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Review **Derleme**

An Evaluation on Fish Diet Composition Studies in Türkiye

Türkiye'deki Balık Diyet Kompozisyon Çalışmaları Üzerine Bir Değerlendirme

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Abstract: Determination of the dietary composition and feeding habits of fish is important to explore and compare trophic interactions, food web structure, population, and ecological dynamics within and between aquatic ecosystems and to ensure sustainability. Factors such as global warming in the world and the effects of human activity cause the reduction of fish populations to the deterioration of the ecological balance. That is why we need to fill scientific knowledge gaps to discover and protect biodiversity. In this study, studies that determine the dietary composition of fish species distributed in our country's waters were brought together and the methods used were examined. When we examine these studies; It has been observed that information on the diet compositions of threatened and important commercial fish species is lacking, and existing studies are concentrated in certain areas. It has been determined that the studies carried out in the Black Sea and Aegean Seas are more than in the Mediterranean and Marmara Seas, there are no studies in the Southeastern Anatolia region, and there are few studies in the inland waters of the Mediterranean, Marmara, and Aegean regions.

Keywords
- Nutritional habits
- Diet composition
- Türkiye
- Stomach content
- Fish

Özet: Balıkların diyet kompozisyonlarının, beslenme alışkanlıklarının belirlenmesi su ekosistemleri içindeki ve arasındaki trofik etkileşimleri, besin ağ yapısı, popülasyon ve ekolojik dinamiklerini keşfetmek, karşılaştırmak ve sürdürülebilirliliği sağlamak için önemlidir. Dünyadaki küresel ısınma, insan aktivitesinin etkileri gibi faktörler balık popülasyonlarının azalmasına ekolojik dengenin bozulmasına kadar sebep olmaktadır. Bu yüzden biyolojik çeşitliliği keşfetmek ve korumak için bilimsel bilgi eksikliklerini gidermeliyiz. Bu çalışmada Ülkemiz sularında dağılım gösteren balık türlerinin diyet kompozisyonlarını belirleyen çalışmalar bir araya getirmek istenmiş ve kullanılan yöntemler incelenmiştir. Bu çalışmaları incelediğimizde; tehdit altındaki ve önemli ticari balık türlerinin diyet kompozisyonları hakkındaki bilgilerin eksik olduğu, var olan çalışmaların belirli alanlarda yoğunlaştığı görülmüştür. Karadeniz, Ege denizinde yapılan çalışmaların Akdeniz ve Marmara denizine göre daha fazla olduğu, Güneydoğu Anadolu bölgesinde hiç çalışma olmadığı ve Akdeniz, Marmara, Ege bölgesindeki iç sularda az çalışma olduğu tespit edilmiştir.

Anahtar kelimeler
- Beslenme alışkanlıkları
- Diyet kompozisyonu
- Türkiye
- Mide içeriği
- Balık

1. INTRODUCTION

Determination of the dietary composition of fish in aquatic ecosystems; contributes to the understanding of much ecological information such as trophic relationships, population dynamics, resource sharing, habitat preference, prey selection, competition, and energy transfer between systems (Motta & Wilga, 2001; Guedes & Araujo, 2008; Rezende et al., 2008; Estes et al., 2011; Birkhofer et al., 2017). Such information is important in protecting ecosystems and species (Mequilla & Campos 2007). Because climate change, pollution, changes in habitats, and human activities affect ecosystems and fish populations (Vitule et al., 2009). In addition, while excessive unconscious fishing causes a decrease in fish stocks, it also puts the species in danger of extinction (Myers et al., 2007; Heithaus et al., 2008). The reproduction and survival of fish species are directly related to ecological conditions (Ramana & Manjulatha, 2014). To understand the relationship between the quantity and quality of the food types of fish and the ecological conditions of the nutrition types; diet compositions should be

known (Aarnio et al., 1996; Wetherbe & Cortes, 2004; Yılmaz et al., 2007). Consequently, determination of fish diet compositions is essential to understanding the role of fish populations in ecology and their productive capacity (Bowen, 1982).

The study of feeding and feeding behavior provides the basis for the development of a successful management program for fishing and breeding (Ultang, 1996). Knowing the dietary composition of fish in aquaculture is vital for controlled aquaculture and formulation of the appropriate diet given to the fish (Wootton, 1990; Shalloof & Khalifa, 2009). Therefore, understanding the feeding and feeding behavior of the species is a key factor for successful fisheries management and aquaculture (Jennings et al., 2001; Oransaye & Nakpodia, 2005).

Direct observation of the feeding behavior and prey selection of aquatic animals such as fish is difficult. Therefore, stomach content analysis has become an important and universal method for the detailed investigation of diet composition and nutritional ecology (Hyslop, 1980). The advantages of choosing the stomach content analysis method in determining the dietary composition of fish are that they have a defined stomach, swallow their prey whole, and are obtained in high numbers (Amundsen & Hernandez, 2019). Various disadvantages can be encountered in the interpretation of the data collected as a result of stomach content analysis. For example, in some cases, slow-digesting prey taxa will be more predicted because they stay in the stomach for a long time, but fast-digested prey will not be seen in the stomach. In addition, some structures that are not digested in the stomach, such as the exoskeleton, chitin capsules of insects, and hard body structures, are easier to distinguish, while it will be difficult to distinguish soft prey species. Another disadvantage is that the prey becomes unpredictable by breaking down into smaller molecules under the influence of the mucus fluid in the stomach (Baker et al., 2014; Buckland et al., 2017).

Although traditional approaches such as examining stomach contents only represent snapshots of recent meals, they may not be reliable indicators of long-term diet (Iverson, 2009). Therefore, alternative approaches using various trophic markers have been used. These approaches are specific biomarkers such as a fatty acid or isotope ratio of an element (Phleger et al., 1997; Michener et al., 2007), these methods reflect dietary contributions but cannot measure the dietary contribution of the specific compound (Winemiller, 2008). The relative amounts of dietary intake and assimilation can vary widely among biochemical compounds (Mitra & Flynn, 2007). As a result, there have been significant developments in both the methodology and application of new and more traditional diet monitoring methods in the world (Wells & Rooker, 2009; Young et al., 2010), but comprehensive studies that systematically and quantitatively compare different approaches should also be conducted (Nielsen et al., 2018).

Our aim in this review, in which we examined the articles of studies in which fish diet compositions were determined;

a) To determine the regions or environments that require attention by determining the dietary compositions of which fish in which regions

b) To determine whether there are studies to investigate commercially important and threatened species

c) To identify general gaps in dietary composition studies of fish, and to guide future studies.

2. METHOD

The review was made by evaluating fish diet composition studies indexed in the Web of Science and Google Scholar databases. All articles containing the words “fish diet composition, nutrition, diet, stomach content, fish nutrition stable isotope, and fish nutrition biomarker” were considered in the research “topic” option. Although this research resulted in a large number of articles, after filtering only the studies conducted in Turkiye to refine the results, many results not related to fish feeding were examined in titles and abstracts and eliminated. Spearman correlation test was performed to look at the relationship between the fish species studied in the articles and the total fish species found in Turkiye (SPSS 22.0 IBM Corp., Armonk, NY, USA).

3. RESULTS

As a result of the literature review carried out in this study, 122 studies on the dietary composition of fish distributed in our country's waters were determined (Figure 1).

Figure 1. Map of fish diet composition study areas in Turkey

In terms of the number of studies, it was observed that 31, 29, 19, 18, 15, and 10 studies were carried out in the Black Sea, Aegean, Mediterranean, Central Anatolia, Marmara, and Eastern Anatolia Regions, respectively. In addition, the number of fish species studied by regions was found to be 32 in the Aegean Region, 24 in the Black Sea region, 20 in the Mediterranean Region, 20 in the Marmara region, 12 in the Central Anatolia Region, and 9 in the Eastern Anatolia Region (Figure 2).

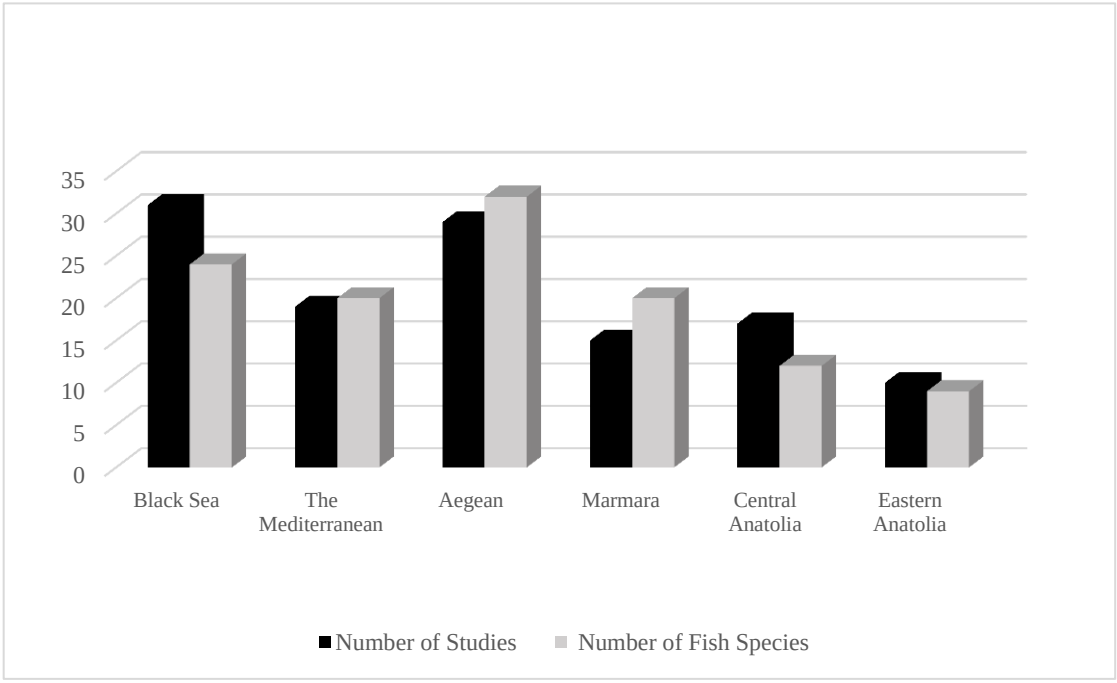

Figure 2. Number of fish diet composition studies by region and number of species

Fish diet composition studies were conducted 64 of them in the sea and 51 of them in inland waters. Of the studies in the seas, 17 were carried out in the Black Sea, 12 in the Mediterranean, 25 in the Aegean, and 10 in the Marmara Sea. Of the inland water studies, 18 were carried out in Central Anatolia, 14 in the Black Sea, 10 in Eastern Anatolia, 7 in the Mediterranean, 5 in the Marmara, and 4 in the Aegean region (Figure 3).

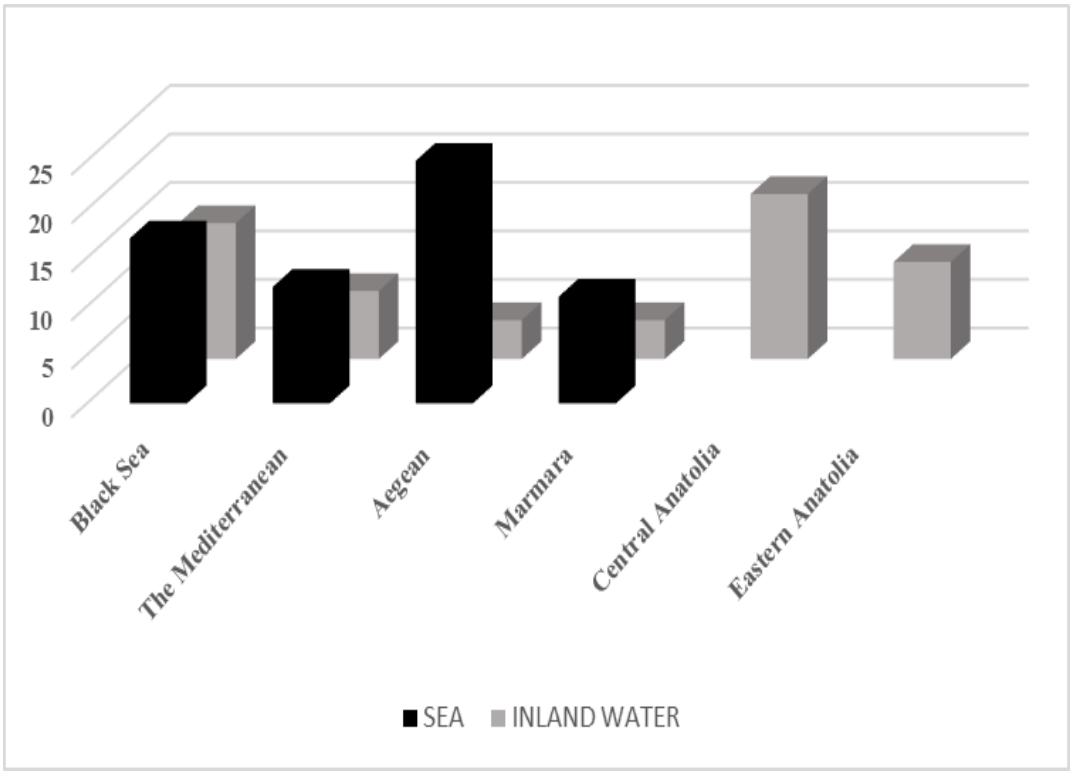

Figure 3. Distribution of fish diet composition studies in marine and inland water

In the studies examined, the nutritional ecology of 89 fish species belonging to 49 families has been reported. The family represented by the most species in the studies is Cyprinidae with 9 species. In addition, the families Leuciscidae 7, Triglidae 5, Salmonidae Gobiidae, Mullidae, Percidae, Rajidae, Scorpaenidae, Sparidae, and Squalidae were the families represented by the other most species with 3 species each (Figure 4). The most studied species based on species were *Raja clava*ta with 9 studies, *Carassius gibelio* with 7 studies, *Sycliorhnius canicula* with 5 studies, *Esox lucius, Atherina boyeri, Cyprinus carpio* with 4 studies, and *Sander luciperca, Perca fluviatilis, Merlangus merlangus* with 3 studies. In addition, there are 2 studies of *Squalus acanthias, Tinca tinca, Mustelus mustelus, Chondrostoma regium, Scardinius erythophthalmus, Silurus glanis, Squalius cephalus, Salmo trutta magrostigma, Salmo trutta, Mullus barbatus, Serranus hepatus* species (Figure 4).

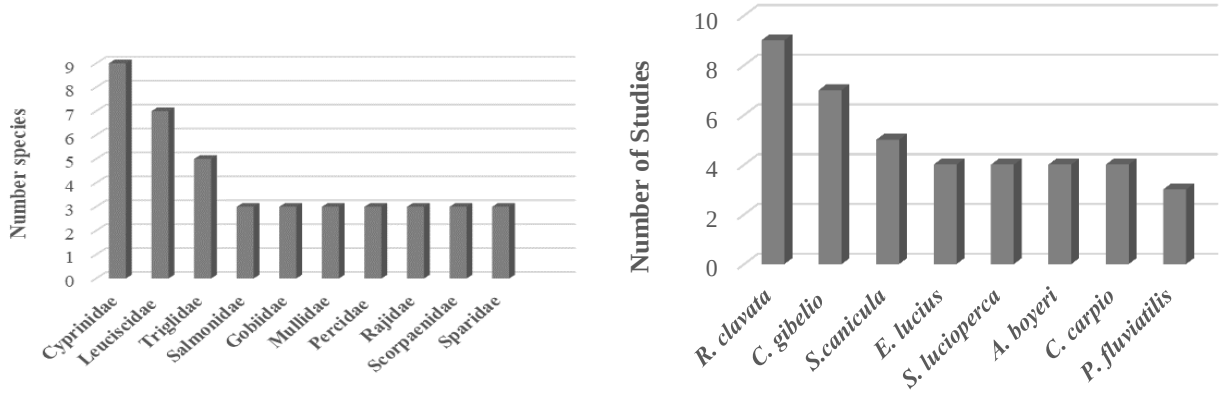

Figure 4. Number of family distributions of studied species and number of studied species

The diet compositions of the same fish in different regions are as follows; In studies conducted in 3 Black Sea, 4 Aegean, 1 Marmara, and 1 Mediterranean region, *Raja clavata* was determined to be fed with carnivores whose diet compositions consisted of teleost fish and crustaceans (Table 1, 2, 3, 4). Demirhan et al. (2007) stated that in the Southeastern Black Sea, *R. clavata* is the main food source not only for anchovy but also for haddock throughout the year. In another study conducted in the Black Sea region, Sağlam and Başçınar (2008) stated that with the increase in the length of *R. clavata*, the diversity of the diet composition also increased, and individuals shorter than 50 cm fed on crustaceans and individuals longer than 50 cm on teleost fish species. In the study of Kabasakal (2001) in the Northeast Aegean region, it was stated that individuals longer than 50 cm were fed with teleost fishes and mostly Mullidae family. In most of these studies, the nutritional ecology of *R. clavata* was studied with the stomach analysis method, and the trophic level was determined by using the stable carbon and nitrogen isotope method in the studies of Gül and Demirel (2020) in Marmara and Yemişken et al. (2018) in the Mediterranean. The trophic level of *R. clavata* was determined as 3.71 in Marmara and 2.75 in the Mediterranean (Table 2, 4).

In their studies conducted in 2 Marmara, 2 Central Anatolia, and 2 Black Sea regions, *Carassius gibelio* reported that they eat omnivores and consume animal foods, especially zooplanktonic organisms (Table 1, 2, 5). Yalçın Özdilek and Jones (2014) determined the trophic level as 2.43 using stomach analysis and stationary carbon nitrogen isotope methods in their study in Karamenderes Stream and stated that filamentous algae and detritus are important food sources (Table 2). Dietary compositions in Eğirdir and Bafra lakes Asterionella sp., Botryococcus sp., Gonium sp., Microcystis sp., Bosmina sp. Spirogyra sp., Lepidella sp., Insecta and Nematoda species were identified (Balık et al., 2003; Yılmaz et al., 2007). In the studies, they stated that the reason for the preference of *C. gibelio* is because it is an invasive species and that its rate of spread increases in inland waters where it settles. Since invasive species can negatively or positively affect the species in the region, it is recommended to reveal the food web structures by investigating the relationships between species in future studies. (Yalçın Özdilek & Jones, 2014; Partal & Yalçın Özdilek, 2017). Most of the fish species such as *C. gibelio, Pseudorasbora parva, Gambusia holbrooki* and *Lepomis gibbosus, Cyprinus carpio, Tinca tinca,* and *Atherina boyeri* are invasive and adapt easily to the waters they enter, exerting pressure on native species in the environment and competing with them for food, living and breeding space. (Gürbüz, 2018). Among these fish species, there are only a few studies on the dietary composition of *Pseudorasbora parva, Cyprinus carpio, Tinca tinca,* and *Atherina boyeri* (Table 1,3,4,5). Thus, dietary composition studies are important to determine the threats posed by invasive species on native species (Yalçın Özdilek & Jones 2014; Partal & Yalçın Özdilek, 2017).

Fish and crustaceans were determined to be the most important food groups in the studies of *Scyliorhinus canicula* conducted in 1 Marmara, 3 Aegean and 1 Mediterranean regions (Tables 2, 3, 4). Gül and Demirel (2021), in their study in Marmara, determined the trophic level of *S. canicula* to be 3.98 and the diet compositions of crustaceans, *Trachurus sp.*, *Engraulis encrasicolus, Gobius niger*, unspecified teleosts species with the stable carbon and nitrogen isotope method. They found that they were fed (Table 2). Bengil et al. (2018) found the trophic level calculated by the global method in their study in the Aegean region as 4.12 and reported that the diet compositions mostly consisted of unidentified teleost fish species. Fish species that make up the diet compositions in studies conducted in other regions; *Engraulis encrasicolus, Gobius niger*, *Serranus hepatus, S. canicula, Scorpaena sp., Gadiculus argenteus, Argentina sphyraena*, *Merluccuis merluccuis* and *Cepola rubescens* (Kabasakal, 2001; Filiz & Taşkavak, 2006).

In studies conducted in 2 Mediterranean and 2 Central Anatolian regions of *Sander luciperca*, it was determined that the diet types generally consisted of fish, *gammarus, diptera* and *mysis*, and cannibalism feeding type was determined (Table 4, 5). While fish is the most important food group for individuals in size groups larger than 19 cm of the species in the Seyhan dam lake, the most important food group for individuals smaller than 19 cm has been determined as *diptera* and *mysid* (Özyurt et al., 2012). It has been determined that the species living in the Karacaören dam lake mostly feed on members of the Krustase (*Mysid, Gammarus, Asellus*) (Becer Özvarol, 2006). It was determined that the species living in Lake Eğirdir mostly feed on fish species (*Knipowitschia sp., Aphanius anatoliae anatoliae, Gambusia affinis, Nemacheilus lendli, Carassius gibelio, S. lucioperca*) (Balık et al., 2006). An endemic species, *Pseudophoxinus handlirschi*, has been reported to have disappeared with the grafting of *S. lucioperca* into Lake Eğirdir (Gürbüz, 2018). It has been stated that *S. lucioperca* in Hirfanlı reservoir constitutes most of the dietary composition especially in late autumn and winter fish (*Tinca tinca* and *Alburnus orontis*). In addition, it was determined that 40.5% cannibalism was seen in pikemen between 145-378 mm in length (Yılmaz & Ablak, 2003).

In studies conducted in Central Anatolia, Black Sea and Aegean Regions, it has been stated that the diet composition of *Esox lucius* mainly consists of fish, but it also prefers crustacean species due to seasonal reasons (Tables 1, 3, 5). It has been stated that food diversity increases in spring and summer due to the increase in temperature and decreases in autumn and winter seasons (Benzer et al., 2012; Ünver, 2011; Yılmaz & Polat, 2005). They stated that the species in Lake Çivril feed on *C. gibelio, Chondrostoma medrense, E. lucius, Gambusia affinis, Gobio gobio, Hemigrammocapoeta kemali, Leuciscus cephalus,* and *Tinca tinca* fish species, and small sized pike of crustacean species are an important food source (Alp et al., 2008). The diet composition of *E. lucius* is composed of fish, gammarus, and odonata species in Kapıkule Dam Lake (Benzer et al., 2012), in Simenit Lake it consists of fish, insects, crustaceans, and some cysts (Yılmaz & Polat, 2005), in Sıddıklı Küçükboğaz dam lake, it has been reported that it consists of odonata larvae, gammarus and fish (Ünver, 2011).

Diet composition studies of *Cyprinus carpio*, which is one of the well-known species in Turkey's freshwater fisheries, were determined in 2 inland waters of the Black Sea region and 2 in the Central Anatolia region (Tablo 1,5). In these studies, it was determined that *C. carpio* feeds mostly on phytoplankton species in Gölköy and Bafra fish lakes, does not prefer food according to their age, and high nutritional activity is observed in summer months (Türker, 2006; Yılmaz et al. 2003). Similarly, in the studies conducted in Hirfanlı dam lake and Mogan Lake, it was determined that it fed on phytoplankton and zooplankton species and showed omnivorous nutrition (Gül vd., 2010; Atasagun, 1990).

Atherina boyeri was found in all sea coasts of Turkey and isolated from the sea to freshwater lakes and reservoirs (Gençoğlu et al., 2017); In the studies carried out in 1 Aegean, 1 Mediterranean, and 2 Central Anatolian regions, it was determined that the diet composition consisted of zooplankton (Table 4, 5). It was determined that the most dominant species in the diet composition of *A. boyeri* was Euterpina acutifrons in the study conducted in the Aegean and *Bosmina longirostres, Cyclops,* and *Keratella coechlaris* in the study conducted in the Mediterranean (Uncumusaoğlu et al., 2018; Becer et al., 2018). In the studies carried out in the Central Anatolia region, it has been determined that they have an opportunistic diet and are mostly fed with cladocerans (*Bosmina longirostris, Alona*

quadrangularis), copepod (*Nitokra hibernica, Mesocyclops leuckarti*) species. In addition, with the increase in fish size, while Insecta, Arthropoda, fish, and unidentified eggs increased in the diet, it was determined that Cladocera and Copepoda decreased (Yağcı et al., 2016; Gençoğlu et al., 2017).

Three studies with *Perca fluviatilis*, an important predator for both commercial and recreational fishing, were carried out in Lake Ladik and its dams in the Black Sea region. According to studies, it has been determined that *P. fluviatilis* has a carnivorous diet consisting of zooplankton, macroinvertebrates, and fish species. Çetin (2011) determined the spatial changes in the nutrition of *P. fluviatilis* in Suat and Hasan Uğurlu dam lakes by using stomach analysis and stable carbon nitrogen isotope method, and the diet composition was mostly determined by fish (*Proterorhinus marmoratus, Gobidae family, Gambusia sp., Rhodeus amarus*) was found to consist of insects and crustaceans. It was also stated that the trophic level changed from 3.83 in the river parts to 3.54-4.00 in the dams. They determined that *P. fluviatilis* in Derbent dam lake feeds on plankton species of all age groups, while the 3 and 4 age groups feed mostly on fish (Yılmaz et al., 2003).

Merlangius merlangus, which is an important species in the Black Sea ecosystem, is known to be hunted 80% from this region (Samsun, 2011). Studies have shown that *M. merlangus* is an important predator for fish and crustaceans, where it shows a carnivorous diet in the Black Sea (Samsun et al., 2011; Mazlum and Bilgin, 2014; Demir and Balık, 2021). Samsun et al. (2011) found that the rate of cannibalism is higher in the spring and summer seasons of the Central Black Sea coast than in the autumn and winter seasons. Mazlum and Bilgin (2014) reported that sprat in spring, haddock in summer, and anchovy in autumn and winter are the most important food sources in their study on the Rize coast of the Southeastern Black Sea Region. Samsun and Balık (2021) determined that the most important food source of the Black Sea coasts of Samsun and Ordu is in spring and summer, anchovy in winter and autumn. In recent years, it has been reported that the dietary compositions of *M. merlangus* may change due to the decrease in the anchovy and sprat population on the Turkish coasts of the Black Sea (Demir & Balık, 2021).

There are only 2 studies on the nutritional ecology of *S. trutta*, one of the economically important fish, one of which was conducted in Çoruh river and the other in Ceyhan and Euphrates rivers (Table 1, 4). According to these studies, *S. trutta* shows carnivorous nutrition. In the study conducted in the Mediterranean, it was observed that they were fed with *Gammarus sp., Hydropsychidae, Gemoura sp., Isoperla sp.* species (Kara & Alp, 2005), in the study conducted in the Black Sea, they were fed with *Trichoptera and Saltatoria* species (Becer et al., 2011). The changes in the nutrient compositions and feeding strategies of fish in the two regions were thought to be due to the availability of different macroinvertebrates in the two macrohabitat types (Becer et al., 2011).

It is seen that the studies carried out in the Black Sea region are mostly carried out in the Southeast Black Sea region (Samsun, Ordu). In addition, many studies have been carried out in inland waters as well as in the seas. Fish species showing carnivorous nutrition in these studies *Sprattus sprattus, Dasyatis pastinace, Mullus barbatus, Proterarhinus marmoratus, Cobitis vardarensis, Squalus acanthias, Raja clavata, Uranoscopus scaber, Scorpanea porcus, Sciaena umbra, Merlangius merlangus, Belone belone euxini, Salmo trutta macrostigma, Carassius gibelio.* Fish species showing omnivorous feeding *Blicca bjoerkna, Scardinius erythrophthalmus, Chondrostoma regium, Squalius cephalus, Perca fluviatilis, Tinca tinca, Esox lucius.* Fish species showing herbivorous diet *Carassius carassius* (Table 1).

It has been determined that the works in the Aegean region are mostly carried out in Izmir, Izmir Bay, and Sığacık Bay. Fish species showing carnivorous nutrition in studies *Argentina sphyraena, Glossanodon leioglossus, Chloraphtholmus agassizi, Hoplostethus mediterraneus, Capros aper, Belona belona, Alosa fallax, Lophius budegassa, Trachurus trachurus, Squalus blainville, Galeus melastomus rafinesque, Galeus melastomus, Etmopterus spinax, Squalus blainville, Scyliorhinus canicula, Raja clavata, Dipturus oxyrinchus, Clinitrachus argentatus, Xiphias gladius, Sardina pilchardus, Engralis encrasicolus, Serranus hepatus, Scomber japonicus, Mustelus mustelus, Spicara flexuosa, Caelorinchus caelorinchus, Atherina boyeri, Cepola macrophthalma, Esox Lucius.* Fish species showing omnivorous feeding; *Petroleuciscus borysthenicus, Mugil cephalus, Carassius gibelio* (Table 3).

Studies in the Mediterranean region mostly took place in the Eastern Mediterranean, the Gulf of Iskendur, and inland waters. Fish species showing carnivorous nutrition in studies *S. canicula, Dasyatis pastinaca, Thunnus thynnus, Thunnus alalunga, Gymnura altavela, Raja asterias, R. clavata, Stenella coeruleoalba, Clarias gariepinus, Mullus barbatus, Upeneus moluccensis, Upeneus porinis moluccensis , Upeneus porisis , Silerinis lauridis , Pterois miles, S. lucioperca, S. trutta*, while the herbivorous fish species was *Capoeta barroisi* (Table 4).

The studies carried out in the Central Anatolia Region were mostly carried out in the Hirfanlı dam lake and Eğridir lake. Fish species showing carnivorous nutrition in studies *A. boyeri, Silurus glanis, S. lucioperca, Stizostedion lucioperca, Pseudorasbora parva, E. lucius*, while the omnivorous fish species were *Tinca tinca, Capoeta sieboldii, C. carpio, C. gibelio, Knipowitschia caucasica, Knipowitschia caucasica* (Table 5).

The studies carried out in the Marmara region were mostly carried out on the sides of the Çanakkale and the Çanakkale. Fish species showing carnivorous nutrition in studies *Trachurus mediterraneus, Chelidonichthys lucerna, Chelidonichthys lastoviza, Eutrigla gurnardus, Lepidotrigla cavillone, Trigla lyra, R. clavata, Mustelus mustelus, Mustelus asterias, Squalius acanthias, S. canicula, Pomatotrigla cavillone, Mustelus asterias, Squalius acanthias*, while omnivorous feeding fish species were *C. gibelio, Vimba vimba, Scardinus erythophthalmus.*

In the studies conducted in the Eastern Anatolia region, the fish species that fed on carnivores were *Salmo trutta macrostigma, Barbus mystaceus*, while the fish species that fed omnivores were *Oncorhynchus mykiss, Acanthobrama marmid, Chondrostoma regium, Capoeta umbla, Capoeta trutta, Carasobarbus luteus, Mastacembelus mastacembelus.*

The reasons for choosing the species in the studies included in the review are mostly based on reasons such as economic value, invasiveness, or use in aquaculture. An exceedingly rare part of them considered it sufficient for the species to be included in the food web. The common point stated throughout the studies is the inadequacy of studies such as fish nutrition ecology, nutrition, and food diversity in our country. For this reason, the relationship between the species in the studies and the total number of fish species in Turkiye was analyzed with the Spearman correlation test and the results were not found statistically significant ($p>0.05$). When we look at our country with its important water resources and endemic species, the studied species are in the minority. The number of fish species living in Turkiye's Freshwaters is 409 (Çiçek et al., 2018), the dietary composition of only 32 species was determined, while the dietary composition of only 57 of the marine species (561 species-Fishbase 2021) was investigated.

Table 1. Results on the nutritional ecology of the species distributed in the Black Sea Region

Family	***Species***	**Working Area**	**Number**	**Stomach Contents**	**Season**	**Author**
Sparidae	*Sprattus sprattus*	Black Sea	46	Copepod species, Fish	September 1990-January 1992	Avşar (1994)
			115	Polychaeta, Crustacea, Mollusca, Chaetognatha	Spring	Bayhan and Sever (2015)
Dasyatidae	*Dasyatis pastinace*		141	Anchovy, Kidney Beans, Crab, Horse Mackerel, Shrimp, Crustaceans	June 2007 - May 2008	Sağlam et al. (2009)
Mullidae	*Mullus barbatus*		760	Bivalvia, Nematoda, Polychaeta, Brachyura, Cumacea	April 2017 - March 2018	Onay and Dalgıç (2019)
Gobiidae	*Proterarhinus marmoratus*		33	Chirinomid larvae, insects	Spring - Summer 2005	Gaygusuz et al. (2010)
Cobitidae	*Cobitis vardarensis*		77			
Squalidae	*Squalus acanthias*	Southeast Black Sea	328	Fish, Crustacea, Anthozoa, Nematoda, Teleost, Polychaeta	September October	Avşar (2001)
			176	*Engraulis encrasicolus*	2001-2003	Demirhan et al. (2007)
Rajidae	*Raja clavata***		52	*Engraulis encrasicolus*, Haddock, Shrimp, Crab		
		Trabzon	198	Teleost Fish, Crustacesrus, Mollusca,	May 2003 - January 2004	Sağlam and Başçınar (2008)
		East Black Sea	193	Kidney beans, Haddock, Horse mackerel, Sprat, Anchovy, Rock, Tiryaki, Seahorse, Seahorse, Camur shrimp, Shore crab, Bush shrimp, Shrimp larva, Isopod, Hermit crab	December 2003-October 2004	Başçınar and Sağlam (2005)
Uranoscopidae	*Uranoscopus scaber*		262	Kidney Bean, Seahorse, Mud Shrimp, Coastal Crab, Bush Shrimp, Prawn Larva, Isapod, Hermit crab, *B. reticulatum, Ulva loctula*		
Scorpaenidae	*Scorpanea porcus*		116	Red mullet, Horse mackerel, Mud shrimp, Shore crab, Bush shrimp, Shrimp larva, Isopot, Hermit crab, B.*reticulatum, Ulva loctuca*		
		Ordu	621	Isopod, *Idotea balthica*, Dekapod, Teleost	December 2015 - November 2016	Aydın and Mazlum (2020)
		Trabzon	262	*Mullus barbatus*, Mud shrimp, Harbor crab, Brown shrimp, Seahorse	November 2003 - January 2004	Başçınar (2009)
	Sciaena umbra	Ordu	217	Crustacea, Teleost, Mollusca	March 2018 - February	Aydın and Bengil (2020)

					2019	
		Black Sea	329	Crustacea, Fish, Empty, Alg, Mollusca, Polychaeta	September 2002August 2003	Engin and Seyhan (2009)
Gadidae	*Merlangius merlangus*	Ordu-Samsun	762	Bony fish, Haddock, Anchovy, Sprat, Horse mackerel, Gobidae, Mollusca	September 2016 - August 2017	Demir and Balık (2021)
		Black Sea	716	*E.engrasicolus*, *Merlangius euxmus*, *Trachurus sp.*, Caridae, Gobidae, *Sprattus sp*., Syngnathidae, İsopoda	December 2001 - April 2003	Samsun et al. (2011)
		Southeast Black Sea	598	Brachyura, Cranganidea, Gammarida, Gastropoda, Bivalvia, *Gobius sp, Trachurus sp, M.euxmus, E.engrasicolus, M.barbatus, S.sprattus*	December 2004 - November 2005	Mazlum and Bilgin (2014)
Leuciscidae	*Blicca bjoerkna*	Ladik Lake	207	Copepoda, Cladocera, Rotifera, Bacilariophyta, Chloropyta, Euglenophyta, Macrophyta	November 2009 - October 2010	Yazıcıoğlu et al. (2017)
	Scardinius erythrophthalmus	Bafra Fish Lake	160	Bacillariophyta, Chlorgohyta	January 2000 - December 2000	Yılmaz and Polat (2003)
	Chondrostoma regium	Suat Uğurlu Dam Lake (Samsun)	145	Bacillariophyta, Zooplankton	April 1993 - March 1994	Polat and Yılmaz (1999)
	Squalius cephalus		332	Insect, Chlorophyta, Bacillarophyta, Aquatic herb, Detritus, Crustaceae	April, July, November 2008 - February 2009	Ölmez and Akın (2020)
Percidae	*Perca fluviatilis*		3332	Fish, *Proterarhinus mamarotus*, Gobidae *Gambusia sp, Rhodeus amorus*, İnsects, Crustacae, Bacillariophyta, Annelida, Nemotodes, Chlorophyta, Petritus, Diatoma	April, July, November 2008 - February, June, July 2009	Çetin (2011)*
		Derbent Dam Lake (Samsun-Bafra)	239	*Cladophora*, *Pediastrum, Asterionella, Spirogyra Oedogonium, Nostoc*, *Nitzchia, Vaucheria, Rhoicosphenia*, Fish scale, *Astacus*, *Ankistrodesmus, Cymatopleura, Melosira, Daphnia, Potamon, Cocconeis, Scenedesmus*, Nematoda, *Navicula*, *Fragillaria*, *Amphora*, Pisces, Incest larva, *Synedra, Cymbella*	May 1998-December 2000	Yılmaz et al. (2003)
		Ladik Lake	308	Fish *(Seardinius erytrophthanus, Perca fluviatilis)*, Chironomidae larva, Odonata (Anizoptera) larvae, Dipter pupae, Coleoptera, Trichoptera larvae	November 2009 - October 2010	Yazıcıoğlu et al. (2016)
Belonidae	*Belone belone euxini*	Trabzon	679	*E.engrasicolus*, Winged ant, Mollusca, Crutacea, Isopoda	October 2010 - November 2011	Kaya (2018)

Salmonidae	*Salmo trutta macrostigma*	Uzungöl	163	Trichoptera, Clitellata, İnsecta, Coleoptera, Ephemeroptera, Haplotaxidae, Diptera, Verenoide, Plecoptera, Hymenoptera, Arachnidae	May 2009 - May 2010	Kocabaş et al. (2012)
	Salmo trutta	Çoruh River	277	Plecoptera, Ephmeroptera, Diptera, Trichoptera, Coloptera, Malocostraca, Gastropoda, Saltataria, Turbelleria, Other items	August 2008 - July 2009	Becer (2011)
Tincidae	*Tinca tinca*	Gölköy Lake (Bolu)	150	Diatom, Crusteceans, Alga	March - November	Türker (2006)
Cyprinidae	*Carassius carassius*		63	Alga		
	Cyprinus carpio		70	Herbs, Crusteceans		
		Bafra Fish Lake	122	*Amphara*, *Anabaena*, *Ankrstrodesmus*, *Chaetophara*, *Closterrum*, *Cocconies*, *Cosmarium*, *Cyclotella*, *Cymotoplevra*, *Cymbella*, *Diotoma*, *Euostrum*, *Evglena*, *Gamphonema*, *Gyrosigma*, *Melosira*, *Merismopedia*, *Microcystis*, *Monoraphidium*, *Navicula*, *Nitella*, *Nitzchia*, *Qedogonium*, *Oscillatoia*, *Pendorina*, *Pedipstrum*, *Peridirium*, *Pinnulara*, *Rhorcosphenia*, *Scenedesmus*, *Spirogyra*, *Staurastrum*, *Surirella*, *Synedra*, Tetraccydus, Vavcheria, Daphnia, Extremity, *Gammarus*, Veratella, Kist, Nematod, İnsects	January 2000 - December 2000	Yılmaz et al. (2003)
	Carassius gibelio		173	*Navicula*, *Amphora*, *Cymbella*, *Daphnia*, *Basmina*, Copepoda	January 2000- September 2003	Yılmaz et al. (2007)
		Ladik Lake	155	Aquatic insects, Copepoda, Cladocera, Rotifera, Bacillariopyhta, Chlorophyta, Cyanobacteria, fish eggs	November 2009-October 2010	Yazıcı et al. (2022)
Esocidae	*Esox lucius*	Simenit Lake	41	*Amphora*, *Synedra*, *Navicula*, *Cymbella*, *Gomphonema*, *Melosira*, *Nitzschia*, *Nostoc*, *Oedogonium*, *Phacus*, *Rhoicosphenia*, *Scenedesmus*, *Gammarus*, Insecta, *Keratella*, *Vorticella*, Kist, Nematod, Pisces	June 2000-May 2001	Yılmaz and Polat (2005)

***** Stomach analysis and stable carbon, nitrogen isotope analysis method were used in the study. **Endangered species (IUCN 2021)

Table 2. Results on the nutritional ecology of the species distributed in the Marmara Region

Family	***Species***	**Working Area**	**Number**	**Stomach Contents**	**Season**	**Author**
Carangida	*Trachurus mediterraneus*	Bandırma Bay	290	Copepeda, Euphausiacea, Cladacera, Amphipoda, Decapoda, Mysidacea, Teleost fish larva	September 2013-March 2014	Akpınar (2018)
			90	Crustacea, Crustacae, Fish roe, Euphausiacea	Spring 2013 - autumn 2015	Koç and Erdoğan (2019)
Triglidae	*Chelidonichthys lucerna*	Edremit Bay	262	Polychaeta, Crustacae, Mollusca, Echinodermata, Teleostei	September 1999-August 2000	İlhan (2019)
	Chelidonichthys lastoviza		300	Polychaeta, Crustacae, Mollusca, Teleostei		
	Eutrigla gurnardus		300	Polychaeta, Crustacae, Mollusca, Teleostei		
	Lepidotrigla cavillone		300	Polychaeta, Crustacae, Mollusca, Teleostei		
	Trigla lyra		43	Polychaeta, Crustacae, Mollusca, Echinodermata, Teleostei		
Cyprinidae	*Carassius gibelio*	Karamenderestea	251	Amphipoda, Chlorophyta, SiliceousAlga, Plant parts, Amphipoda, Chrinomidae	Summer 2012 - Autumn 2012 - Spring 2013	Partal ve Yalçın Özdilek (2017)
			29	Filamentous algae, Detritus	Summer 2011	Yalçın Özdilek ve Jones (2014)*
Oxynotidae	*Oxynatus centrina***	Marmara Sea	2	Stomach filled with fluid	Spring 2018	Gül et al. (2009)
Rajidae	*Raja clavata***		98	Teleost, Crustacea, Mollusca, Nematoda	December 2017 - December 2018	Gül and Demirel (2022)*
Triakidae	*Mustelus mustelus***		28	Nematoda, Polychaeta, Bivalvia, Decapod, Stomatopods, Cephalopods, Teleost	December 2017 - December 2018	Gül and Demirel (2021)
	*Mustelus asterias***		18	Nematod, Decapod, Stomatopods, Cephalopods, Teleost		
Squalidae	*Squalius acanthias*		45	Nematod, Spuncula, Annelid, Stomatopods, Polychaeta, Cephalopods, Decapods, Teleost		
Scyliorhinidae	*Scyliorhinus canicula*		50	Polychaeta, Decapods, Isapod, Cephalopod, Teleost		
Pomatomidae	*Pomatomus saltarix*		512	*E.engrasicolus*, Teleostei, Crustacea	January-December 2014	Bal et al. (2020)

Leuciscidae	*Vimba vimba*	Sapanca Gölü	298	Ostracods, Gastropods, Bivalvia, Mollusca, Fish larva, Macrophytes, Oligochaetes, Chironomids, Phytoplankton, Detritus	August 2003 - July 2004	Okgerman et al. (2013)
		Büyükçekmece Barajı	258	Diptera, Insecta, Plants, Cladocera, Bivalvia, Ostracoda, Fish ve Detritus	March 2009 - February 2010	Saç (2020)
	Scardinus erythophthalmus		305	Insecta, Plants, Bivalvia ve Detritus		
Sparidae	*Sparus aurata*	Çanakkale Boğazı	112	Crustacea, Foraminifera, Annelida	October 2008 - August 2009	Altın et al. (2011)
	Lithognathus mormyrus	Çanakkkale	113	Copepoda, Faraminifera, Peracaridea,Cumacae, Amphipoda, Mollusca	January-December 2007	Ayyıldız et al. (2011)
Gobiidae	*Gabio bulgaricus*	Istaranca Nehri	875	Diptera lavra, Crustacea, Annelida, Arachnida, Bivalves, Detritus	March 2012 - June 2013	Saç ve Özuluğ (2020)
	Pomatoschıstus marmoratus	Çanakkale	383	Copepod, Amphipods, Bivalves apperared	October 2008 - August 2009	Altın et al. (2015)

* Stomach analysis and stable carbon, nitrogen isotope analysis method were used in the study. **Endangered species (IUCN 2021)

Table 3. Results on the nutritional ecology of the species distributed in the Aegean Region

Family	***Species***	**Working Area**	**Number**	**Stomach Contents**	**Season**	**Author**
Argentinidae	*Argentina sphyraena*	Aegean Sea	72	Crustacea, Chaetognatha, Teleostei	Spring 2003	Sever et al. (2013)
	Glossanodon leioglossus		32	Copepoda, Decapoda , *Sagitta spp*		
Chlorophthalmidae	*Chloraphtholmus agassizi*		122	Crustacea,Chaetognatha, Teleostei		
Trachichthyidae	*Hoplostethus mediterraneus*		108	Crustacea,Chaetognatha, Teleostei		
Caproidae	*Capros aper*		74	Crustacea,Chaetognatha, Appendicularia, Thaliacea		
Belonidae	*Belone belone*		597	Ploychaeta, Crustaceans, Mollusca, Thaliacea, Teleostei, Other, Cateparies,	January - December 2002	Sever et al. (2009)
Clupeidae	*Alosa fallax*		208	Crustacea, Teleostei	November - December 2007	Ceyhan et al. (2011)
Lophiidae	*Lophius budegassa*		558	Fishes, Cephalopoda, Crustacae	September 2017 - August 2018	Şenbahar and Özaydın (2021)
Carangida	*Trachurus trachurus***		657	Polychaeta, Crustacea, Mollusca, Chaetognatha, Osteichthyes	September-November June-May January-February March-April 2003	Bayhan and Sever (2013)
Squalidae	*Squalus blainville*	Sığacık Bay	135	Teleostei, Cephalopoda	4.3.2007 (within 24 hours)	Özütemiz et al. (2009)
Pentanchidae	*Galeus melastomus rafinesque*		130	Crustacae		
	Galeus melastomus	East Aegean Sea	441	Chondrichthyan fishes, Amphipoda, Cephalopoda, Decapod, Euphausiids, Teleost and Agnathan fishes	In 2008 (April, May, June, September and November), 2014 (April)	Bengil et al. (2018)
Etmopteridae	*Etmopterus spinax***		129	Amphipoda, Cephalopoda, Decapod, Euphausiids		
Squalidae	*Squalus blainville*		308	Chondrichthyan fishes, Amphipoda, Cephalopoda, Decapod, Euphausiids		
Scyliorhinidae	*Scyliorhinus canicula*		1296	Chondrichthyan fishes, Amphipoda, Cephalopoda, Decapod, Euphausiids,		

				Teleost, and Agnathan fishes		
		İzmir - Foça	146	Fish, Crustaceans	September - November 2002	Filiz and Taşkavak (2006)
		Northeast Aegean Sea	125	Teleost, Crutaceans, Cephalapods, Polychaetes	March 1997 - April 1997	Kabasakal (2001)
Rajidae	*Raja clavata***		53	Scyliorhinus, Canicula, Teleost, Crutaceans, Cephalapods, Polychaetes, Gastropoda, Pisces		
		Sığacık Bay	187	Mysidacea, *Parapenaeus longirostris* and *Plesionika sp*	2008- 2009	Eronat and Özaydın (2015)
		Gökçeada	257	Decapoda, Crustacea, Teleost fish, Cephalopoda	February 2019 - February 2020	Daban et al. (2022)
		Saros	121	Crustacea, fish, Nematod, Cephalopoda, Annelida, Mollusca	February 2005- December 2006	Yigin and İsmen (2010)
	*Dipturus oxyrinchus***		179	Cepholapoda, Crustecea, Asteroidea, Teleostei, Nemetoda, Dipested material	March 2005 - December 2007	
Clinidae	*Clinitrachus argentatus*	North Aegean Sea	59	Crustacea, Mollusca, Polychaeta, Actinapter egg	January - December 2007	Ozen et al. (2010)
Xiphiidae	*Xiphias gladius*	South Aegean Sea	108	Teleostei, Cephalopoda, Crustacea	Autumn, Winter, Spring	Salman (2004)
Clupeidae	*Sardina pilchardus*	Ege Bay	365	Copepod, Decapod, Crustacea larva	January 1997 - December 1997	Sever et al. (2005)
	Sardinella aurita		434	Polychaeta, Crustacea (copepod), Mollusca, Chaetognatha, Tunicate, and Teleostei.	October 2010 - September 2011.	Bayhan and Sever (2015)
Engraulidae	*Engralis encrasicolus*		545	Siphonophora, Polychaeta, Crustacea, Cladocera, Ostrocoda, Copepoda, Isopoda, Euphausacea lavrae, Amphipoda, Musidacea, Appendicularia, Echinodermata, Chaetognatha, Actinopterygii	2005 - 2006	Akalin et al. (2018)
		İzmir Bay	200	Copepoda, Cladocera Lavrası, Bivalvia Larva	December 1996 - December 1997	Uçkun et al. (2003)

Serranidae	*Serranus hepatus*	İzmir	2827	Decapoda, Mysida, Amphipoda, Ophiurida, Polychaetes, Fish, Mollusca	February 2007-November 2008	Tirasin and Özgen (2016)
		İzmir Bay	603	Crustacae-Amphipoda,Natantia	January-May-October 2002	Bilecenoğlu (2009)
Scorpaenidae	*Scomber japonicus*		296	Hydrozoa, Polychaeta, Crustacea, Mollusca, Chaetopnatha, Thaliacea, Teleostei, Teleost egg	2001	Sever et al. (2006)
Triakidae	*Mustelus mustelus***	Sığacık Bay	72	Polychaeta, Crustacea, Cephalopoda, Teleostein	2006 - 2007	Halit (2009)
Sparidae	*Spicara flexuosa*		400	Siphonophora, Polychaeta, Crustacean, Cladocera, Decapoda ve Mysidacea lavraları, Ostracoda, Copepoda	May 2005 - June 2006	Sever (2019)
Macrouridae	*Caelorinchus caelorinchus*		148	Crutaceans, Polychaetes, Chaetognathans	March 2003	Sever et al. (2008)
Leuciscidae	*Petroleuciscus borysthenicus*	Şahinkaya Dam-Gökçeada	163	Plant, Diptera, Odonata, Ephemeroptera, Trichoptera, Cladocera, Bivalvia, Hirudinea, Coleoptera, Hemiptera	May 2020 - January 2021	Ağdamar and Sac (2022)
Mugilidae	*Mugil cephalus*	Gökova (Muğla)	120	Bacillariophyta, Chloraphyta, Cyonaphyta	June 2007 - May 2008	Kasımoğlu ve Yılmaz (2016)
Esocidae	*Esox lucius*	Çivril Lake	409	Fishes, Crustaceae, Insecta, Hirudinae, Amphibia	October 2003 - April 2005	Alp et al. (2008)
Copelidae	*Cepola macrophthalma*	İzmir and Sığacık Bay	380	Anthomedusae, Siphonophora, Polychaeta, Crustacea, Mollusca, Chaetognatha, Appendicularia, Thaliacea, and Actinopterygii. Pelagic copepods	May 2005 to June 2006	Sever and İlhan (2016)
Atherinidae	*Atherina boyeri*	Çandarlı Bay	1492	Zooplankton, Euterpina, Cypris Larva, Crustacea	2007 - 2008	Uncumusaoğlu et al. (2018)

**Endangered species (IUCN 2021)

Table 4. Results on the nutritional ecology of the species distributed in the Mediterranean Region

Family	***Species***	**Working Area**	**Number**	**Stomach Contents**	**Season**	**Author**
Scyliorhinidae	*Scyliorhinus canicula*	Northeast Mediterranean Region	482	Crustacea, Fish, Cephalapoda	May 2012-March 2014	Özçan and Başusta (2015)
Dasyatidae	*Dasyatis pastinaca***		346	Crustacea, Nematod, Cephalapoda, Teleostei	1999 - 2003	Yeldan et al. (2009)
Scombridae	*Thunnus thynnus*	East Mediterranean	218	Crustacea,Cephalopoda, Fishes	2003 - 2006 (May - June)	Karakulak et al. (2009)
	Thunnus alalunga		116	Cephalapoda, Teleost, Crustaceans	May - June 2006	Salman and Karakulak (2009)
Gymnuridae	*Gymnura altavela***		13	Cephalopods, Teleost	September 2014 - April 2016	Yemişken et al. (2018)*
Rajidae	*Raja asterias***		46	Crustacea, Decapoda, Teleost, Copepod		
	*Raja clavata***		26	Crustacea, Decapoda, Teleost		
Delphinidae	*Stenella coeruleoalba*		4	Osteichthyes, Cephalopod, Crustacea, Teleost	June 2003 - 2004	Dede et al. (2016)
Cyprinidae	*Capoeta barroisi***	Asi Basin	137	Chrysophyta, Cyanophyta, Chloropyta	February 2002 - January 2003	Demirci and Yalçın Özdilek (2015)
Clariidae	*Clarias gariepinus*	Asi Stream	619	Diptera larva, Arthropoda	September 1996 - October 1998	Yalçın et al. (2001)
Mullidae	*Mullus barbatus*	Hisarönü Bay	20	Polychaetes, Decapods, Bivalves, Amphipods	June 97	Ünlüoğlu et al. (2002)
		İskederun Bay	362	Crustacea, Annelida, Polychaeta	September 2014-January-April-June 2015	Tüzün et al. (2021)
	Upeneus moluccensis		478	Crustacea, Decapoda		
	Upeneus pori		339	Decapoda, Amphipods, Cumacea, Mysida		
Synodontidae	*Saurida undosquamis*		1058	Teleost, Crustacean, Cephalapod	January 2010 - December 2010	Özyurt et al. (2017)
			1058	*Engraulis encrasicolus, Sardinella aurita, Eguulites klunzingari, Trachurus minuta*	January 2012 - December 2012	Yeşilçimen and Özyurt (2018)
Atherinidae	*Atherina boyeri*	Karacaören Dam Lake	190	Clodocera, Copepoda, Odonata, Rotifera	December 2009 - April 2010	Becer et al. (2018)
Siluridae	*Silurus glanis*	Benzelet Dam Lake	244	*Alburnus kotsychyi, Capoeta erhani, Lucrobarbus pectoralis, Silurus glanis,* Crab, Leech	2007	Alp (2017)
Tetraodontidae	*Lagocephalus sceleratus*	Mersin Bay	208	Fishes, Mollusca, Crustacea	September 2014 - April 2015	Özbay (2015)
Scorpaenidae	*Pterois miles*	Antalya Bay	35	Fishes, Crutacea, Crab, Lobster	October 2018 - May 2019	Tanrıverdi et al. (2022)
Percidae	*Sandar lucioperca*	Karacaören	585	Crustacea, Fish, İnsecta	October 1996 - April	Becer Özvarol (2006)

		Dam Lake			1998	
		Seyhan Dam Lake	257	Teleost, Silucroperca, *Corossius sp, Cyprinus carpio, Acantholbinus sp, Aphanius sp, Rutilus sp, Gambusia sp, Tinca Tinca, Silurus glanis, Abramis sp, Teleostei sp*, Mysid, Diptera, Other, İsapods, Odenata, Gasiropoda	July 2009 - June 2010	Özyurt et al. (2012)
Salmonidae	*Salmo trutta*	Ceyhan ve Fırat Nehirleri	611	Coleptera, Trichoptera, Ephemeroptera, Plecoptera, Molocostraca, Diptera, Araneidae, Odonata, Gastropoda, Acridae, Acarii, Heteroptera, Fish	May 2000 - April 2001	Kara and Alp (2005)

Stomach analysis and stable carbon, nitrogen isotope analysis method were used in the study. **Endangered species (IUCN 2021)

Table 5. Results on the nutritional ecology of the species distributed in the Central Anatolia Region

Family	***Species***	**Working Area**	**Number**	**Stomach Contents**	**Season**	**Author**
Tincidae	*Tinca tinca*	Beyşehir Lake	188	Phytoplankton, Zooplankton, İnsect, Detritus, Macrophyte	April 2004 - March 2005	Alaş et al. (2010)
		Hirfanlı Dam Lake	249	Copepoda, Rotifera, Cladocera, Ostracoda, Ephippium, Chironomus, Oligochaeta, Gastropoda, Corethra, Gastropoda, *Gammarus*, Bacillariophyta, Cyanophyta, Chlorophyta, Pyrrophyta, Euglenophyta, Fish egg	June-May	Gürbüz et al. (2012)
Atherinidae	*Atherina boyeri*	Eğridir Lake	619	Zooplankton, Phytoplankton, Arachnida, Arthropoda, Insecta, Fishes	January - December 2010	Yağcı et al. (2016)
		Hirfanlı Dam Lake	472	*Daphnia sp, Bosmina sp, Eurycerаus sp, Chydorus sp*, *Cyclopoid copepods*, Mepacylops larva, Ostracoda, *Keratella sp*, other Rotifera, Copepoda egg, *Chironamus sp*, *Gammerus sp*, İnsecta, Fish egg, *Atherina boyeri* (juvenile)	April 2008 - March 2009	Gençoğlu, et al. (2017)
Siluridae	*Silurus glanis*	Hirfanlı Dam Lake	162	*Tinca tinca, S. lucioperca, S. glanis*, Diptera, Odonata, *Gammarus*, Gastropoda, Homoptera, Caryophylaidae, Fishremoins, Other	September 1996 - August 1997	Bora and Gül (2004)
Percidae	*Sander lucioperca*	Eğridir Lake	986	Fishes, Odonata, Mysidae, Amphipod, Diptera	March 2001 - February 2002	Balık et al. (2006)
		Hirfanlı Dam Lake	326	*Gammarus*, Diptera larva, Fish, Odonata nimfleri, *Mysis*, Isopada, Filamentous algae	September 1996 - August 1997	Bora and Gül (2003)
	Stizostedion lucioperca	Beyşehir Lake	474	*Grammarus sp, Mysis sp*, Chirinomidae	March 1995 - February 1996	Balık (1997)
Cyprinidae	*Capoeta sieboldii*	Hirfanlı Dam Lake	173	Amphora, Anabaena, Ankistrodesmus, Cladophora, Cocconeis, Cosmarium, Cyclotella, Cymatopleura, Cymbella, Diatoma, Euastrum, Fragillaria, Geminella, Galeocapsa, Gomphonema, Gyrosigma, Licmophora, Melosira, Merismopedia, Navicula, Nitzchia	March 2004 - August 2005	Yazıcıoğlu and Yılmaz (2011)

	Cyprinus carpio	Hirfanlı Dam Lake	206	Cladocera, Copepods, Rotifera, Ostracoda, Diptera, Gastropoda, Euglenophyta, Cyanophyta, Pyrrophyta, Chlorophyta	August 1996 - July 1997	Gül et al. (2010)
		Mogan Gölü	91	Diptera, Oligochaeta, Cladocera, Copepoda, Rotatoria, Ostracoda ve Cyanophyta, Chlorophyta, Bacillariophyta, Euglenophyta	Nisan 1990-Aralık 1990	Atasagun (1990)
	Carassius gibelio	Eğirdir Lake	265	Gastropod, Diptera, Clodocera, Copepod, Ostracadas, Daphnia, *Chironomus sp, Cyclops sp*, Acarina, Bosmina	March 2001-March 2002	Balık et al. (2003)
			177	Spinogyra, Lepidella, Insecta, Nematoda	March2001-May2002	Yılmaz et al. (2008)
Gobionidae	*Knipowitschia caucasica*	Eğridir Lake	400	Ochropyta, *Gammarus pulex*	2008	Güçlü and Erdoğan (2017)
	Pseudorasbora parva	Gelingölü Dam	605	Cladocera, Copepods, Rotifera	summer 2003 - summer 2005	Yalçın Özdilek et al. (2013)
Esocidae	*Esox lucius*	Sıdıklı Küçükboğaz Dam Lake	124	Odonata Larva, *Gammarus spp*, Fish, Mammalia, Arthropoda, Mollusca	April 2010 - May 2011	Ünver (2011)
		Kapulukaya Baraj Gölü	328	Tinca tinca, Cyprinus carpio, Alburnus orontis, fish remains, *Gammarus*, Odonata (*Zygptera, Anisoptera*) , Diptera (larvae), and plant residues.	November 2001 and October 2002	Benzer et al. 2012
Leuciscidae	*Squalius cephalus*	Tödürge Lake	241	Phytoplankton, Zooplankton, Nematodes, İnsects, Fish	March 1998 - November 1999	Ünver and Erkakan (2011)

Table 6. Results on the nutritional ecology of the species distributed in the Eastern Anatolia Region

Family	***Species***	**Working Area**	**Number**	**Stomach Contents**	**Season**	**Author**
Salmonidae	*Oncorhynchus mykiss*	Fırat River	70	Cyanophyta, Bacillariophyta, Chlophyta, Euglenophyta, Dinophyta, Rotifera, Olipochoeta, Copepoda, Amphipoda, Diptera, Pisces	March 1999 - February 2000	Çakmak et al. (2002)
Salmonidae	*Salmo trutta macrostigma*	Karasu River	104	Ephemeroptera, Simulidae, Fish, Chrinomidae, Pammaruy		Serdar and Özer (2017)
Leuciscidae	*Acanthobrama marmid*	Fırat River	156	Bacillariophyta, Chlorophyta, Cyanophyata, Chrusophyta, Rotifera, Amphipoda, Cladocera, Copepoda	January2005-December 2005	Konar and Parlak (2009)
	Chondrostoma regium	Keban Dam Lake	79	Bacillariaphyta, Chlorophyta, Chrysophyta, Cyonophyta, Rotifera, Cladocera Copepada	March 2001- February 2002	Tellioğlu et al. (2004)
Cyprinidae	*Barbus mystaceus*		80	Rotifera, Copepoda, Novplius lavrası, Cladocera, Chironomidae lavrası	January - December 2008	Saler et al. (2010)
	Capoeta umbla		80	*Cyclotella, Cymbella* ve *Cocconeis, Keratella, Daphnia* ve *Cyclops*	April 2009-March 2010	Saler et al. (2010)
	Capoeta trutta		82	*Cyclotella, Cymbella ve Cocconeis, Keratella, Daphnia ve Cyclops*	April 2009-March 2011	Saler et al. (2010)
		Dicle River	120	Bacillariophyta, Chlorophyta, Cyanophyata, Euglenophyta	September 1991 - August 1992	Yılmaz and Solak (1999)
	Carasobarbus luteus	Atatürk Dam Lake	173	Bacillariophyta, Chlorophyta, Dinophyta, Rotifera, Clodocera, Cepepoda, Diptera	April 2011 - March 2012	Çelik and Saler (2016)
Mastacembelidae	*Mastacembelus mastacembelus*	Karakaya Dam Lake (Malatya)	126	Bacillariophyta, Chlorophyta, Cyannophyta, Dinophyta, Euglenophta, Rotifera, Clodocera, Cepepoda, Pisces	February 2002 - January 2003	Pala et al. (2010)

4. CONCLUSION

In previous studies on fish diet composition determination, the aim was to determine the feeding habits of the species (Cortes, 1997; Werner & Hall, 1974), but recently these studies have been changed to determine the niche overlap (Kratina et al., 2012; Piana, 2006; Longenecker, 2007), community structure (Jennings et al., 2002; Estes et al., 2011; Wilson & Wolkovich, 2011), species competitive interaction (Guedes & Araujo, 2008; Svanback & Bolnick, 2007; Tunney et al., 2014), trophic leveling (Stergiou & Karpouzi, 2002; Ebert & Bizzarro, 2007), and it aims to reveal the food web structure (Kartzinel et al., 2015). As a result, diet composition determination studies in the world are based on foraging theory and ecosystem modeling. When we examine the studies in this review, the food types and nutritional habits of the species were determined mostly by using the stomach analysis method, and only a few studies were used to determine the fish diet composition and trophic level using the stomach analysis and stable carbon and nitrogen isotope method (Çetin, 2011; Gül & Demirel, 2022; Yalçın Özdilek & Jones, 2014; Yemişken et al., 2018).

Studies of fish feeding habits are commonly done by examining the contents of the stomach and intestines (Hynes, 1950; Hyslop, 1980). The stomach analysis method directly examines the contents of the stomach contents of organisms and collects information about their nutritional properties (Winemiller, 1990). Examining the stomach content provides much useful information about the nutritional diversity and feeding behavior of fish, metabolism, living environments, predators, population dynamics of the species used as food, feeding migrations, water pollution, and feeding of fishery products (Erdem et al., 2001; Gerking, 1994; Özer & Başusta, 2012; Pierce & Boyle, 1991). Knowing where and how fish are fed; Determining the area to be hunted and designing the hunting tool suitable for the behavior of the species also facilitates the determination of the bait to be used (Broad, 1996). And the advent of biomarker and molecular techniques has allowed further expansion of data on ecological communities (Costalago et al., 2020). These techniques are DNA identification of prey items (Wirta et al., 2014), stationary isotope analysis (Mantel et al., 2004; Winemiler et al., 2007; Wells & Rooker, 2009), direct observations (Marshall & Elliott, 1997) and biomarker fatty acid analysis (Alfora et al., 2006; Logan et al., 2000; Young et al., 2010). When we examined the studies in the review, it was determined that only four studies (Çetin, 2011; Gül & Demirel, 2022; Yalçın Özdilek & Jones, 2014; Yemişken et al., 2018) used a combination of stationary carbon and nitrogen isotope and stomach analysis method. In addition, many studies in the review were based on the size, reproduction, and seasonal changes of fish diet compositions, and gastric analysis was considered sufficient as a method, but since it represents important trophic levels in the ecosystem where the fish live, future studies such as DNA identification, stable carbon-nitrogen isotope, and biomarker fatty acids. Ecological data should be further expanded by making use of other methods. In addition, increasing studies such as energy dynamics, trophic ecology, and food web in aquatic ecosystems can form the basis for ecosystem models and the conservation of aquatic ecosystems can be supported.

Nutritional data of fish can be used to create food webs, and predict energy flow and possible changes in food chains between or within ecosystems (Rezende et al., 2008; Vizzini & Mazolla, 2004; Winemiller & Layman, 2005). Scientists have collected a great deal of nutrition data over the years and have made efforts to collect and combine this data into an open repository, but applications of such an open-source repository are still not fully realized. Data analytics scientists such as GenBank now collect data for DNA-based dietary analyzes in the GenBank database (Benson et al., 2013). There is no data center for dietary biomarkers yet, which is a significant shortcoming. Data repositories also provide the chance to reanalyze collected consumer dietary data in new ways. For example, Simons et al. (2013) collected pre-existing consumer diet datasets and characterized trophic interactions in the Gulf of Mexico, Clare et al. (2016) analyzed previous data on molecular diet analysis of bioinformatic steps on several ecological factors, and Yoğurtçuoğlu et al. (2021) collected available literature data on the feeding habits of fish in the Hirfanlı Dam and estimated fractional trophic levels. In addition, by creating an open pool of information within the nutritional data, the dietary composition data of a fish living in any region can be used as a source in ecological research of the same fish in a different region of the world.

Considering that Turkiye is surrounded by sea on three sides, rich inland water resources, and endemic species are in the majority, the studies are insufficient. Fish diet composition studies conducted in our seas were mostly conducted in the Black Sea and Aegean regions, and less frequently in the Mediterranean and Marmara regions. Studies in inland waters have been done less than in the seas. While the regions that are studied more in inland waters are Central Anatolia, Black Sea, and Eastern Anatolia, the less studied regions are the Mediterranean, Marmara, and Aegean. In addition, there are no studies in the Southeast Anatolia region.

Of the 89 fish species recorded in this study, only 16 are endangered, vulnerable, or critically endangered (IUCN, 2021). When studies are analyzed, most researchers tend to select commercially important or invasive species, but endangerment is not considered an important criterion. With the lack of ecological knowledge of most species found in each environment, we may not know what conservation methods should be. If we do not take these knowledge gaps into account, we will face huge ecological losses in this rapidly changing world. For this reason, nutritional data, interactions, and food web structures should be constantly investigated and nutrient evaluation methods should be constantly improved.

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CONFLICT OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

AUTHOR CONTRIBUTIONS

Fiction: AÖ; Literature: AÖ, AA; Data analysis: AÖ, AA; Manuscript writing: AÖ, AA, Supervision: AÖ. All authors approved the final draft.

ETHICAL STATEMENTS

Local Ethics Committee Approval was not obtained because experimental animals were not used in this study.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable for the present study as no new data was created or analyzed.

REFERENCES

Ağdamar, S., & Saç, G. (2022). Growth and Feeding Ecology of Dnieper chub *Petroleuciscus borysthenicus* (Kessler, 1859) in Şahinkaya Reservoir, an Artificial Water Body of an Island Ecosystem (Gökçeada, Turkey). *Çanakkale Onsekiz Mart University Journal of Advanced Research in Natural and Applied Sciences, 8*(1), 76-85. https://doi.org/10.28979/jarnas.1008841

Akalin, S., Sever, T. M., İlhan, D., & Unluoğlu, A. (2018). The Diet Composition of European Anchovy, *Engraulis encrasicolus* (Linnaeus, 1758) in İzmir Bay, Aegean Sea. *Turkish Journal of Fisheries and Aquatic Sciences*, *19*(5), 431-445. http://doi.org/10.4194/1303-2712-v19_5_08

Akpınar, Y. (2018). *Nutrition of Yellowtail Mackerel [Trachurus mediterraneus (Steindachner, 1868)] living in Bandırma Bay*. [Master's Thesis, Balıkesir University].

Alaş, A., Altındağ, A., Yılmaz, M., Kırpık, M. A., & Ak, A. (2010). Feeding Habits of Tench (*Tinca tinca* L., 1758) in Beyşehir Lake (Turkey). *Turkish Journal of Fisheries and Aquatic Sciences, 10*(2), 187-194. https://doi.org/10.4194/trjfas.2010.0205

Alfora, A., Thomas, F., Sergent, L., & Duxbury, M. (2006). Identification of trophic interactions within an estuarine food web using fatty acid biomarkers and stable isotopes. *Science Direct Esluarine, Coastal and Shelf science*, *70*(1-2), 271-286. https://doi.org/10.1016/j.ecss.2006.06.017

Alp, A., Yeğen, V., Yağcı, M.A., Uysal, R., Biçen, E., & Yağcı, A. (2008). Dietary composition and prey selection of Esox lucius crane in Lake Çivril, Turkey. *Journal of Applied Ichthyology, 24*(6), 670-677. https://doi.org/10.1111/j.1439-0426.2008.01119.x

Alp, A. (2017). Diet Shift and Prey Selection of the Native European Catfish, *Silurus glanis*, in a Turkish Reservoir. *Journal of Limnology and Freshwater Fisheries Research, 3*(1), 15-23. https://doi.org/10.17216/LimnoFish.288217

Altın, A., Özen, Ö., Ayyıldız, H., Öztekin, A., & Ayaz, A. (2011). Seasonal Variation in Feeding Habits of Young of The Year Sea Bream, *Sparus aurata* (Linnaeus, 1758), in Dardanelles. *Igdir Universty Journal of Science Institute, 1*(3), 99-104.

Altın, A., Ozen, O., Ayyıldız, H., & Daban, B. (2015). Feedıng Habıts of the Marbled Goby, *Pomatoschıstus marmoratus* (Actınopterygıı: Percıformes: Gobıidae), in the Çanakkale Straıt, Northern Aegean Sea, Turkey. *Acta Ichthyologıca et Pıscatorıa*, *45*(1), 95–100. https://doi.org/10.3750/aıp2015.45.1.11

Amundsen, P. A., & Henandez, J. S. (2019). Feeding studies take guts – critical review and recommendations of methods for stomach contents analysis in fish. *Fish Biyology, 95*(6), 1364-1373. https://doi.org/10.1111/jfb.14151

Atasagun, S., (1990). Mogan (Ankara) gölündeki sazan (*Cyprinus carpio* L., 1758) ve kadife (*Tinca tinca* L., 1758) balıklarının besin tipleri ve beslenmelerinde mevsimsel değişimler. [Yüksek lisans tezi, Ankara Üniversitesi]

Avşar, D. (1994). Stomach contents of sprat (*Sprattus sprattus phalericus* Rısso) in Turkish Black Sea coast. *Doğa-Turkısh Journal of Zoology, 18,* 69-76.

Avşar, D. (2001). Age, Growth, Reproduction and Feeding of the Spurdog (*Squalus acanthias* Linnaeus, 1758) in the South-eastern Black Sea. Estuarine, *Coastal and Shelf Science 52*(2), 269–278. https://doi.org/10.1006/ecss.2000.0749

Aydın, M., & Bengil, E. G. T. (2020). Feeding Habit and Length-Weight Relationship, *Sciaena umbra* Linnaeus, 1758 from Southeastern Black Sea. *Acta Aquatica Turcica, 16*(4), 479-486. https://doi.org/10.22392/actaquatr.714094

Aydın, M., & Mazlum, R. E., (2020). Feeding ecology of black scorpion fish (*Scorpaena porcus* Linnaeus, 1758) in SE Black Sea region, (Ordu) Turkey. *Journal of the Marine Biological Association of the United Kingdom, 100*(3), 435 – 444. https://doi.org/10.1017/S002531542000020X

Ayyıldız, H., Özen, Ö., Altın, A., & Öztekin, A. (2011). Feeding Habits of Young of the Year Striped Sea Bream, *Lithognathus mormyrus* (Linnaeus, 1758), from Çanakkale Shallow Waters. *Iğdir Universty Journal of Science Institute. 1*(3), 93-98.

Balık, İ. (1999). The Feeding Features of The Pike–perch (*Stizostedion lucioperca*) Population in Lake Beyşehir. *Turkish Journal of Zoology, 23*(2), 189-194.

Balık, İ., Karaşahin, B., Özkök, R., Çabuk, H., & Uysal, R. (2003). Diet of Silver Crucian Carp *Carasssius gibelio* in Lake Eğirdir. *Turkish Journal of Fisheries and Aquatic Sciences 3*(2), 87-91.

Balık, İ., Çubuk, H., Karaşahin, B., Özkök, R., Uysal, R., & Alp, A. (2006). Food and Feeding Habits of the Pikeperch, *Sander lucioperca* (Linnaeus, 1758), Population from Lake E¤irdir. Turkey *Turkısh Journal of Zoology, 30*(1), 19-26.

Bal, H., Yanık, T., & Türker, D. (2020). Diet composition of bluefish *Pomatomus saltatrix* (Linnaeus, 1766) in the Sea of Marmara. *Marine Science and Technology Bulletin, 9*(1), 46–50. https://doi.org/10.33714/masteb.675929

Baker, R., Buckland, A., & Sheaves, M. (2014). Fish gut content analysis: robust measures of diet composition. *Fish and Fisheries, 15*(1), 170– 177.

Başçınar, C. S., & Sağlam, H. (2005). Feedıng Habıts of Thornback Ray (*Raja clavata*), Scorpıon Fısh (*Scorpaena porcus*) and Stargazer (*Uranoscopus scaber*) ın The Eastern Blacksea. *Turkish Journal of Aquatic Life, Special Issue, 3*(4),165-169.

Başçınar, N.S., & Sağlam, H. (2009). Feeding Habits of Black Scorpionfish *Scorpaena porcus*, in the SouthEastern Black Sea. *Turkish Journal of Fisheries and Aquatic Sciences, 9*, 99-103.

Bayhan, B., & Sever, T.M. (2013). Food and feeding habits of the Atlantic Horse Mackerel, *Trachurus trachurus*, from the Aegean Sea (Osteichthyes: Carangidae). *Zoology in the Middle East, 46*(1), 2326-2680. https://doi.org/10.1080/09397140.2009.10638327

Bayhan, B., & Sever, T. M. (2015). Spring diet and feeding strategy of the European sprat *Sprattus sprattus* (L., 1758) from the Black Sea coast of Turkey. *Turkish Journal of Agriculture - Food Science and Technology, 3*(9), 697-700.

Bayhan, B., & Sever, T. M. (2015). Feeding of the round sardinella *Sardinella aurita* Valenciennes,1847 (Osteichthyes: Clupeidae) in the Turkish Aegean Sea. *International Journal of Fauna and Biological Studies, 2*(4), 38-42.

Becer, Z. A., Apaydın-Yağcı, M., Yağcı, A., & Alp, A. (2018). Diet Of Sand Smelt, *Atherina boyeri* (Risso, 1810) During The Reproductive Period In Karacaören Dam Lake (Turkey). *Fresenius Environmental Bulletin, 27*(7), 5173-5178.

Becer, Z. A., Özvarol, Y., Gozacan, M. N., Bektaş, S., & Yıldırım, A. (2011). The diet of the brown trout (*Salmo trutta L.*) in different streams of River Coruh in Turkey. *Journal of Food, Agriculture Environment, 9*(1), 451-456.

Bengil, F., Bengil, E. G. T., Mavruk, S., Heral, O., Karaman, O. D., & Ozaydın, O. (2018). Feeding Ecology of Four Demersal Shark Species (*Etmopterus spinax, Galeus melastomus, Scyliorhinus canicula and Squalus blainville*) from the Eastern Aegean Sea. *Turkish Journal Fisheries and Aquatıc Sciences, 19*(6), 475-484. http://doi.org/10.4194/1303-2712-v19_6_03

Benson, D. A., Cavanaugh, M., Clark, K., Karsch-Mizrachi, I., Lipman, D. J., Ostell, J., & Sayers, E. W. (2013). GenBank. *Nucleic Acids Research, 41*, 36–42. https://doi.org/10.1093/nar/gks1195

Benzer, S., Gül, A., & Yılmaz, M. (2012). Feeding Properties of Pike (*Esox lucius* L., 1758) Living in Kapulukaya Dam Lake (Türkiye). *GEFAD / GUJGEF, 32*(3), 697-714.

Bora, N., & Gül, A. (2004). Feeding Biology of *Silurus glanis* (L., 1758) Living in Hirfanlı Dam Lake. *Turkish Journal of Veterinary Animal Sciences, 28*(3), 471-479.

Birkhofer, K., Bylund, H., Dalin, P., Ferlian, O., Gagic, V., Hambäck, P. A., & Jonsson, M. (2017). Methods to identify the prey of invertebrate predators in terrestrial field studies. *Ecology and Evolution, 7*(6), 1942– 1953. https://doi.org/10.1002/ece3.2791

Bilecenoğlu, M. (2009). Growth and feeding habits of the brown comber, *Serranus hepatus* (Linnaeus, 1758) in Izmir Bay, Aegean Sea, *Acta Adrıatıca, 50*(1), 105 – 110.

Broad, W. J. (1996). "Scientists Close in Elusive Giant Squid, New York Times", *Science Times, 13.*

Buckland, A., Baker, R., Loneragan, L., & Sheaves, M. (2017). Standardising fish stomach content analysis: The importance of prey condition. *Fisheries Research, 196*, 126– 140.

Ceyhan, T., Akyol, O., Sever, T. M., & Kara, A. (2011). Diet composition of adult twaite shad (*Alosa fallax*) in the Aegean Sea (Izmir Bay, Turkey). *Journal of the Marine Biological Association of the United Kingdom, 92*(3), 601–604. https://doi.org/10.1017/S0025315411000750

Cortes, E., (1997). A critical review of methods of studying fish feeding based on analysis of stomach contents: application to elasmobranch fishes. *Canadian Journal Fisheries and Aquatic Science, 54*(3), 726–738.

Costalago, D., Forster, İ., Nemcek, N., Neville, C., Perry, İ. R., Young, K., & Hunt, P. V. (2020). Seasonal and spatial dynamics of the planktonic trophic biomarkers in the Strait of Georgia (northeast Pacific) and implications for fish. *Scientific Reports, 10*, 8517. https://doi.org/10.1038/s41598-020-65557-1

Çakmak, M. N., Şen, D., Çalta, M., Pala, G., Aydın, R., & Ural, M. Ş. (2002). The Stomach Content of Rainbow trout (*Oncorhynchus mykiss*, Walbaum 1792) Living in Euphrates. *Fırat University Journal of Science and Engineering Sciences, 14*(1), 217-223.

Çelik, B., & Saler, S. (2016). Digestive System Content of Bizir, *Carrassobarbus luteus* (Heckel,1843) Living in Atatürk Dam Lake. *Limnology Fish*. *2*(2), 83-93. https://doi.org/10.17216/LimnoFish-5000139495

Çetin, E. (2011). *Spatial and Seasonal Changes in Feeding Habits of Freshwater Sea Bass (Perca fluviatilis L., 1758) in Yeşilırmak and Dams Built on it.* [Master Thesis, T.C. Gaziosmanpasa University]

Clare, E. L., Chain, F. J., Littlefair, J. E., & Cristescu, M. E. (2016). The effects of parameter choice on defining molecular operational taxonomic units and resulting ecological analyses of metabarcoding data 1. *Genome, 59,* 981– 990. https://doi.org/10.1139/gen-2015-0184@gen-iblf.issue0

Çiçek, E., Frıcke, R., Sungur, S., & Eagderı, S. (2018). Endemic freshwater fishes of Turkey. *FishTaxa, 3*(4), 1-39.

Daban, İ. B., Cabar, K., & Yığın, C. Ç. (2022). Feeding Ecology of Thornback Ray, *Raja clavata* (Linnaeus 1758) in Gökçeada Island, Northern Aegean Sea, Turkey. *Thalassas: An International Journal of Marine Sciences, 38*(1), 197–211. https://doi.org/10.1007/s41208-021-00363-8

Dede, A., Salman, A., & Tonay, A. M. (2016). Stomach contents of by-caught striped dolphins (*Stenella coeruleoalba*) in the eastern Mediterranean Sea. *Journal of the Marine Biological Association of the United Kingdom, 96*(4), 869–875. https://doi:10.1017/S0025315415001538

Demirci, S., & Yalçın Özdilek, Ş., (2015). Feeding Habits of *Capoeta barroisi (*Cyprinidae) in The Asi Basin (orontes) Turkey. *Journal of Fisheries Sciencies 9*(3), 055-062.

Demir, N., & Balık, İ., (2021). Food Composition of the Whiting, Merlangius merlangus in the South-eastern Coast of the Black Sea. *Acta Aquatica Turcica 17*(1), 64-71. https://doi.org/10.22392/actaquatr.753134

Demirhan, S. A., Seyhan, K., & Başusta, N. (2007). Dietary Overlap in Spiny Dogfish (Squalus acanthias) and Thornback Ray (*Raja clavata*) in the Southeastern Black Sea. *Ecology, 16*(62), 1-8.

Dönmez, M. A., & Bat, L. (2019). Detection of feeding dietary *Rhizostoma pulmo* (Macri, 1778) in Samsun coasts of the Black Sea, Turkey. *Ege Journal of Fisheries and Aquatic Sciences, 36*(2), 135-144. https://doi.org/10.12714/egejfas.2019.36.2.0

Ebert D. A., & Bizzarro, J. J. (2007). Standardized diet composition and trophic levels of skates (Chondrichthyes: Rajiformes: Rajoidei). *Environmental Biology of Fish, 80*(2-3), 221–237.

Engin, By.S., & Seyhan, K. (2009). Age, growth, sexual maturity and food composition of Sciaena umbra in the south-eastern Black Sea, Turkey. *Journal Applied Ichthyol*ogy, *25*(12), 96–99. https://doi.org/10.1111/j.1439-0426.2008.01173.x

Estes, J. A., Terborgh, J., Brashares, J. S., Power, M. E., Berger, J., Bond, W., Carpenter, S. R., Essington, T. E., Holt, R. D., Jackson, J. B. C., Marquis, R. J., Oksanen, L., Oksanen, T., Paine, R. T., Pikitch, E. K., Ripple, W. J., Sandin, S. A., Scheffer, M., Schoener, T. W., Shurin, J. B., Sinclair, A. R. E., Soule, M. E., Virtanen, R., & Wardle, D. A. (2011). Trophic downgrading of planet Earth. *Science, 333*(6040), 301–306. https://doi.org/10.1126/science.1205106

Erdem, Y., Özdemir, S., & Sümer, Ç. (September 4-6, 2001). *A study on stomach contents of stingray (Raja clavata L.).* XI. National Fisheries Symposium; Hatay, Turkey.

Eronat, E. G., & Özaydın, O. (2015). Diet composition of the Thornback Ray, *Raja clavata* Linnaeus, 1758 (Elasmobranchii: Rajidae) in the Turkish Aegean Sea. *Zoology in the Middle East, 61*(1), 38–44. http://doi.org/10.1080/09397140.2014.994312

Fishbase (2022). https://www.fishbase.se/country/CountryChecklist.php?c_code=792&vhabitat=saltwater&csub_code=

Filiz, H., & Taşkavak, E. (2006). Food of Lesser Spotted Dogfısh, *Scyliorhinus canicula* (Linnaeus, 1758), ın Foca (The Northeast Aegean Sea, Turkey) ın Autumn. *Ege Universty Journal of Fisheries & Aquatic Sciences, 32*(4), 193-195.

Filiz, H. (2009). Diet composition of smooth-hound, *Mustelus mustelus* (Linnaeus, 1758), in Aegean Sea, Turkey. *Belgian Journal of Zoology, 139*(1), 81-4.

Froese, R., & Pauly, D. (2017). FishBase. World Wide Web Electronic Publication. Retrieved from www.fishbase.org. version (10/2017).

Gaygusuz, C. G., Tarhan, A. S., & Gaygusuz, O. (2010). The Diet Changes in Feeding Activity, Microhabitat Preferences and Abundance of Two Freshwater Fish Species in Small Temperate Streams (Ömerli, Istanbul). *Ecology, 19*(76), 15-24. https://doi.org/10.5053/ekoloji.2010.763

Gerking SD (1994). Feeding ecology of fish. Academic Press, San Diego.

Gençoğlu, L., Kırankaya, Ş. G., Yoğurtçuoğlu, B., & Ekmekçi, F. G. (2017). Feeding Properties of the Translocated Marine Fish Sand Smelt *Atherina boyeri* Risso, 1810 (Atherinidae) in a Freshwater Reservoir. *Acta Zoologiıca Bulgarica, 9,* 131-138.

Guedes, A. P. P., & Araújo, F. G. (2008). Trophic resource partitioning among five flatfish species (Actinopterygii, Pleuronectiformes) in a tropical bay in south-eastern Brazil. *Journal Fish Biology, 72*(4), 1035–1054. https://doi.org/10.1111/j.1095-8649.2007.01788.x

Gulland, J. A. (1977) *Fish population dynamics: The implications for management.* Wiley Interscience, New York.

Güçlü, S. S., & Erdoğan, Ö. (2017). Age, growth, sex ratio and feeding of *Knipowitschia caucasica* (Berg, 1916) (Actinopterygii, Gobiidae) in non-native species of Eğirdir Lake (Turkey). *Acta Bıologıca Turcıca, 30*(1), 1-6.

Gül, G., Yokeş, M. B., & Demirel, N. (2009). The occurrence and feeding of a critically endangered shark species, *Oxynotus centrina* in the Sea of Marmara. *Fish Biyology, 101*(3), 728–735. https://doi.org/10.1111/jfb.15119

Gül, A., Yılmaz, M., Kuşçu, A., & Benzer, S. (2010). Feedıng Propertıes of Common Carp (*Cyprinus carpio* L.,1758) Lıvıng ın Hirfanlı Dam Lake. *Kastamonu Journal of Education, 18*(2), 545-556.

Gül, G., & Demirel, N. (2021). Evaluation of the comprehensive feeding strategy and trophic role of overexploited mesopredator species in the Sea of Marmara (northeastern Mediterranean). *Estuarine, Coastal and Shelf Science, 259,* 107448. http://doi.org/10.1016/j.ecss.2021.107448

Gül, G., & Demirel, N. (2022). Ontogenetic shift in diet and trophic role of *Raja clavata* inferred by stable isotopes and stomach content analysis in the Sea of Marmara. *Fish Biyology, 101,* 560–572. https://doi.org/10.1111/jfb.15123

Saç, G. (2020). Food overlap between *Vimba vimba (L., 1758) and Scardinius erythrophthalmus* (L., 1758) in Büyükçekmece Reservoir (Turkey). *Turkish Journal of Bioscience and Collections, 4*(1), 14-20. https://doi.org/10.26650/tjbc.20200013

Gürbüz, Ö. A., Yılmaz, M., & Gül, A. (2012). Feeding properties of tench (*Tinca tinca* (Linnaeus, 1758)) in Hirfanlı Dam Lake (Kırşehir, Turkey). *Ege Journal Fish Aquatic Science, 29*(4), 157-165. https://doi.org/10.12714/egejfas.2012.29.4.02

Gürbüz, Ö. A. (2018, October 29-November 1). *Impact assessment of non-native fish species in inland waters of Turkey* [Oral Presentation]. 2nd International Water Congress. Afyonkarahisar, TURKEY.

Halit, F. (2009). Diet composition of smooth-hound, *Mustelus mustelus* (Linnaeus, 1758), in Aegean Sea, Turkey. *Belgian Journal of Zoology, 139*(1), 81-84.

Hynes, H. B. N. (1950). The food of fresh-water sticklebacks (*Gasterosteus aculeatus* and *Pygosteus pungitius*), with a review of methods used in studies of the food of fishes. *The Journal of Animal Ecology, 19,* 36– 58.

Hyslop, E. J. (1980). Stomach contents analysis - a review of methods and their application. *Journal of Fish Biology, 17,* 411– 429.

İlhan, D. (2019). Food Preferences of the five gurnard species (Triglidae) in Edremit Bay. *Acta Aquatica Turcica, 15*(3), 347-353. https://doi.org/10.22392/actaquatr.529907

Iverson, S. J. (2009). Tracing aquatic food webs using fatty acids: from qualitative indicators to quantitative determination. *Lipids in aquatic ecosystems, Springer, New York, NY, 7*(1), 281−308. https://doi.org/10.1007/978-0-387-89366-2_12

Jennings, S., Greenstreet, S. P. R., Hill, L., Piet, G. J., Pinnegar, J. K., & War, K. J. (2002). Long-term trends in the trophic structure of the North Sea fish community: evidence from stable-isotopes analysis, size-spectra and community metrics. *Marine Biology*, *141*(6), 1085–1097.

Kabasakal, H. (2001). Prellminary data on the feeding ecology of some selachians from the north-eastern Aegean Sea. *Acta Adriatica*, *42*(2), 15-24. https://doi.org/10.1007/s00227-002-0905-7

Kasımoğlu, C., & Yılmaz, F. (2016). The feeding habits of *Mugil cephalus* (Linneaus, 1758) inhabiting in Gökova Bay (Muğla). *Dicle University Institute of Natural and Applied Science Journal*, *5*(1), 34-40.

Kara, C., & Alp, A. (2005). Feeding Habits and Diet Composition of Brown Trout (*Salmo trutta*) in the Upper Streams of River Ceyhan and River Euphrates in Turkey. *Turkish Journal Veterinary and Animal Sciences*, *29*(2), 417-428.

Karakulak, F. S., Salman, A., & Oray, K. (2009). Diet composition of bluefin tuna (*Thunnus thynnus* L. 1758) in the Eastern Mediterranean Sea, Turkey. *Journal Applied Ichthyology*, *25*(6), 757–761. https://doi.org/10.1111/j.1439-0426.2009.01298.x

Kartzinel, T. R., Chen, P. A., Coverdale, T. C., Erickson, D. L., Kress, W. J., Kuzmina, M. L., & Pringle, R. M. (2015). DNA metabarcoding illuminates dietary niche partitioning by African large herbivores. *Proceedings of the National Academy of Sciences of the United States of America*, *112*(26), 8019– 8024. https://doi.org/10.1073/pnas.150328311

Kratina, P., LeCraw, R. M., Ingram, T., & Anholt, B. R. (2012). Stability and persistence of food webs with omnivory: Is there a general pattern? *Ecosphere*, *3(6)*, 50. https://doi.org/10.1890/ES12-00121.1

Kaya, Ş. (2018*). Nutritional Ecology of Garfish (Belone belone euxini Günther, 1866).* [Master's Thesis, Karadeniz Technical University].

Kocabaş, M., Kayım, M., Aksu, Ö., Can, E., Kızak, V., Kutluyer, F., Serdar, O., & Demirtaş, N. (2012). Seasonal variation in food preference of the brown trout *Salmo trutta macrostigma* (T., 1954) from Uzungöl Stream, Turkey. *African Journal of Agricultural Research*, *7*(13), 1982-1987. https://doi.org/10.5897/AJAR11.403

Koç, H.T., & Erdoğan, Z. (2019). Feeding Habits of the Mediterranean Horse Mackerel, *Trachurus mediterraneus* (Steindachner, 1868) in the Sea of Marmara (Bandırma Bay, Turkey). *NESciences, 4(2),* 182-193. https://doi.org/10.28978/nesciences.567123

Konar, V., & Parlak, A. E. (2009). The Content of Digestive System of *Acanthobrama marmid* Heckel, 1843 Inhabiting Euphrates River. *Fırat Univ. Journal of Science*, *21*(2), 157-165.

Logan, M. S., Iverson, S. J., Ruzzante, D. E., Walde, S. J., Macchi, P. J., & Alonso, M. F. (2000). Long term diet differences between morphs in trophically polymorphic *Percichthys trucha* (Pisces: Percichthyidae) populations from the southern Andes. *Biology Journal Linnean Society*, *69*, 599–616. https://doi.org/10.1111/j.1095-8312.2000.tb01225.x

Lawror, L. R., (1980). Overlap, similarity and competition coefficients. *Ecology*, *61*(2), 245-251. https://doi.org/10.2307/1935181

Longenecker, K. (2007). Devil in the details: high-resolution dietary analysis contradicts a basic assumption of reef-fish diversity models. *Copeia*, *3*, 543–555. https://doi.org/10.1643/0045-8511(2007)2007[543:DITDHD]2.0.CO;2

Mantel, S. K., Salas, M., & Dudgeon, D. (2004). Food web structure in a tropical forest stream. *Journal North America Bentholgical Society*, *23*(4), 728-755.

Marshall, S., & Elliott, M. (1997). A comparasion of univariate and multivariate numerical and grophical techniques for determing inter and intraspecific feeding relationships in estuarine fish. *Journal Fish Biyology*, *51*(3), 526-545. https://doi.org/10.1111/j.1095-8649.1997.tb01510.x

Mazlum, R. E., & Bilgin, S. (2014). Age, growth, reproduction and diet of the whiting, *Merlangius merlangus euxinus* (Nordmann, 1840), in the southeastern Black Sea. *Cahiers de Biologie Marine*, *55*(4), 463-474.

Michener, R. H., Kaufman, L., & Lajtha, K. (2007). Stable isotope ratios as tracers in marine food webs: An update. *Stable Isotopes in Ecology and Environmental Science*, *2*, 238– 282.

Mitra, A., & Flynn, K. J. (2007). Importance of interactions between food quality, quantity, and gut transit time on consumer feeding, growth, and trophic dynamics. *The American Naturalist, 169*(5), 632– 646.

Motta P. J., & Wilga, C. D. (2001). Advances in the study of feeding behaviors, mechanisms, and mechanics of sharks. *Environmental Biology of Fish*, *60*(20), 131–156.

Nielsen, J. M., Clare, E. L., Hayden, B., Brett, M. T., & Kratina, P. (2018). Diet tracing in ecology: method comparison and selection. *Methods in Ecology and Evolution, 9*, 278– 291.

Onay, H., & Dalgıc, G. (2019). Seasonal Changes ın The Food Spectrum and Day-Tıme Rhythm of Feedıng ın Red Mullet *Mullus barbatus* (Lınnaeus, 1758) ın The Southeast Black Sea. *Fresenius Environmental Bulletin, 28*(4), 2671-2678.

Okgerman, H. C., Yardımcı, C. H., Dorak, Z., & Yılmaz, N. (2013). Feeding ecology of (*Vimba vimba* L., 1758) in terms of size groups and seasons in Lake Sapanca, northwestern Anatolia. *Turkish Journal of Zoology*, *37*(3), 288-297. https://doi.org/10.3906/zoo-1107-1

Ozen, O., Altın, A., & Ayyıldız, H. (2010). The diet of *Clinitrachus argentatus* (Blennioidei: Clinidae) in the northern Aegean and Marmara Seas. *Journal of Fish Biology*, *76*(1), 1516–1519. https://doi.org/10.1111/j.1095-8649.2010.02577.x

Ölmez, A., & Akın, Ş. (2020). Spatial and Temporal Variation in Feeding Habits *Squalius cephalus* (Linnaeus, 1758) Living in Suat Uğurlu and Hasan Uğurlu Dam Lakes, Yeşilırmak River, Turkey. *Black Sea Journal of Engineering and Science, 3*(1), *8-14.* https://doi.org/10.34248/bsengineering.639797

Özbay, T. (2015). *Investigation of Biological Characteristics of Blowfish, Lagocephalus sceleratus (Gmelin, 1789), Distributed in Mersin Bay.* [Master's thesis, Balıkesir University].

Özcan, E. İ., & Başusta, N. (2015). Stomach contents of the Lesser Spotted Dogfish, (*Scyliorhinus canicula* (Linnaeus, 1758) inhabiting Northeastern Mediterranean. *Ege Journal of Fisheries and Aquatic Sciences*, *32*(4), 193-195. https://doi.org/10.12714/egejfas.2015.32.4.03

Yalçın Özdilek, Ş., & Jones, R. I. (2014). The Diet Composition and Trophic Position of Introduced Prussian Carp *Carassius gibelio* (Bloch, 1782) and Native Fish Species in a Turkish River. *Turkish Journal of Fisheries and Aquatic Sciences*, *14*(3), 769-776. https://doi.org/10.4194/1303-2712-v14_3_19

Özer, E. İ., & Başusta, N. (2012). Balıklarda mide içeriği analiz yöntemleri. *Nwsa-ecological Life Sciences*, *7*(1), 12-21.

Özütemiz, Ş., Kaya, M., & Özaydın, O. (2009). A Preliminary Study on the Length-Weight Relationship and Nutritional Characteristics of Two Species of Shark [*Galeus melastomus* Rafinesque, 1810 *and Squalus blainvillei* (Risso, 1826)] in the Sığacık Bay (Aegean Sea). *Journal of Fisheries Aquatic Sciences*, *26*(3), 211-217.

Özvarol, Z. A. B. (2006). Food and Feeding Characters of The Pikeperch, *Sander lucioperca* (L., 1758) Population from Karacaören-I Dam Lake (Turkey). *Journal of Süleyman Demirel University Egirdir Fisheries Faculty*, *2-3*(1-2), 1-11.

Özvarol, A. Z. B., Özvarol, Y., Gozacan, M. N., Bektaş, S., & Yıldırım, A. (2011). The diet of the brown trout (*Salmo trutta* L.) in different streams of River Coruh in Turkey. *Journal of Food, Agriculture & Environment, 9*(1), 451-456.

Özyurt, C. E., Mavruk, S., & Kiyağa, V. B. (2012). Effects of Predator Size and Gonad Maturation on Food Preference and Feeding Intensity of *Sander lucioperca* (Linnaeus, 1758). *Turkish Journal of Fisheries and Aquatic Sciences, 12*(2), 315-322. https://doi.org/10.4194/1303-2712-v12_2_17

Özyurt, C. E., Mavruk, S., Kiyağa, V. B., & Perker, M. (2017). Assessment of Some of the Feeding Aspects and Reproduction of *S. undosquamis* Distributed in the İskenderun Bay. *Turkish Journal of Fisheries and Aquatic Sciences*, *17*(1), 51-60. https://doi.org/10.4194/1303-2712-v17_1_07

Pala, G., Tellioğlu, A., Eroğlu, M., & Şen, D. (2010). The Digestive System Content of *Mastacembelus mastacembelus* (Banks & Solander, 1794) Inhabiting in Karakaya Dam Lake

(Malatya-Turkey). *Turkish Journal of Fisheries and Aquatic Sciences, 10*(2), 229-233. https://doi.org/10.4194/trjfas.2010.0211

Partal, N., & Yalçın Özdilek, Ş., (2017). Feeding ecology of invasive *Carassius gibelio* (Bloch, 1782) in Karamenderes Stream, Turkey. *Ege Journal of Fisheries and Aquatic Sciences*, *34*(2), 157-167. https://doi.org/10.12714/egejfas.2017.34.2.07

Partal, N., & Yalçın Özdilek, Ş., (2019). Ontogenetic Diet Shift of Invasive Gibel Carp (*Carassius gibelio*, Bloch 1782) in Karamenderes River (Turkey). *Journal of Limnology and Freshwater Fisheries Research*, *5*(1), 6-16. http://doi.org/10.17216/LimnoFish.461758

Phleger, C. F., Nichols, P. D., & Virtue, P., (1997). The lipid, fatty acid and fatty alcohol composition of the myctophid fish electrona antarcticus: high level of wax esters and food-chain implications. *Antarctic Science*, *9*(3), 258-265.

Piana P. A., Gomes L. C., & Agostinho A. A. (2006). Comparison of predator–prey interaction models for fish assemblages from the neotropical region. *Ecology Model*, *192*(1-2), 259–270.

Pierce, G. J., & Boyle, P. R. (1991). A review of methods for diet analysis in piscivorous marine mammals. *Oceanography and Marine Biology, 29,* 409– 486.

Polat, N., & Yılmaz, M. (1999). The Contents of Digestion System of *Chondrostoma regium* Heckel, 1843 (Pisces: Cyprinidae) Population in Suat Uğurlu Dam Lake (Çarşamba-Samsun). *Turkish Journal of Zoology*, *23*(2), 679-693.

Rezende C. F., Caramaschi E. M. P., & Mazzoni R. (2008). Fluxo de energia em comunidades aquaticas, com enfase em ecossistemas lóticos. *Oecologia Brasiliensis*, *12*(4), 626–639.

Salman, A. (2004). The role of Cephalopods ın the dıet of Swordfısh (*Xıphıas gladıus* Lınnaeus, 1758) ın the aegean sea (eastern medıterranean). *Bulletın of Marıne Scıence*, *74*(1), 21–29.

Salman, A., & Karakulak, F. S. (2009). Cephalopods in the diet of albacore, *Thunnus alalunga,* from the eastern Mediterranean. *Journal of the Marine Biological Association of the United Kingdom, 89*(3), 635–640. https://doi.org/10.1017/S0025315408002555

Saler, S., Çoban, Z., Örnekçi, G. N., Yüce, S., & Türkgülü, İ. (2010). The animal organisms found in *Barbus mystaceus'* (Pallas, 1814) stomach content lııving in Keban Dam Lake. *e-Journal of New World Sciences Academ Ecological Life Sciences, 5*(2), 97-104.

Saler, S., Sönmez, F., Çelik, B., Örnekçi, G. N., & Yüce, S. (2010). The Digestive system contents of *Capoeta umbla (*Heckel, 1843) and *Capoeta trutta* (Heckel, 1843) species living in Keban dam lake (Turkey). *Ecological Life Sciences*, *5*(4), 307 -318.

Sağlam, H., & Başçınar, N. S. (2008). Feeding ecology of thornback ray (*Raja clavata* Linnaeus, 1758) on the Turkish coast of the south-eastern Black Sea. *Marine Biology Research*, *4*(6), 451-457. https://doi.org/2010.1080/17451000802233393

Sağlam., H., Ak, O., Kutlu, S., & Aydın, İ. (2009). Diet and feeding strategy of the common stingray *Dasyatis pastinaca* (Linnaeus, 1758) on the Turkish coast of southeastern Black Sea. *Cahiers de Biologie. Marine*, *51*(1), 37-44.

Saç, G., & Özuluğ, M. (2020). Life history pattern and feeding habits of *Gobio bulgaricus* (Drensky, 1926) (Pisces: Gobionidae) in an endorheic stream (Istranca Stream, Turkey). *Iranian Journal of Fisheries Sciences*, *19*(1), 248 – 261. https:/doi.org/2010.22092/ijfs.2019.118805

Saç, G. (2020). Food overlap between *Vimba vimba* (L., 1758) and *Scardinius erythrophthalmus* (L., 1758) in Büyükçekmece Reservoir (Turkey). *Turkish Journal of Bioscience and Collections, 4*(1), 2601-4292. https://doi.org/10.26650/tjbc.20200013

Samsun, S., Erdem, Y., & Kalaycı, F. (2011). Feeding Regime of Whiting (*Gadus merlangus euxinus* Nordmann, 1840) In Turkish Middle Black Sea Coast. *Turkish Journal of Fisheries and Aquatic Sciences, 11*(4), 515-522. https://doi.org/10.4194/1303-2712-v11_4_02

Serdar, O., & Özer, E. İ. (2017). Preliminary study on feeding habits and condition factor of *Salmo trutta macrostigma* (Dumeril, 1858) in Karasu River. *International Journal of Nature and Life Sciences, 1*(1), 17-21.

Sever, T. M., Bayhan, B., & Taşkavak, E. (2005). A Preliminary Study on the Feeding Regime of European Pilchard (*Sardina pilchardus* Walbaum1792) in Izmir Bay, Turkey, Eastern Aegean Sea. *NAGA, WorldFish Center Quarterly*, *28*(3), 41-48.

Sever, T. M., Bayhan, B., Bilencioğlu, M., & Mavili, S. (2006). Diet composition of the juvenile chub mackerel (*Scomber japonicus*) in the Aegean Sea (Izmir Bay, Turkey). *Journal Applicety Ichthyology*, *22*(9), 145–148.

Sever, T. M., Filiz, H., Bayhan, B., Taşkavak, E., & Bilge, G. (2008). Food habits of the hollow snout grenadier, *Caelorinchus caelorhincus* (Risso, 1810), in the Aegean Sea, Turkey. *Belgian Journal of Zoology*, *138*(1), 81-84.

Sever, T. M., Bayhan, B., Bilge, G., & Taşkavak, E. (2009). Diet composition of *Belone belone* (Linnaeus, 1761) (Pisces: Belonidae) in the Aegean Sea. *Journal Applicety Ichthyology*, *25*(5), 702–706. https://doi.org/10.1111/j.1439-0426.2009.01368.x

Sever, T. M., Bayhan, B., Filiz, H., Taşkavak, E., & Bilge, G. (2013). Diet composition of the five deep sea fish from the Aegean Sea. *Ege Journal Fish Aquatic Sciences*, *30*(2), 61-67. https://doi.org10.12714/egejfas.2013.30.2.03

Sever, T. M., & İlhan, D. (2016). Dıet composıtıon of red bandfısh, *Cepola macrophthalma* (Actınopterygıı: Percıformes: Cepolıdae), from the aegean sea of Turkey. *Acta Ichthyologıca Et Pıscatorıa*, *46*(3), 211–224. https://doi.org/10.3750/aıp2016.46.3.05

Sever, T. M. (2019). Diet Composition of the Blotched Picarel *Spicara flexuosa* Rafinesque, 1810 (Actinopterygii, Sparidae) from the Aegean Sea, Turkey. *Acta Zoologıca Bulgarica*, *71*(4), 581-588.

Simons, J. D., Yuan, M., Carollo, C., Vega-Cendejas, M., Shirley, T., Palomares, M. L., & Holmes, J. (2013). Building a fisheries trophic interaction database for management and modeling research in the Gulf of Mexico large marine ecosystem. *Bulletin of Marine Science*, *89*(1), 135– 160. https://doi.org/10.5343/bms.2011.1130

Stergiou, K. I., & Karpouzi V. S. (2002) Feeding habits and trophic levels of Mediterranean fish. *Reviwes Fish Biology Fish*, *11*(3), 217–254.

Svanbäck, R., & Bolnick, D. I. (2007). Intraespecific competition drives increased resource use diversity within a natural population. *Proceedings Royal Socıety B-Biological Sciences*, *274*(1611), 839–844. https://doi.org/10.1098/rspb.2006.0198

Şenbahar, A. M., & Özaydın, O. (2021). Feeding ecology of Black bellied Anglerfish *Lophinus budegassa* in the Central Aegean Sea, Turkey. *Journal of Ichthyology*, *61*(6), 881–890. https://doi.org/10.1134/S0032945221060151

Tanrıverdi, R., Gökoğlu, M., & Korun, J. (2022). First Observations on the Stomach Contents of Devil Firefish, *Pterois miles* (Bennett, 1828) in the Gulf of Antalya, Turkey. *Acta Natura Scientıca*, *3*(1), 24-31. https://doi.org/10.29329/actanatsci.2022.351.03

Tellioğlu, A., Pala, G., Çoban, M. N., & Şen, D. (2004). The Content of Digestive System of *Chondrostoma regium* (Heckel, 1843) Inhabiting In Keban Dam Lake. *Fırat University Journal of Science and Engineering Sciences*, *16*(4), 623-632.

Tirasin, E. M., & Özgen, Ö. (2016). Feeding Ecology of Brown Comber *Serranus hepatus* (Linnaeus, 1758) in Izmir Bay (Turkey). *Natural and Engineering Sciences*, *1*(3), 17-30.

Tunney, T. D., McCann, K. S., Lester, N. P., & Shuter, B. J. (2014). Effects of differential habitat warming on complex communities. *Proceedings of the National Academy of Sciences of the United States of America*, *111*(22), 8077– 8082. https://doi.org/10.1073/pnas.1319618111

Türker, H. (2006). The Feeding Habits and Assimilation Efficiencies of Three Cyprinid Species in Lake Gölköy (Bolu-Turkey). *Journal of Süleyman Demirel University Egirdir Fisheries Faculty*, *2*(1), 37-45.

Tüzün, S., Dalyan, C., & Eryılmaz, L. (2021). Feeding biology and resource partitioning of the Mullidae family members of the northeastern Levantine coast of Turkey. *Environmental Biology Fishes*, *104*(12), 1629–1642. https://doi.org/10.1007/s10641-021-01190-9

Uçkun, D., Sever, T. M., & Toğulga, M. (2003). A Preliminary Study on Nutritional Characteristics of Anchovy (*Engraulis encrasicolus*, L., 1758) in Izmir Bay. *Journal of Fisheries Aquatic Sciences*, *20*(1-2), 121 – 127.

Uncumusaoglu, A., Gurkan, Ş., & Taşkavak, E., (2018). Seasonal variation in the diet of Big-Scale Sand Smelt *Atherina boyeri* from the coast of Candarli Bay (North Aegean Sea, Turkey). *Cahiers de Biologie Marine, 59,* 131-135. https://doi.org/10.21411/CBM.A.530F9BFA

Ünlüoğlu, A., Cihangir, B., Kaya, M., Benli, H. A., & Katağan, T. (2002). *Variations in the feeding intensity and diet composition of red mullet (Mullus barbatus) during 24-h period in the summertime in Hisarönü Bay.* Published online by Cambridge University Press.

Ünver, E. (2011). *Feedıng dıetary of pıke Esox lucius l.,1758 ınhabıtıng Sıdıklı Küçükboğaz dam lake.* [Master's thesis Ahi Evran University Institute of Natural Sciences]

Ünver, E., & Erakan, F. (2011). Diet composition of chub, *Squalius cephalus* (Teleostei: Cyprinidae), in Lake Tödürge, Sivas, Turkey. *Journal of Applied Ichthyology, 27*(6), 1350–1355. https://doi.org/10.1111/j.1439-0426.2011.01766.x

Vizzini, S., & Mazzola, A. 2004. Stable isotope evidence for the environmental impact of a land-based fish farm in the western Mediterranean. *Marine Pollution Bulletin, 49*(1-2), 61-70.

Wirta, H. K., Hebert, P. D., Kaartinen, R., Prosser, S. W., Várkonyi, G., & Roslin, T. (2014). Complementary molecular information changes our perception of food web structure. *Proceedings of the National Academy of Sciences of the United States of America, 111*(5), 1885– 1890. https://doi.org/10.1073/pnas.131699011

Werner, E. E., & Hall, D. J. (1974). Optimal foraging and the size selection of prey by the bluegill sunfish (*Lepomis macrochirus*). *Ecology, 55*(5), 1042–1052.

Wells, R. J. D., & Rooker, J. R. (2009). Feeding ecology of pelagic fish larvae and juveniles in slope waters of the Gulf of Mexico. *Journal of Fish Biology, 75*(7), 1719–1732. https://doi.org/10.1111/j.1095-8649.2009.02424.x

Winemiller, K. O. (1990). Spatial and temporal variation in tropical fish trophic networks. Ecological Monographs, *60*(3), 331-367.

Winemiller, K. O., & Polis, G. A. (1996). What can they tell us about world=?. In G. A. Polis & K. O. Winemiller (Eds.). *Food webs: integration of patterns and Dynamics.* Chapman and Hall, New York.

Winemiller, K. O., & Layman, C. A. (2005). "Food web science". *Dynamic Food Webs,* 10-23.

Winemiller, K. O., Akın, S., & Zeug, S. C. (2007). *Production sources and food web structure of a temperate tidal estuary, integration of dietary and stable isotope data.* Marine Ecology Progress Series.

Winemiller, K. O., Agostinho, A. A., Caramaschi, E. P. (2008). Fish ecology in tropical streams. *Tropical stream ecology*, (I-III), 107-146. https://doi.org/10.1016/B978-012088449-0.50007-8

Wilson, E. E., & Wolkovich, E. M. (2011). Scavenging: how carnivores and carrion structure communities. *Trends Ecology Evolution, 26*(3), 129–135. https://doi.org/10.1016/j.tree.2010.12.011

Yağcı, M. A., Alp, A., Yağcı, A., Uysal, R., & Yeğen, V. (2016). Feeding ecology and prey selection of sand smelt, *Atherina boyeri* Risso, 1810 in Eğirdir Lake (southern Anatolia, Turkey). *Wiley Journal of Applied Ichthyology, 34*(4), 815–824. https://doi.org/10.1111/jai.13676

Yalçın, Ş., Akyurt, İ., & Solak, K. (2001). Stomach Contents of the Catfish (*Clarias gariepinus* Burchell, 1822) in the River Asi (Turkey). *Turkish Journal Zoology, 25*(4), 461-468.

Yalçın Özdilek, Ş., Kırankaya, Ş. G., & Ekmekçi, F. G. (2013). Feeding Ecology of the Topmouth Gudgeon *Pseudorasbora parva* (Temminck and Schlegel, 1846) in the Gelingüllü Reservoir, Turkey. *Turkish Journal of Fisheries and Aquatic Sciences, 13*(1), 87-94. https://doi.org/10.4194/1303-2712-v13_1_11

Yazıcıoğlu, O., & Yılmaz, M. (2011). Feeding Regime of Siraz Fish *Capoeta sieboldii* (Steindachner, 1864) Living in Hirfanlı Dam Lake. *The Black Sea Journal of Sciences, 1*(3), 62-73.

Yazıcıoğlu, O., Yılmaz, S., Yazıcı, R., Erbaşaran, M., & Polat, N. (2016). Feeding ecology and prey selection of European perch, *Perca fluviatilis* inhabiting a eutrophic lake in northern Turkey. *Journal of Freshwater Ecology, 31*(4), 641-651. https://doi.org/10.1080/02705060.2016.1220432

Yazıcıoğlu, O., Yılmaz, S., Yazıcı, R., Yılmaz, M., & Polat, N. (2017). Food Items and Feeding Habits of White Bream, *Blicca bjoerkna* (Linnaeus, 1758) Inhabiting Lake Ladik (Samsun, Turkey). *Turkish Journal of Fisheries and Aquatic Sciences*, *17*(2), 371-378. https://doi.org/10.4194/1303-2712-v17_2_16

Yazici, R., Yazicioazlu, O., Yilmaz, S., & Polat, N. (2022). Food composition and feeding strategies of an invasive species, Carassius gibelio (Bloch, 1782) inhabiting a eutrophic lake in Middle Black Sea region. *Indian Journal Of Fısherıes,* *69*(2). https://doi.org/10.21077/ijf.2022.69.2.109176-06

Yeldan, H., Avşar, D., & Manaşırlı, M. (2009). Age, growth and feeding of the common stingray (*Dasyatis pastinac*a, L., 1758) in the Cilician coastal basin, northeastern Mediterranean Sea. *Journal of Applied Ichthyology*, *25*(1), 98–102. https://doi.org/10.1111/j.1439-0426.2008.01075.x

Yemişken, E., Forero, M. G., Megalofonou, P., Eryılmaz, L., & Navarro, J. (2018). Feeding habits of three Batoids in the Levantine Sea (north-eastern Mediterranean Sea) based on stomach content and isotopic data. *Journal of the Marine Biological Association of the United Kingdom*, *98*(1), 89 –96. https://doi:10.1017/S002531541700073X

Yeşilçimen, H. Ö., & Özyurt, C. E., 2018. Spawnıng And Some Of The Feedıng Traıts Of Brushtooth Lızardfısh (*Saurida undosquamis* (Rıchardson,1848)) Iskenderun Gulf (North-Eastern Medıterranean. *Çukurova University Journal of Science and Engineering Sciences*, *7*, 35.

Young, J. W., Guest, M. A., Lansdell, M., Phleger, C. F., & Nichols, P. D. (2010). Discrimination of prey species of juvenile swordfish *Xiphias gladius* (Linnaeus, 1758) using signature fatty acid analyses. *Progress Oceanography*, *86*(1-2), 139–151. https://doi.org/10.1016/j.pocean.2010.04.028

Yoğurtçuoğlu, B., Ekmekçi, F. G., & Karachle, P. (2021). A review and assessment of fish trophic levels in a large reservoir of central Anatolia, Turkey. *Marine and Freshwater Research 72*(3), 311-320. http://dx.doi.org/10.1071/MF20161

Yigin, Ç., & İsmen, A. (2010). Dıet of Thornback ray (*Raja clavata* Lınnaeus, 1758) ın Saros bay (the north aegean sea). *Environmental Science, 39, 700.*

Yılmaz, F., & Solak, K., (1999). Nutritional Organisms of *Capoeta trutta* (Heckel, 1843) Living in the Tigris River and Changes of These Organisms According to Months and Ages. *Turkish Journal of Zoology*, *23*(3), 973-978.

Yılmaz, M., & Polat, N. (2003). Digestive System Content of Red Frog (*Scardinius erythrophthalmus* L. 1758) Living in Samsun-Bafra Fish Lakes (Tatlı Göl and Gıcı Lake). *Fırat University Journal of Science and Engineering Sciences*, *15*(4), 463-471.

Yılmaz, M., Yılmaz, S., Kandemir, Ş., Bostancı, D., & Polat, N. (2003). Dietary Preferences of Perch (*Perca fluviatilis* L., 1758) Inhabiting Derbent Dam Lake (Bafra-Samsun) and Their Relationship with Seasonal and Age-Dependent Variations. *Turk Journal Vetenira Animal Sciences*, *27*(3), 627-635.

Yılmaz, M., Gümüş, A., Yılmaz, S., & Polat, N. (2003). Aged-Based Food Preferences of Common Carp (*Cyprinus carpio* L., 1758) Inhabiting Fish Lakes in the Bafra District of Samsun Province (Lakes Tatl› and Gıcı). *Turkish Journal Veterinary Animal Science*, *27*(4), 971-978.

Yılmaz, M., & Ablak, Ö. (2003). The Feeding Behavior of Pikeperch (*Sander lucioperca* (L., 1758)) Living in Hirfanl› Dam Lake. *Turkish Journal of Veterinary Animal Science*, *27*(5), 1159-1165.

Yılmaz, M., & Polat, N. (2005). Digestive System Contents of the Pike (*Esox lucius* L., 1758) Inhabiting Simenit Lake (Terme-Samsun). *Science and Eng. J. of Fırat Univ, 17* (3), 573-580.

Yılmaz, M., Yılmaz, S., Bostancı, D., Polat, N., & Yazıcıoğlu, O. (2007). Feeding dietary of prussian carp (*Carassius gibelio*, Bloch 1782) inhabiting bafra fish lakes (Samsun). *Journal of FisheriesSciences*, *1*(2), 48-57. https://doi.org/10.3153/jfscom.2007007

Yılmaz, M., Bostancı, D., Yılmaz, S., & Polat, N. (2008). ki farklı habitatta [Eğirdir Gölü (Isparta) ve Bafra balık gölleri (Samsun)] yaşayan havuz balığı (*Carassius gibelio* Bloch, 1782)'nın beslenme rejimlerinin karşılaştırılması. *Journal of FisheriesSciences.com, 2*(3), 233-240.