

A RESEARCH ON THE CATCH EFFICIENCY AND THE POSSIBILITIES OF THE USAGE OF MIDWATER TRAWL IN THE EASTERN BLACK SEA

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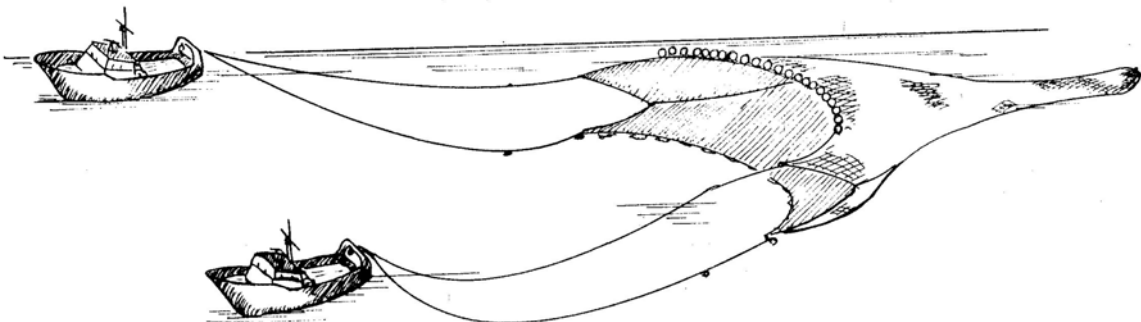
Studies on the midwater trawl have started shortly after the Second World War. Firstly it was aimed to move the trawl gear just above sea bottom. Later, the bottom trawls were used to be towed in the mid water layers by being suspended from the surface with the help of floats. The first actual midwater trawl was designed by a Danish scientist, Robert Larsen, in 1948. This trawl was designed to be towed by a pair vessel. After this date, pair trawling has become very common to catch herring (*clupea harrengus*) in the northwest Europe. In addition to 20-30 meters fishing vessels, over 40 meters long and 600 HP vessels also were successfully used in the pair trawling operations. After 1950s, the studies related to single trawling had been commenced.

In 1950s, by the innovation of modern fish finding equipment (echo sounder, echo graph) a fast development was maintained in the field of midwater trawling. By the end of 1950s, another electronic equipment, named net sounder, come into use. Existence of net sounder enabled to determine the height of the gear in relation to the water column and removed the technical problems to a great extent.

Midwater trawls were first used to fish small pelagic fishes in the world. After 1970s,

studies towards to hunt large pelagics were started. Since large pelagics exist larger areas of water column and have higher swimming speed, the small scale midwater trawling gears become insufficient to catch such species. For the purpose of reducing hydrodynamic resistance of the gear larger mesh sizes were used in the wing parts of the trawl gear.

The main species hunted primarily for midwater trawl gear in the world' seas today are respectively, herring (*Clupea harengus*), sardine (*Sardina pichardus*), hake (*Merluccius merluccius*), cod (*Gadus morhua*), whiting (*Gadus merlangus*), sprat (*Sprattus sprattus*), mackerel (*Scomber scombrus*), anchovy (*Engraulis encrasiclis*), and horse mackerel (*Trachurus trachurus*). Although in the world, especially in the waters shared by European Countries, midwater trawling operations are commonly being carried out. There is no sufficient study on the application of such fish harvesting technique in Turkey. Limited work done about it but it does not cover the details of designing the trawl gear parameters such as gear model, fishing method, criteria for fishing, bio-ecological features of target species, variation of by-catch, and the efficiency of fishing. In the regions of Samsun and Sinop there are limited numbers of fishing vessels that make pair trawling. But these fishers face many



problems in application due to the lack of knowledge related to characteristics of the target species and the prototype gears used.



On the other hand since there is a risk of using midwater trawl as a bottom trawl and no efficient control mechanism by the officials upon the fishing, midwater trawling could not find the favourable change to be implemented.

This project aims to minimize the excessive fishing power of the purse seining commonly used in the Black Sea on the pelagic species. By this way it is hoped that the sustainable fishing will be maintained, under sized fish will be prevented. As a result, establishing a good market balance between the supply and demand will generate more income for the fishermen. It is also in the scope of this project to fish some non-commercial species and to make them use for other purposes rather than direct consumption for human food. Another aim of this project is to establish and make widespread an alternative fishing method to purse seining fishery.

In the research, four midwater trawls of different design characteristics were used. Gear drags (R_t) and the towing forces (F_t) of each trawl type in relation to the vessel speed were determined. According to the trawling applications it was found that to reduce the hydrodynamic resistance of the gear it is a good practise to use larger meshes where it is possible. It is also found variation of the towing speed and the length of warp affect the depth of the trawl in the water column. This variation has been found to be a polynomial function.

Regardless the trawls type it was determined that the maximum mean value of the catch per unit effort (CPUE) for the target species occurs in the autumn season (1050kg/h/op.). The values of CPUE of the target species were also determined for both

single and pair trawling systems. The higher values were at single vessel for anchovy, at pair vessel for sprat, single vessel for horse mackerel, and pair vessel for bluefish.

Optimum trawling speeds for anchovy, sprat, horse mackerel and bluefish were found to be 2.6, 2.6, 2.9 and 3.0 knots, respectively. The two seasonal periods in which the catches of target species of anchovy, sprat and bluefish were maximum were determined to be 15 November to 15 December and 1 March to 15 June, 15 February to 15 May and 1 October to 30 November, respectively. For horse mackerel the maximum catch season was 1 October to 15 June.

The selectivity lengths (L_{50}) for anchovy populations for each type of trawl were 11.38, 12.14, 11.54 and 12.63cm.

According to results obtained by this project it can be said that the midwater trawling can be an alternative method to traditional purse seiners operated in the Black Sea and the fishing power over the pelagic species can be decreased due to higher selectivity. In addition it was proved that the sprat populations, which are not exploited commercially, can also be harvested by midwater trawling especially in spring and autumn seasons and be used as an important raw material for fishmeal plants. It was stated that the midwater trawling of single vessel is more profitable than that of pair vessel.



It is recommended that the use of midwater trawling for catching anchovy, sprat, horse mackerel and bluefish in the Black Sea should be encouraged and supported for commercial purposes. To achieve this objective a new management policy should be arranged and put it into action by The Ministry of Agriculture, which is responsible for fishing.

