# ANCHOVY FISHING IN TURKEY IN LAST 20 YEARS

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## Introduction

Anchovy is the most important fish in terms of fisheries in Turkey and the Black Sea as well as the Mediterranean Sea. Anchovy constitutes 50% of the fish caught in our country. During autumn months in the Black Sea (in between November and February, intensely between November 15 and 15 December), anchovy is caught with surrounding nets called purse seine. *Anchovy* generally lives in all tropical and subtropical seas and composes schools in the coastlines. Anchovy is represented by two species in the Black Sea where it exists abundantly. They are called Black Sea anchovy (*Engraulis encrasicolus ponticus)* and Azov anchovy (*Engraulis encrasicolus maeticus*). It has been reported that Black Sea anchovy which is intensely caught in our coasts grows with a maximum length of 18-20 cm. In the studies carried out in our Institute, individuals with up to a maximum length of 16 cm were also found. Azov anchovy as the second species is relatively small compared to Back Sea anchovy and it has been reported that they can grow up to a maximum length of 15 cm. This species reproduces and is fed in the Sea of Azov. Azov anchovy which is reported to be caught in the Northern Black Sea coasts is observed to be a little mixed within the schools caught in our coasts (especially in the areas close to the Georgian border) during some periods.

Black Sea anchovy has wintering, alimental and spawning migration pattern in north-south direction. They winter in the south direction and are fed in the north direction, and the rate of spawning migration is 10-20 miles per day. The schools are dense and generally winter in the lukewarm coasts of Anatolia, Caucasus, and Crimea and they constitute dense schools. Besides the seasonal migrations, anchovy also exhibits horizontal migration between day and night. The individuals which go down to deep water (70-90 m) in day time move towards the coasts at night time and display daily migration towards the areas (10-40 m) close to surface.

Anchovy is fed on planktons, and the organisms that they feed are the larvae Calanus species (Copepoda), Cirripedia and Mollusca. Anchovy competes for the jointly consumed food groups against the organisms and groups of organisms that are in the same group with it in the food chain, such as sprat fish, shad, sardinella, comb jellies (ctenophore) and medusae. In March, the schools migrate from the wintering ground in the Turkish coasts to feeding and reproduction ground in the north. As of the midst of April until October, anchovy dispersing in the entire sea is found scattered around the north part of the Black Sea. Depending on temperature and the other climate changes in the other environmental parameters; migration to the south generally starts in November. From year to year, significant changes are observed in the beginning of migration to south, and in intensity and quantity of migration. In the north-south migration, anchovy either goes along the coast or directly crosses the sea (Figure 1).

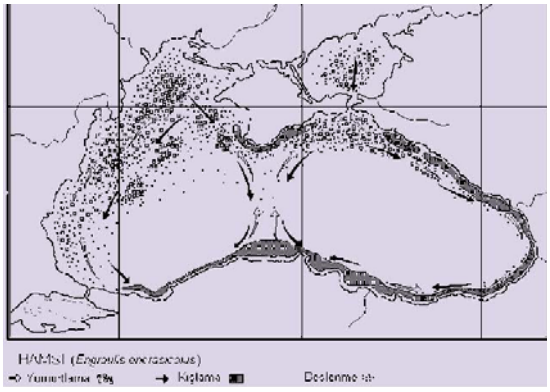

**Figure 1.** Reproduction, feeding and wintering grounds, and migration of anchovy (Ivanov and Beverton, 1985).

Black sea anchovy reaches the sexual maturity in a period of one year, and spawning takes place in May/September in 10 and more abdomens. Average individual fecundity was found as 42,000 eggs. Anchovy lives for 2-3 years and matures after the first winter it passes, and it spawns at 17-18 °C in the shallow water between 5-10 meters close to the

coast. Depending on the water temperature, the larvae form within 24 hours. Planktonic larvae that mostly disperse between 5-30 meters, feed on other small planktons. The highest survival rate is observed in the eggs spawned by the end of June and the beginning of July. Although some researchers reported that the main reproduction ground of anchovy is northern and northwestern continental shelve, according to results of Einarson's and Gürtürk's articles and the results of the study conducted by the Middle East Technical University Institute of Marine Sciences in the Black Sea, it has been observed that a considerable amount of anchovy eggs is scattered around Turkey's characteristically economic region (Figure 2).

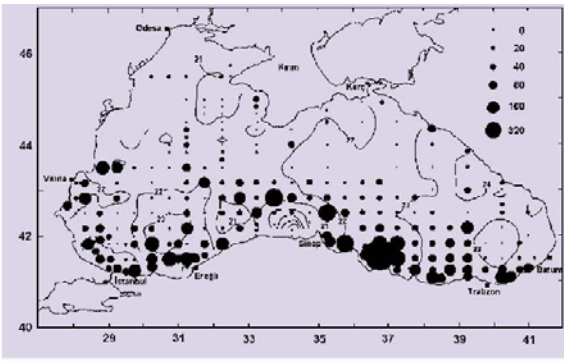


**Figure 2.** *Current distribution of anchovy (number/m2)* (Niermann *et al.*, 1993).

## Importance of Anchovy Fishing in the Black Sea for Our Country

### a) Importance of the Black Sea for Marine Fish Caught

When the catch value in the fisheries statistics of 20 years (1986-2005) is assessed, it could be observed that 90% and 80% of Turkish fisheries production is obtained from the seas in the first 10 years and in the second 10 years respectively (Table 1).

In the last twenty years, an average of 75% of the marine fish has been caught from the Black Sea. When the other sea food are added into this ratio, the rate of sea food obtained from fishing reaches up to 80% (Table 1).

A considerable amount of marine fish production in Turkey is from anchovy fishing. When the fishing statistics of 1986-2005 are examined, except for 1989, 1990 and 2005 having low rates of fishing, more than 60% even 70% of marine fish production is from anchovy fishing (Figure 3).

**Table 1.** Amounts of marine fish production and anchovy in the Black Sea and Turkey between 1986–2005 years (ton) (TUİK, 1997–2006).

| Years | Total fish production (ton) | Marine fish production (ton) | | | | Anchovy production | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Total (Turkey) | Eastern Black Sea | Western Black Sea | Total (Black Sea) | Total (Turkey) | Eastern Black Sea | Western Black Sea | Total (Black Sea) |
| 1986 | 582.920 | 525.381 | 297.940 | 140.979 | 438.919 | 288.105 | 199.317 | 75.423 | 274.740 |
| 1987 | 627.913 | 562.697 | 318.915 | 151.853 | 470.768 | 310.298 | 214.670 | 81.232 | 295.902 |
| 1988 | 676.003 | 580.701 | 352.487 | 127.913 | 480.400 | 310.618 | 240.000 | 55.000 | 295.000 |
| 1989 | 457.116 | 361.770 | 179.130 | 85.040 | 264.170 | 98.620 | 96.145 | 661 | 96.806 |
| 1990 | 385.114 | 297.123 | 105.478 | 94.352 | 199.830 | 74.035 | 64.780 | 1.629 | 66.409 |
| 1991 | 364.661 | 290.046 | 115.177 | 67.479 | 182.656 | 90.637 | 76.151 | 3.074 | 79.225 |
| 1992 | 454.346 | 366.060 | 185.138 | 46.577 | 231.715 | 174.626 | 148.432 | 6.985 | 155.417 |
| 1993 | 556.044 | 453.123 | 225.979 | 76.960 | 302.939 | 227.130 | 197.727 | 21.139 | 218.866 |
| 1994 | 601.104 | 491.335 | 300.417 | 57.601 | 358.018 | 294.418 | 262.591 | 16.076 | 278.667 |
| 1995 | 649.200 | 557.138 | 295.143 | 146.916 | 442.059 | 387.574 | 270.080 | 103.702 | 373.782 |
| 1996 | 549.646 | 451.997 | 226.456 | 121.157 | 347.613 | 290.680 | 191.849 | 81.390 | 273.239 |
| 1997 | 500.260 | 382.065 | 193.696 | 71.855 | 265.551 | 241.000 | 170.500 | 43.280 | 213.780 |
| 1998 | 543.900 | 413.900 | 200.019 | 60.526 | 260.545 | 228.000 | 163.241 | 32.755 | 195.996 |
| 1999 | 636.824 | 510.000 | 323.328 | 48.118 | 371.446 | 350.000 | 294.342 | 16.459 | 310.801 |
| 2000 | 582.376 | 441.690 | 243.417 | 97.595 | 341.012 | 280.000 | 218.028 | 42.642 | 260.670 |
| 2001 | 594.977 | 465.180 | 221.690 | 121.073 | 342.763 | 320.000 | 201.949 | 86.667 | 288.616 |
| 2002 | 627.847 | 493.446 | 251.818 | 130.229 | 382.047 | 373.000 | 235.398 | 101.021 | 336.419 |
| 2003 | 587.715 | 416.126 | 204.754 | 107.132 | 311.886 | 295.000 | 186.173 | 79.896 | 266.069 |
| 2004 | 644.492 | 456.752 | 233.084 | 118.129 | 351.213 | 340.000 | 214.572 | 92.084 | 306.656 |
| 2005 | 544.773 | 334.248 | 170.841 | 63.132 | 233.973 | 138.569 | 114.308 | 4.947 | 119.255 |
| Mean | 558.362 | 442.539 | 232.245 | 96.731 | 328.976 | 255.616 | 188.013 | 47.303 | 235.316 |

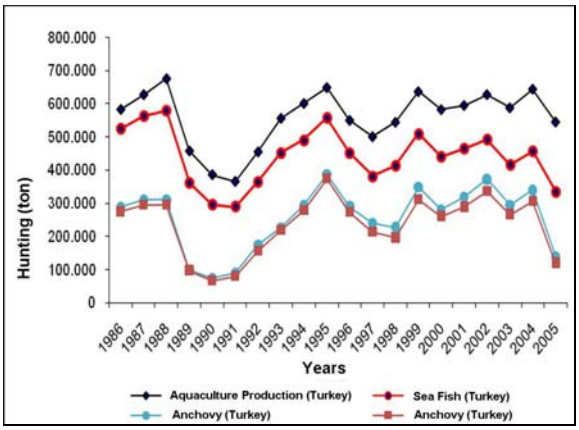


**Figure 3.** Changes in the Turkish fisheries production, marine fish and anchovy production between 1996 and 2005 (TÜİK – Turkish Statistical Institute, 1997-2006).

### b) Importance of the Black Sea in terms of Fishing Fleet

Considering the industrial fisheries in our country, anchovy comes to mind. In recent years, anchovy fishing boats are also involved in tuna fishing in the Mediterranean Sea. Although the length of especially tuna fishing vessels has increased significantly, only the number of vessels longer than 20 m is reflected to the statistics, but not specifically classified. 50% of the vessels longer than 20m are represented by the Black Sea Region (the number of vessels longer than 20 m in 2005 was 827 in Turkey, 402 in the Black Sea Region).

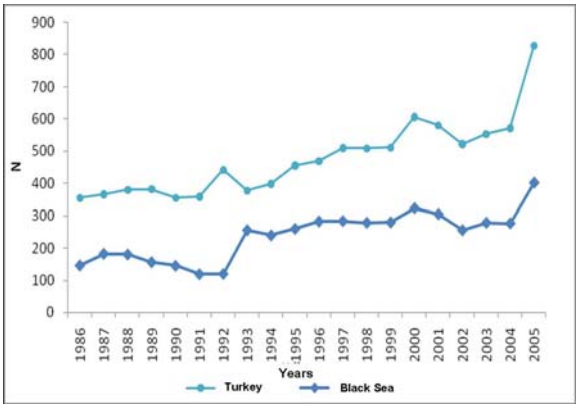


**Figure 4.** Changes in the number of vessels longer than 20m in Turkey in the Black Sea Region between 1986 and 2005 (TÜİK, 1997-2006).

When the number of purse seines, trawls, trawls – purse seines, and carrier boats is examined by years, huge fluctuations could be noticed (Figure 5).

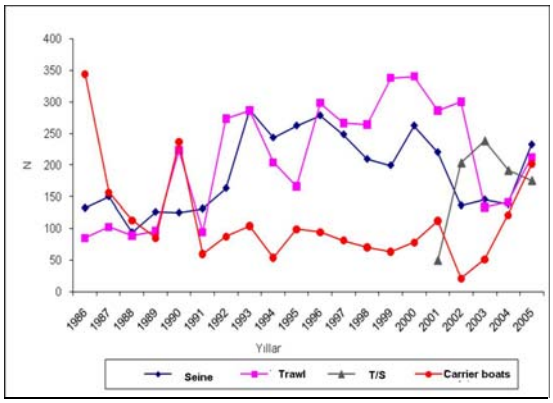


**Figure 5.** Changes in the number of purse seines, trawls, trawls – purse seines, and carrier boats in the Black Sea by years between 1996 and 2005 (TÜİK, 1997-2006).

These fluctuations might be due to the sampling method, and also may be due to the fact that trawl – purse seine certificates obtained after the crisis in 1989-1990 fishing season were not reflected to the statistics for a long time. It is known that most of these boats are fishing anchovy. Or it could also occur that some of these might have been assessed as trawl for some years and as purse seine for some other years. Therefore, it sounds more reasonable to assess the boats longer than 20 m as a change. Vessels longer than 20 m were classified for the first time in the statistics of 2005. During this period, one could notice how important the Black Sea fishery (anchovy fishing) was (Figure 6).

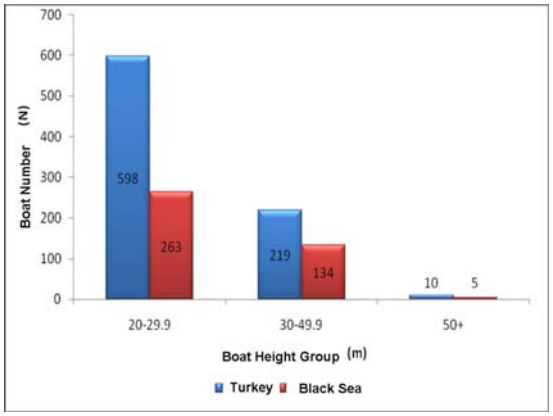


**Figure 6.** Changes in the number of boats longer than 20m our country and in the Black Sea in 2005 (TÜİK, 2997-2006).

As it is shown in the Figure, 44% of the boats between 20-20.9 m in our country are

represented by the Black Sea Region, and this ratio is 61.2% for the boats between 30-49.9 m; and 50% for boats above 50 m. One could note how important the Black Sea is for the Turkish fishery. Considering the boats longer than 30 meters, other than the Black Sea, the Marmara is predominant and the Aegean and the Mediterranean have less number of boats (Table 2). Considering the fact that most of the boats longer than 30 m in the Marmara Region are fishing anchovy in the Western Black Sea, one could understand how influential anchovy is on the increase of big fishing boats.

**Table 2.** Distribution of fishing boats of 20 m and above by regions in our country, 2005 (TÜİK, 2006)

| Vessel Length (m) | Total | Black Sea | Marmara | Aegean | Mediter-ranean |
|---|---|---|---|---|---|
| 20–29.9 | 598 | 263 | 190 | 56 | 89 |
| 30–49.9 | 219 | 134 | 72 | 10 | 3 |
| 50+ | 10 | 5 | 5 | | |
| Total | 827 | 402 | 267 | 66 | 92 |

### c) Importance of the Black Sea Region and Anchovy in terms of Fish Meal and Industry

In recent years, the Black Sea has met the entire fish meal and fish oil production. Although it has been accepted that sprat fish which are caught with midwater pair trawl especially in Samsun area are totally transformed into fish meal or fish oil, a considerable amount of share is met by anchovy. Figure 7 shows the yearly change in the fish meal and fish oil production in Turkey.

As seen in Figure 7, almost all anchovy used in fish meal and fish oil production were provided from the Black Sea or more precisely Eastern Black Sea. Since there was little amount of production in the Marmara and Aegean Regions before 1988, they were not taken into evaluation.

Consequently, it is very well observed that the fish production in Turkey attained from the fishing is dependent on sea fish, and that sea fish catching is dependent on the Black Sea and anchovy, which is the most important product of big fishing boats and fishery-based industry. And it is a cheap protein source that creates significant employment.

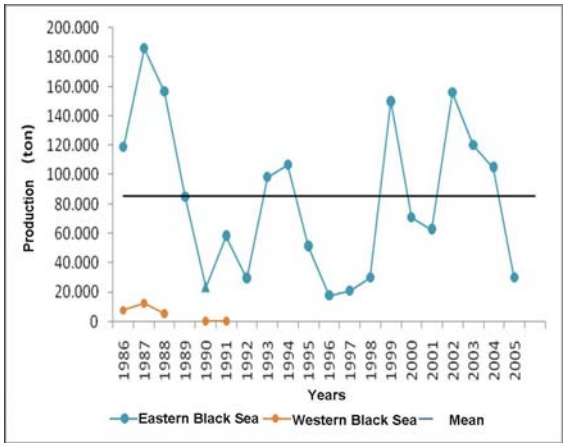


**Figure 7.** Fish meal and oil in the Black Sea Region between 1986 and 2005 (TÜİK, 1987-2006).

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