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AN OPEN LETTER TO DOCENT N. N. ANDREEV OF THE DEPARTMENT OF
COMMERCIAL FISHERIES OF THE A. I. MIKOIAN TECHNICAL
COLLEGE OF FISHERIES IN MOSCOW.

By P. Moiseev

Director, Pacific Research Institute for
Fisheries and Oceanography (TINRO).

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rybolovstva Mosrybvtuza imeni A. I. Mikoiana N. N. Andreevu.

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Dear Nikolai Nikiforovich!

I have seen your letter published in issue No. 9 of the journal "Rybnoe Khoziaistvo" for 1954, and I will attempt to answer the questions set forth in it.

You point out, correctly, that in my work "Cod and flounders of Far-eastern seas" (Izvestiia TINRO, Vol. 40) I demonstrated quite positively a large effect of an intensive and indeed excessive fishery on the condition of the stock of flounders in the Gulf of Peter the Great. This point of view was presented also in a number of published works somewhat earlier ("The flounder fishery with small-sized vessels in the Gulf of Ussuri", Izvestiia TINRO, Vol. 14, 1935; "Information on the effect of the fishery on the condition of the flounder stock in the Gulf of Peter the Great", Zoologicheskii Zhurnal, Vol. 25, 1946; and others).

The effect of an intensive fishery is very significant and is particularly ^{well} exhibited in the case of the Far-eastern flounders, which occur in a large number of local, isolated, and for the most part relatively small stocks. These stocks live within the shallow-water shelf area, and formerly were practically unfished. The influence of the fishery has led to a number of changes in the stock, some of which were pointed out in my works and then were cited in your letter under my name. It seems to me that this influence is now sufficiently evident, and that there is no need for additional facts or argument about it.

It must be acknowledged that the nature of the distribution and biology of the Far-eastern flounders mentioned above (and to a somewhat less degree this is also true of the Atlantic flounders) is very conducive to the development of a strong effect of an intensive fishery on these particular fish.

It is a much more complicated matter to recognize and establish the degree and the nature of the effect of a fishery on other fishes. However the great majority of investigators have been able to demonstrate sufficiently clearly some effect of a fishery, in one form or another, on the abundance of almost all species of fishes. For example, R. S. Semko, F. V. Krogus and others have demonstrated this in respect to the Kamchatka salmon; the influence of the fishery on the abundance of Amur River fishes is generally known; N. P. Tanasiichuk has pointed out the effect of the fishery on Caspian fishes; and Yu. Yu. Marti has done the same for Atlantic herring.

The effect of a fishery upon the abundance of fishes must be considered generally recognized; and, in fact, having recognized it, Soviet ichthyologists are endeavouring, with much persistence, to establish scientifically based rules for fishing. The All-Union Conference on Problems of the Fishing Industry (17-26 December, 1951), in which more than 500 ichthyologists and workers of the fishing industry took part, wrote as follows in its resolutions: "Observing that fishing is one of the factors which have an influence on the dynamics of fish populations, the Conference

considers that regulation of fishing must be placed under continuing scientific control, and must be altered as the condition of the stock of commercial fishes in any body^{of} water changes and as the fishery develops".

However, as it appears to me, the basic difference between the point of view of Professor F. I. Baranov and that of the great majority of ichthyologists, including Professor G. N. Monastyrsky, consists primarily in the degree of the influence of the fishery on stock which each accepts--whether overfishing by an intensive non-regulated fishery is possible or impossible; and also in the recognition of (or failure to recognize) the important role of biological considerations [zakonomernosti] and the influence of factors of the external environment on the dynamics of abundance of the stock.

Professor Baranov considers that "whatever may be the intensity of the fishery--very small or very great--after a comparatively short time an equilibrium is achieved so that there is no continuous decrease in catches and no continuous change in the population curve". In other words the fishery, however intensive it may or may not be, cannot bring the commercial stock to a condition of catastrophic overfishing, because in the event there is a decrease in landings below some limit, the fishery will peter out for economic reasons and thus overfishing will be prevented. In this way Professor Baranov reaches the conclusion that all kinds of protective measures and restrictions on the fishery are unnecessary.

It is easy to observe what such a method of "regulation" has actually lead to in some cases [page 52]--fishing fleets tied up at the dock, and processing plants working at a fraction of their capacity.

In contrast, the great majority of ichthyologists believe that non-rational, excessive exploitation of almost any fish (including marine fishes, with the present development of the industry and level of fishing techniques) can lead to extremely bad consequences; such that stocks of fish, once exhausted, cannot even reestablish themselves normally, or need a long period of time for this, or may even require major fish-cultural measures. In addition, the majority of ichthyologists attach great importance to the fluctuations in abundance of many fishes which occur as the result of the influence of external conditions or of biological laws. On this point, after assuming that the recruitment to a stock is always adequate, Professor Baranov does not assign any significant role to fluctuations of that sort, especially in his more recent works.

With this necessary introduction, I will turn now to answering your questions.

1. In dealing with local isolated stocks of flounders, one of which has been subjected to very intensive and excessive fishing, it was necessary for me, in putting together my summary, to emphasize the information obtained regarding the effects of such

a fishery on the stock in order to make these results abundantly evident, and by their example to try to avoid similar cases in the future. It is inevitable that so intensive a fishery, one which removed more than 100,000 centners of flounders from a stock of very limited numbers, should be the principal factor affecting the abundance of the flounders of the Gulf of Peter the Great during the original development of the industry.

As time went on, there were observed changes in species composition, differences in the abundance of individual year-classes, and so on, which indicated that significant variations in the abundance of the flounder stocks were being caused by various other factors.

For the West European flounder or plaice fishery also, very important "fluctuations" in abundance of the stock are well known to result from the presence in the stock of year-classes of very different strengths. For example, from 1950 to 1953 the mean catches [srednie ulovy] and the total removal [summarnyi vylov] of plaice from the North Sea had considerably increased by comparison with the preceding years as the result of the presence in the stock of several numerous year-classes hatched in 1945-1947.

Thus to me it seems that it can be considered well established that an intensive fishery significantly affects the abundance of a stock of flounders, and in certain cases is one of the principal factors which determine their abundance.

2. An increase in rate of growth, associated with the thinning out of a population by a fishery, and the earlier achievement of sexual maturity that goes along with this, is known for many species of fishes; it is rather well exhibited by the flounders of the Gulf of Peter the Great. This kind of reaction of a species to an improvement in feeding conditions takes place within the range of changes in growth which are possible for the species in question, and after attaining the maximum rate, additional thinning of the stock will not effect any change in growth.

3. I agree with T. F. Dementeva's point of view, which you cite, that "the basic factor limiting the abundance of commercial fishes in the majority of cases consists of the conditions for reproduction and for nutrition of young fish. Even in respect to the flounder family, to which the theory of Professor F. I. Baranov is most nearly applicable, that theory is upset by the existence of strong and weak year-classes"; and I have already adduced, above, some examples which support this point of view.

Also, "the determination of the total numbers of fish which are present in the sea", seems to me a very complex and difficult problem, as is any problem of establishing the absolute abundance of fishes; but it is fairly evident that it is possible to determine relative changes in their abundance. Work on determining changes in the abundance of the Sakhalin herring, the Pacific salmon, the Kamchatka cod and other fishes, which has been undertaken by TINRO, has given rather good results and has permitted accurate orientation of the fishery.

Incidentally, we should remember that even Professor Baranov, in his work "On the question of the biological basis of fisheries" (1918) pointed very persuasively to the necessity for a continuous study of the productivity of individual year-classes, or in other words, of the relative abundance of the stock; assuming quite correctly that massive mortalities of young from a variety of causes can lead to important changes in abundance in different years.

4. A majority of ichthyologists, among whom are G. N. Monastyrsky and G. V. Nikolsky, whose names you mentioned, recognize ^{that} mortality curves have an individual character (specificity) for each species; nevertheless, accepting this, none of these ichthyologists has equated specificity to stability, as you have done, and in this you undoubtedly err. We all (including Monastyrsky and Nikolsky) recognize that the mortality curve of a species can be changed by a variety of causes, but only within fixed limits which are characteristic for the species in question. From the above it is apparent that there is nothing illogical in the remarks of G. V. Nikolsky which you quote; in my opinion they are completely just.

5. It appears to me that Professor Baranov has constructed a theory which, although strictly logical, is methodologically erroneous, and its practical application has not given successful results. The theoretical foundations of the modern materialistic theory of dynamics of fish abundance were worked out cooperatively by the combined efforts of the ichthyologists of this country. Of course we can't be sure that the theory isn't still a bit lopsided, but even in its present state, to a large extent it makes possible the formulation of prediction of permissible exploitation from accurate evaluations of the conditions of commercial fish stocks. [page 53] As examples, I might cite the successful predictions of the stocks of vobla and bream which were developed as the result of the work of Professors G. N. Monastyrsky and T. F. Dementeva, the prediction of changes in the condition of the stock of Amur chum salmon which was formulated by I. B. Birman, and many others.

I will not in this letter dwell on the details of the development of methods of making predictions of abundance for the Far-eastern flounders, which are as yet in a far from finished form because of the limitations of the materials at hand, but I hope in the near future to devote a special article to this question.

6. As you have rightly observed, in my work "Cod and flounders of Far-eastern seas" there is no mention of Professor Baranov's theory concerning the effect of a fishery on the abundance of fishes. This is so because the recent broad discussions of this theory, both in print and at the All-union Conference on Problems of the Fishing Industry, appeared to me to cover the ground.

I fully agree with the decisions of the All-union Conference, and believe there is no need to return once again to a discussion of Professor Baranov's erroneous theory.

In my paper I made no mention of the work of Professor Baranov nor yet of the articles of his opponents like Professor Monastyrsky; I cited only such Russian and foreign publications as contained factual material on the effect of a fishery on the condition of flounder and plaice stocks in different parts of the Atlantic. As you know, in the works in which Professor Baranov established his theory he did not use his own observations and materials-- rather, his factual data were cited from various other investigators.

It is for this reason that I cited and referred to original works by native and foreign investigators, hence only these authors are mentioned in the list of literature cited.

Professor P. Moiseev
Director, Tikhookeanskiĭ Nauchno-
Issledovatel'skiĭ Institut Rybnovo
Khoziaistva i Okeanografii (TINRO).