

INTERNATIONAL COMMISSION FOR



THE NORTHWEST ATLANTIC FISHERIES

Document No. 19THIRD ANNUAL MEETINGComments on a Standard Unit of Fishing Effort.*

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I. The Index of Fishing Power

Since fishing vessels differ with respect to such factors as size, horsepower, and type of gear, and since changes in these factors affect fishing efficiency, the primary problem in arriving at a standard unit of fishing effort is to measure the relative fishing powers of various types of vessels fishing with various types of gear under similar conditions. In theory it is required only that the vessels be fishing on the same abundance of fish. In practice it can be safely assumed that the abundance is the same only if the vessels are fishing in the same place at the same time.

To formulate indices of relative fishing power, the vessels fishing a particular area should be grouped into categories as homogeneous as possible with respect to the factors known to affect efficiency. One category of vessels should be selected as standard, the most important consideration in the selection of this category being the stability of its characteristics in time. After determining the average catches of each category per unit of fishing time, an index can be assigned, referred to the standard category as the unit index.

II. The Measure of Fishing Time

Once the relative fishing power of the various vessel types is known, it becomes possible to adjust the fishing time of vessels in any category to a fishing time equivalent to that of the standard category. The problem of summation of fishing time for the entire fleet becomes, then, one of selecting an appropriate measure of fishing time. Several measures have been suggested:

- (1) Days absent from port.
- (2) Days absent from port minus running time and time lost because of mechanical failure and bad weather.
- (3) Actual trawling time in hours.

Days absent from port has the advantage of being obtained with comparative ease and accuracy. With its use, however, the more distant grounds would show an abundance in terms of catch per unit effort not comparable to fishing grounds closer to port. If the same grounds, furthermore, are exploited by

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vessels from two ports not equally distant from the grounds, the apparent abundance will depend on the port from which data is obtained, so that three measures are possible: one for each port and another for the two ports combined.

The comparative merits of measures (2) and (3) depend on the assumptions which must be made concerning the distribution of fish as they fluctuate in abundance, either from natural causes or from the effects of fishing. These assumptions may be stated as follows:

(A) The fish distribute themselves at random over the fishing area. As their numbers are reduced, their abundance per unit of area is reduced in proportion because they are redistributing themselves in a random fashion over the available bottom.

(B) The fish school together because of a natural gregariousness. As their numbers are reduced, they close ranks so that the within-school density remains more or less constant. The schools thus become of smaller size and, possibly, the number of independent schools is reduced.

(C) The fish are found in schools because they like particular places, conditions, or types of bottom. As their numbers are reduced, they redistribute themselves more or less independently of one another but the redistribution is limited to the area of the particular place, condition, or bottom type which they prefer.

If assumption (A) holds, measures of fishing time (2) and (3) ought to be equivalent or nearly so. The actual trawling time in hours (3) might be preferred as being more precise if the cooperation of the fishing skippers could be obtained so that accurate logs of trawling time could be had.

Assumption (B), which may very well apply to certain pelagic species such as the pilchard and menhaden, would make the use of actual fishing time (3) quite invalid. While fishing in a school, (3) would show little or no reduction in abundance. The time spent in locating a school would not be adequately measured by the time consumed by exploratory sets. On the other hand, the total time absent from port minus time lost from bad weather and mechanical difficulties (2) would include time spent in scouting and thus indicate more accurately the effort required to obtain the catch.

Assumption (C), that fish school because they like particular conditions, bears some resemblance to assumption (A) except that our concept of "fishing grounds" becomes one not of homogeneous conditions over the total area of the grounds but rather one in which the total area consists of discrete patches of favorable and unfavorable conditions for the fish.

If assumption (C) holds, the measure of fishing time (3), actual trawling time in hours, will not include time spent in running from one favorable area to another. From our information on areas of fishing concentrations on Georges Bank, from the experience of observers on commercial vessels at sea, and from

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interviews of individual trips, it appears that areas of favorable conditions for fish are quite well known to the fishermen, that these areas are fairly discrete, that they vary with season, and that a vessel finding one area unproductive will proceed directly to another area. However, our information about the distribution and schooling habits within these areas is quite inadequate. In any case, it is evident that assumption (A) does not hold, so that a measure of fishing time which includes time spent in locating fishable concentrations is a better measure of effort than actual trawling time alone for these particular conditions.

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