

There have been dramatic changes in the Black Sea recipient ecosystem. These include the loss of extensive areas of seagrass meadows, a virtual collapse of the benthos over broad regions of the shelf area and mass mortalities due to hypoxia.

The harvesting of the bivalve *Ruditapes decussatus* by dredging the mediolittoral zone of the sea is very damaging to the benthic community and is destroying flatfish habitats, particularly *Solea* sp. In addition, mollusc and crustacean communities, such as *Donax* sp., *Turiletta* sp. and *Mactra* sp., are coming under threat. Isopod and amphipod species are also affected by coastal degradation and destruction. The dredging of sand from the sea is also destroying the habitats of marine biota along the Turkish Black Sea coast.

### III. Review of Turkish Black Sea Coastal Fish Fauna

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The tectonic evolution of the Black Sea has resulted in four distinct groups of fish fauna each of a different origin, namely: warm water fish; moderately cold water fish; brackish water fish; and anadromus fish (Rass, 1992).

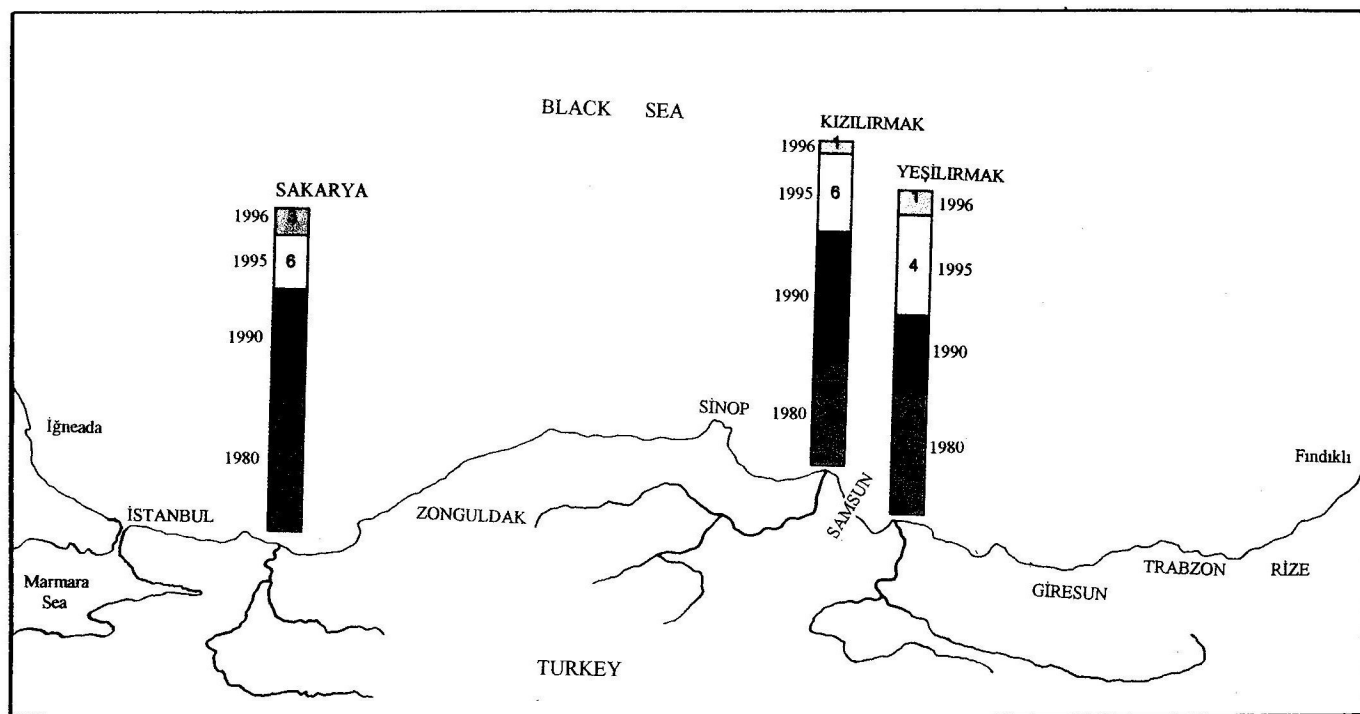
The warm water marine fish, which account for the largest number of species, originated in the Mediterranean and moved through the Bosphorus during the post-glacial period. This group includes the Black Sea anchovy *Engraulis encrasicolus*, *Mugil cephalus*, *Mullus barbatus*, *Belone belone euxini*, *Dasyatis pastinaca* and all the members of the Sparidae and Sciaenidae families. Other members of this group (such as *Trachurus mediterraneus*, *Sarda sarda*, *Scomber japonicus*, *Scomber scombrus*, *Thunnus thynnus thynnus* and *Pomatomus saltator*) are migratory, spending the warmer months in the Black Sea and wintering in the Marmara Sea and the northern Aegean (Rass, 1992).

The moderately cold-water species are relicts from the glacial period during which the Mediterranean and its adjacent seas experienced a fall in temperature. Examples of this group include *Sprattus sprattus*, *Merlangius merlangus euxinus*, *Platichthys flesus*, *Gymnammodytes eicerehus*, *Raja clavata* and *Squalus acanthias*.

The brackish water species, such as *Clupeonella cultriventris*, are Ponto Caspian relicts (Ross, 1992). Most are confined to the northwestern shelf and the Azov Sea, where a significant amount of fresh water is discharged into the basin via major rivers, such as the Danube, Dniestr, Dniepr and Kuban. They are therefore very rare along the Turkish Black Sea coast.

The anadromus species breed in rivers flowing into the Black Sea but spend most of their adult life in the sea itself, such as sturgeons Acipenseridae diminishing in the Turkish Black Sea coast (Figure 5).

Deknik (1979) recorded 165 fish species in the entire Black Sea, of which 119 were exclusively marine, 24 anadromus or semi-anadromus and 22 fresh water species. A total of



**Figure 5.** Sturgeon catches in the Turkish Black Sea coasts in 1980-1996 (tons). Since 1997, sturgeons are under the legal protection.

140 species have been recorded off the Turkish Black Sea coast (Aksiray, 1954; Erazi, 1942; Slastenenko, 1956; Bingel *et al.*, 1995; Whitehead *et al.*, 1984-1986; Fischer, 1987; Kuru, 1980). In addition, an exotic species, *Mugil so-huy*, was introduced into the Black Sea by the Soviet Union (Zaitsev, personal communication) and today can be found in large numbers along the entire coastline. A full list of the fish species recorded in the Turkish Black Sea is given in Annex 1 - Table 5. Further studies have been undertaken by Acara (1956, 1957, 1985), Bilecik (1974), Bingel (1995), Kutaygil (1976, 1979), Demir (1960, 1961), Gücü (1995), Özdamar *et al.* (1991) and Samsun (1995).

The populations of Acipenceridae, *Thunnus thunnus thynnus*, *Scomber japonicus*, and *Scomber scombrus* appear to be in drastic decline in the Turkish Black Sea. The anchovy population relative to total fish stocks is given in Figure 6, after Kideys (1991).

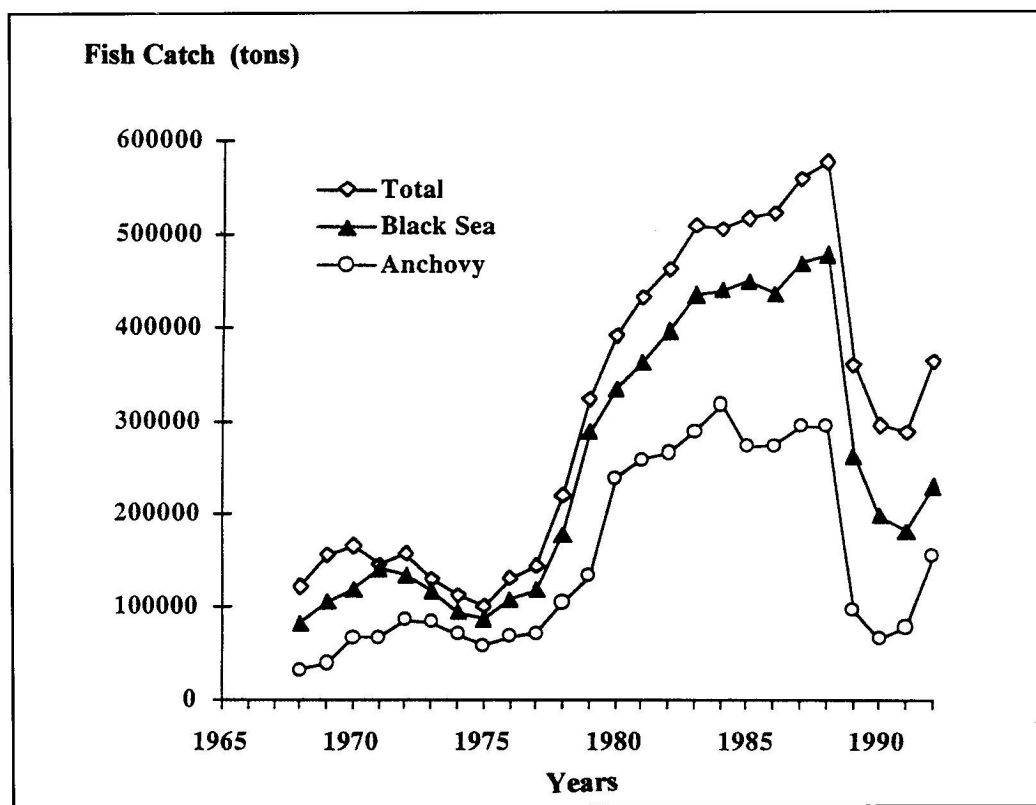


Figure 6. The importance of the Black Sea anchovies in the Turkish fisheries (after Kideys, 1991).

Bingel *et al.* (1995) stated that their estimate of demersal fish biomass within the depth of 0-100 m is the minimum biomass. This is because the catchability coefficient of the net is taken as  $q=1=100\%$ . Meanwhile, the species groups of highest proportions in the catch were bony fish and cartilaginous fish. These were followed by molluscs and jelly fish. The Black Sea anchovy spawns repeatedly between June and August producing 10 batches. Assuming that each of these 10 batches forms a separate group of recruits, then the arrival time of each individual batch should be different. The sudden decline of anchovy ichthyoplankton in 1989 supports the hypothesis that the recently introduced species *Mnemiopsis leidyi* has played an important role in diminishing the Black Sea anchovy fisheries.

#### IV. Review of Marine Mammals of the Turkish Black Sea Coast

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Little research has been done on the state of the marine mammal population of the Black Sea. In recent years, the Black Sea coasts have been heavily polluted, urbanized and over exploited, factors which have negatively affected the whole ecosystem and all the trophic levels. As the top predators in the ecosystem marine mammals are very sensitive to such ecological degradation.

There are three cetacean species in the Black Sea, namely: *Delphinus delphis* (common dolphin), *Tursiops truncatus* (bottlenose dolphin) and *Phocoena phocoena* (harbour porpoise). These species are almost completely isolated geographically and some scientists, particularly those of the former Soviet Union, categorize them as subspecies, namely: *Delphinus delphis ponticus*, *Tursiops truncatus ponticus* and *Phocoena phocoena relicta*. In the current study, in order to avoid confusion they are referred to by their more commonly accepted names.

In addition there is one species of pinniped in the Black Sea, the Mediterranean monk seal *Monachus monachus*. But, as in many other areas, its Black Sea population has fallen to dangerously low levels.

The First International Symposium on the Marine Mammals of the Black Sea was held in Istanbul in 1994. The consensus of the littoral countries is reflected in Declaration on the Conservation of Black Sea Marine Mammals (see Annex II) and the Elements of an Agreement under the Bonn Convention (CMS) for the Conservation of Marine Mammals of the Black Sea (see Annex III). The threat posed by pollution to Black Sea dolphins has prompted studies by Madrusree *et al.* (1997) and Tanabe *et al.* (1997).