net that shall let go the small sole and undersized fry of other fish, keeping the marketable fish only, allowing the others to escape and grow?"
16. In 1894 C.G.J. Petersen wrote about the decrease of the fisheries for flatfish in Danish waters (p. 58), "For it cannot well be doubted that the same area of sea would be able to give a quantitatively greater profit as a constancy, when we suffered the stock of fish to be as fully developed, as in the years before the too eager fishing commenced ...and then took exactly so much as the stock could reproduce by new growth."
17. In 1918 Baranov published the first mathematical model of the relation of vital processes (reproduction, growth and mortality) to the yield of the fishery.
18. In 1931 Russell's theoretical consideration paid attention to "C", the total quantity taken from the fishery during a year, or "yield". Russell did not thereby mean that the catch per unit of effort had to be excluded, as he often made plain to me in conversation. It happens that all theoretical study of fisheries must use the yield as the main variable to be determined, which tended to give it prominence as if it were the sole object of conservation. The conception of "optimum catch" (Hjort et al, 1933) reinforced that, and in the New World there was a gradual crystallization of opinion in favour of total yield as the primary objective of conservation.
19. In 1926, the United States and Canada agreed to regulate the halibut fishery, and in 1932 they did so by holding the total catch at a low level which it had reached in the depression of 1931. Since that date, an increase has been

allowed in the total catch, but there have been several other results including an increase in the catch per unit fishing effort, relatively greater than the increase in yield.

20. In Europe at about that time, the International Council for the Exploration of the Sea was renewing its effort to solve the problem of chronically depressed fishing. As Andersson wrote in the Foreword to the Jubilee Volume of the Council's Report (1952): "The Council has always upheld its original intention that the main object of its activity should be the benefit of the fishery ... Here the Council has obtained very positive results, the outcome of which is a convention for the protection of fish in the North Sea and the North Atlantic."

21. In the same volume, Graham (p. 75) mentions measures adopted and expresses the lack of definition of objective. "The Convention of 1937 was superseded by that of 1946, in which the mesh for distant waters, now including Icelandic grounds, was raised to 110 mm. and in all other waters covered by the Convention, that is from 48° northwards and from Cape Farewell to Vardø, the mesh was to be 80 mm. on the gauge. In addition a Permanent Commission was constituted, for consideration of extensions or alterations of the provisions of the Convention. Size limits were also raised, and two more species (G. merlangus and P. limanda) were added to the list, which now included hake 30 cm., haddock 27 cm., plaice 25 cm.

22. "It is evident that such advances in comprehensive thinking as were being made between 1930 and 1935 were accompanied by vigorous prosecution of conservati policy, based on partial assessment of the situation, but, nevertheless, sound. The overfished condition of the North Sea was indeed so obvious, that no very advanced theory was required to justify the first modest measure of conservation. In somewhat the same way, on the other side of the globe, the beginning of the period under review saw the outstanding, indeed, the classical example of regulation somewhat in advance of full mathematical theory undertaken on a large scale. This was the regulation of the halibut fishery of the Pacific, which began effectively in 1930 with the simple ordinance that the annual catch in future should not exceed two specified quantities, for two different areas."



23. On the Pacific halibut fishery, Thompson (1935) wrote (p. 380): "On the walls of the Commission laboratories are kept charts showing the changing abundance of the halibut in its different areas; the great decline in abundance from the earliest days until the year 1930 is shown; where once 300 pounds of fish were taken on the standard unit of gear it is shown that on the southern grounds the yield had fallen to 35 pounds and on the western to 65 pounds, while the total catch on the southern grounds had fallen from 60,000,000 to 22,000,000. The Commission was organized in 1924. Under the observation of its staff the later part of this decline from 1925 to 1930 occurred. At that time the Commission had no powers of regulation. It could merely study and analyse but in 1930 it submitted recommendations to the two Governments, and a new treaty was adopted giving the Commission proper regulatory powers. The result is shown on the charts kept by the Commission. Beginning with 1931 the abundance has risen steadily on the banks to the south from 35 pounds to 60; on the banks to the west from 65 pounds to 90. The Commission has made good use of the scientific instruments placed at its disposal by its staff ...

24. "It may seem to the fisherman somewhat like magic; that by fishing less he can obtain as much or more from the sea than before. But to the Commission, interested in increasing the number of young, as well as making better use of what we have, the results are profoundly interesting. They see the commercial catches becoming to a greater extent composed of mature spawning fish. They see the number of floating eggs and larvae increasing, and they await with eagerness the time when these increased young commence to show in the commercial catch as a real increase of the available stock, an increase that may be used, not simply an accumulated reserve. Justifying each step by its practical success, a great biological experiment is in progress, testing the ability of men to perpetuate and exploit rationally the vitally important resources of marine fish."

25. It is evident that in 1935 those watching the regulated halibut fishery were clearly distinguishing the catch per unit effort, which had already risen greatly, and the yield, which it was hoped to rise later.

26. In the ensuing ten years, general policy in the United States came down firmly in favour of raising as high as possible the sustained yield. In November, 1945, Dr. Ira N. Gabrielson, then Director of the Fish and Wildlife

Service, when discussing the conservation of fur seals, halibut, blue crab, trout and black bass, Alaskan salmon, deer and elk, and waterfowl, said: "The purpose of the conservation program of the Government of the United States of America is to insure a maximum sustained yield from our natural resources."

27. The United States Sockeye Salmon Fishery Act of 1947 appeared to aim no closer than at "the protection, preservation and extension" of the fishery concerned, which does not tie the promoters down to the maximum yield. That was, however, closely followed by the International Convention for the Northwest Atlantic Fisheries, 1949, which explicitly aimed, "to make possible the maintenance of a maximum sustained catch from those fisheries".

28. Dunlop and Bell (1952) find new problems in this fishery, and seek for solutions giving greater yield. They write (p. 167) "Under regulation by the International Fisheries Commission, the abundance of halibut on the Pacific coast has increased almost 150 per cent since 1931 and annual catches have been increased to over 56 million pounds,<sup>3/</sup> about 12 million pounds more annually<sup>4/</sup> than immediately before regulation. This additional poundage has added about \$3,000,000<sup>5/</sup> to the fleets' earnings in each recent year. Though the annual catch is larger, the amount of fishing effort has been reduced about one-third due to the greatly increased abundance.

29. "The success of regulation has created new regulatory problems. The improved condition of the stocks and a doubling in the size of the fishing fleets have greatly increased the rate of landing and sharply reduced the length of the authorized fishing season, in spite of the greater total catch allowed. The fishing season which was eight and one-half months long in 1932, has progressively declined to only 28 days in Area 2 and 56 days in Area 3<sup>6/</sup> in 1951. Under present

---

<sup>3/</sup> The as yet unpublished figure for 1954 is 70 million pounds.

<sup>4/</sup> 25 million pounds in 1954.

<sup>5/</sup> Approximately double this figure in 1954.

<sup>6/</sup> Areas 2 and 3 account for over 98 per cent of the fishery.

conditions, some sections of the stocks are not yielding the poundage of which they are capable. Other sections of the stocks appear to be subjected to too much fishing.

30. "When fishing was conducted over a longer period of the year, the fishermen, guided by experience, fished each ground at the best time from the standpoint of availability of fish, the value of the catches, and weather conditions. With the present season the fishery tends to concentrate on those grounds where the fish are most available at that time of the year."

31. They conclude (p. 171), "Some modification of the system of management, applied so successfully by the International Fisheries Commission since 1932, will be necessary if the maximum productive capacity of the Pacific halibut stocks is to be reached."

### III. REVIEW

32. It seems that conservation of fisheries commends itself naturally to peoples who are used to husbanding the resources of agriculture. They need the eloquence of a Huxley to remind them that there may be fisheries where no conservation is required. A good historical example is that of the European herring fishery, which from 900 A.D. or earlier has provided a fluctuating but not diminished harvest for at least ten centuries, in spite of a generally increasing toll by fishing.

33. In many other fisheries, the fall in the catch per unit effort has prematurely convinced people that conservation is necessary. When a fall in the catch per unit effort is recognized, it is not always easy to convince the fishermen that all is well because the total catch is still rising. Nor can he obtain the same living as previously. It may be necessary for him to risk greater capital expenditure, or to undertake longer voyages, or even to hire himself to a master when formerly he could be his own master. At this stage, it is usual to hear complaints about some new and more efficient way of catching fish. In the United Kingdom, the classical example was a complaint mainly from the Scottish liners that trawls destroyed the spawn of sea fish, whereas all the staple

41. "In the case of whaling the dilemma is particularly difficult, because this industry is above all others an occupation of the open free, international seas. A voluntary restriction of the size of the industry, i.e. the size of the whaling fleet, in deference to what is necessary at any time with a view to preserving the stock of whales, would mean the voluntary acceptance of this ideal by all nations. If a country declares itself willing to restrict the expansion of its own industry in conformity with this ideal, as the Norwegian industry did for the present whaling season, such a step ought to strengthen its credit all over the world. But it is also understandable that a country may feel a certain anxiety lest an offer of this kind should fail to receive adequate recognition and support. Not unreasonably it may fear that advantage might be taken of the offer by people who have so far shown no enterprise and made no sacrifices to promote the development of whaling, but who would manoeuvre themselves into a position based on power rather than honest work."

42. In that passage from a noted Norwegian scientist we may note the expression of an idea that many fishermen tend to have - and which is usually admitted as correct for mollusca - namely of a proprietary right in a fishery that they have developed.

#### IV. CONCLUSION

43. It is possible to generalize simply but truthfully about the attitude of men towards marine resources. At first, there are the few adventurers who obtain a living where few men wish to follow them, and so long as the fisheries are prosecuted in that way no question of conservation arises. Later follow the organizers, who may or may not reduce the catch per unit effort. If they do reduce it, the concept of conservation arises as one of maintaining or restoring the catch per unit effort. This, however, does not appeal to Governments as a suitable objective, so long as the total yield per annum continues to rise or at least is not reduced. When, however, the catch per unit effort falls so low as to endanger the continuance of the fishery, because boys no longer wish to engage in it, or when the average size of the fish falls so as to endanger the market because consumers are not interested in such small fish, then governing authorities are willing to take action. In the Old World they have not as yet made any explicit choice among the possible qualities of the fishery - annual yield, catch per unit effort, and average size of the fish - but, in the New World, the choice of maximum yield has been explicit in all recent international conventions.

44. As to the means of maintaining the yield, and so of other desirable qualities, it is evident from the history that later men have agreed with those of the county of Cumberland in 1278, who were anxious that the ascending salmon should be allowed to spawn and the descending salmunculi to grow larger. By fostering breeding and growth, all men have sensed that they could increase annual yield, catch per unit effort and average size of the fish.

69

Bibliography

Andersson, K.A.

- 1952 Introduction to Rapport Jubilaire. Rapports et procès-verbaux des réunions, Conseil Permanent International pour l'Exploration de la Mer (Copenhague), Vol. 132.

Baranov, F.I.

- 1918 On the question of the biological foundation of fisheries. Izvestiya, Nauchnyi Issledovatel'skii Ikhtiologicheskii Institut, Vol. 1, pp. 81-128.

Bompas, G.C.

- 1885 Life of Frank Buckland, London.

Buckland, F.

- 1881 The Natural History of Fishes, London.

Clark, A.H.

- 1887 The whale fishery. 1. History and present condition of the fishery. In Goode, George Brown, ed., The Fisheries and Fishery Industries of the United States, Section V, Vol. 2, pp. 1-293.

Clarke, R.

- 1954 Open boat whaling in the Azores. The history and present methods of a relic industry. "Discovery" Reports, Vol. 26, p. 281.

Dunlop, H.A. and Bell, F.H.

- 1952 New problems in regulation of Pacific halibut stocks. Journal du Conseil Permanent International pour l'Exploration de la Mer, Vol. 18 (2), p. 167.

Gabrielson, I.R.

- 1945 International Whaling Conference papers (in manuscript).

Graham, M.

- 1952 Overfishing and optimum fishing. Rapports et procès-verbaux des réunions, Conseil International pour l'Exploration de la Mer (Copenhague), Vol. 132, pp. 72-78.

- Hjort, J.  
1933 Whales and whaling (Introductory remarks) Hvalradets Skrifter,  
Nr. 7, p. 7.
- Hjort, J., Jahn, G., and Ottestad, P.  
1933 The optimum catch, Hvalradets Skrifter, Nr. 7, p. 92.
- Huxley, T.H.  
1834 Inaugural address to the conference held in connexion with the  
Great International Fisheries Exhibition, 1883, Papers of the  
Conference, Lit. iv.
- Johnstone, J.  
1905 British Fisheries, London.
- Moore, S.A. and Moore, H.S.  
1903 The History and Law of Fisheries, London.
- Petersen, C.G.J.  
1894 The decrease of our flat-fish fisheries. Report of the Danish  
Biological Station to the Board of Agriculture (Copenhagen), Vol. 4.
- Russell, E.S.  
1931 Some theoretical considerations on the "overfishing" problem.  
Journal du Conseil Permanent International pour l'Exploration  
de la Mer, Vol. 6, p. 3.
- Thompson, W.F.  
1936 Conservation of the Pacific halibut, an international experiment.  
Smithsonian Institute, Annual Report 1935.
- United Kingdom Royal Commission on Trawling 1883  
1885 H.M. Stationery Office, Cmd. 4324.
- United Kingdom Select Committee on Sea Fisheries 1893  
1893 House of Commons, Reports and Papers, Vol. 377.