

Native, Threatened, and Invasive Species in the Black Sea Food Chains

PROJECT TITLE: BIOBLACK – BSB00794
THE RAISING AWARENESS FOR THE BLACK SEA
PEOPLE TO RECOGNIZE AND PROTECT BLACK SEA
BIODIVERSITY

Project Activity 1.2 The methodologies to raise public awareness
for the Black Sea Biodiversity – e-booklet

The project is implemented by three partner organizations from Türkiye,
Bulgaria, and Romania



KARADENİZ
TEKNİK ÜNİVERSİTESİ
KARADENİZ TECHNICAL UNIVERSITY
1955

LP1-KTU MSF-TÜRKİYE



PP2- IFR-BULGARIA



PP3-MARE NOSTRUM-ROMANIA

Partner organizations:

Lead Partner: KARADENIZ TECHNICAL UNIVERSITY MARINE SCIENCES FACULTY

Department: DEPARTMENT OF MARINE SCIENCES AND TECHNOLOGY ENGINEERING

Address: Çamburnu, Sürmene, 61530 Trabzon, Turkey

Department address: Çamburnu, Sürmene, 61530 Trabzon, Turkey

Legal status: public

Organisation type: Higher education and research organisations

Website: <https://www.ktu.edu.tr/marine>

Institute of Fish Resources

Department: DEPARTMENT OF HYDROBIOLOGY AND ICHTHYOLOGY

Address: 4, Primorski Blvd., 9000 Varna, Bulgaria

Department address: 4, Primorski Blvd., 9000 Varna, Bulgaria

Legal status: public

Organisation type: Higher education and research organisations

Website: <https://www.ifrvarna.com/>

Organizatia Neguvernamentala Ecologista Mare Nostrum

Department: Ecological Nonguvernamental Organization Mare Nostrum

Address: Tomis, 900647 Constanta, Romania

Department address: Tomis, 900647 CONSTANTA, Romania

Legal status: public

Organisation type: Interest groups including NGOs

Website: <http://www.marenostrum.ro>

Scientific Team

KARADENİZ TECHNICAL UNIVERSITY MARINE SCIENCES FACULTY:

Prof. Dr. Hacer SAĞLAM

Prof. Dr. Fatma TELLİ KARAKOÇ

Prof. Dr. Coşkun ERÜZ

Prof. Dr. Ali Muzaffer FEYZİOĞLU

Assoc. Prof. Dr. Rafet Çağrı ÖZTÜRK

Assist. Prof. Dr. İlknur YILDIZ

Assist. Prof. Dr. Ahmet ŞAHİN

Assist. Prof. Dr. Mehmet ZEKE ŞENER

Assist. Prof. Dr. Hasan ÖLMEZ

Dr. Neira Purwanty ISMAIL

INSTITUTE OF FISH RESOURCES:

Assoc. Prof. Dr. Sonya UZUNOVA

Assoc. Prof. Dr. Tihomir STEFANOV

Assoc. Prof. Dr. Eng. Slava DINEVA

Chief Ass. Dr. Dimitar GERDZIKOV

ORGANIZATIA NEGUVERNAMENTALA ECOLOGISTA MARE NOSTRUM:

Angelica PAIU

Alexandra MARGINE

Clementina CORNEA

Marian PAIU

Booklet:

Design: Slava Dineva

Contents

1. Definition of food chains.....	4
2. Definition of a food pyramid	5
3. Types of food chains and pyramids	7
4. Species involved at the different levels of food chains	111
Primary producers	111
Primary consumers.....	18
Second level consumers	355
Third level consumers	51
Apex predators	588

1. Definition of food chains

A food chain is a fundamental concept in ecology, illustrating the transfer of energy among the different levels of an ecosystem. They reveal the relationships between organisms and their a role in maintaining ecological balance. Study of food chains, give us better understanding of ecosystem dynamics, including the flow of energy, population control, and the impact of human activities on natural habitats. Food chains allow the flow of organic matter and energy between living organisms. Only 10% of the energy is transferred from one trophic level to the next. The remaining 90% is used by the organism for its life processes.

A food chain in the Black Sea refers to the linear sequence of energy transfer from primary producers, such as phytoplankton, to higher trophic levels, including herbivores and carnivores.

Primary Producers: These are the first level, primarily phytoplankton, which capture sunlight and convert it into energy through photosynthesis.

Herbivores: These include zooplankton and small fish, which feed on primary producers.

Carnivores: At the top of the food chain are larger fish, birds, and marine mammals, which consume herbivores.

Decomposers: These organisms, like bacteria and fungi, break down dead matter, recycling nutrients back into the ecosystem.

This food chain illustrates the complex relationships among various species in the Black Sea ecosystem, highlighting the importance of primary producers in sustaining the entire food web.

2. Definition of a food pyramid

A pyramid displays different trophic levels in a marine food web.

Marine Food Pyramid

Organisms on the first trophic level, such as marine plants and algae, are consumed by organisms on the second trophic level, such as zooplankton and grazer fish species. At the top of the food web are apex predators, as a shark or dolphins.

A food pyramid is a visual representation that organizes foods into groups arranged in a triangular shape, indicating the recommended proportions of each group in a balanced diet. In the context of the Black Sea, it highlights the trophic levels of marine ecosystems, showing how different organisms interact and contribute to the food web. For example, primary producers like phytoplankton form the base, while secondary consumers such as fish and invertebrates occupy higher levels, with apex predators like dolphins, sharks and birds at the top. This representation helps in understanding the flow of energy through the ecosystem and the importance of balanced nutrition.

3. Types of food chains and pyramids

Main Types of Food Chains in the Black Sea

The **Black Sea food chain** is structured around a classic marine trophic pyramid, but with unique twists caused by limited water exchange, strong stratification, and decades of human impact. At its core, energy flows from **phytoplankton** → **zooplankton** → **small pelagic fish** → **larger predators**, but invasive species and overfishing have reshaped this balance dramatically.

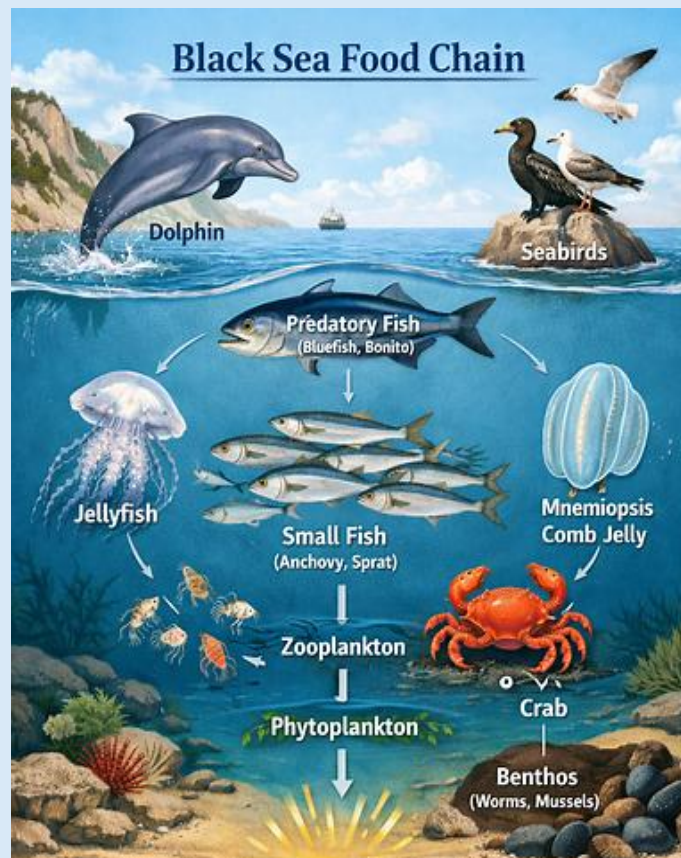


Image: © Slava Dineva

The Black Sea supports **several types of food chains and ecological pyramids**, each shaped by its unique stratified waters, limited biodiversity, and strong human impacts. The core structure is consistent across studies, but the **relative strength of each trophic level** has shifted over time due to eutrophication, overfishing, and invasive species.

1. Classical Phytoplankton → Zooplankton → Fish → Predators Chain

This is the **baseline pelagic food chain** described in ecosystem assessments.

- **Phytoplankton** form the primary producers.
- **Zooplankton** (copepods, cladocerans) are the primary consumers and are widely used as indicators of food-web integrity.
- **Small pelagic fish** (anchovy, sprat, horse mackerel) dominate the secondary consumer level.
- **Higher trophic levels** include turbot, bonito, and dolphins.

This chain is the foundation of most **multi-trophic assemblage analyses** in the western Black Sea.

2. Microbial Loop Food Chain

A major component of the Black Sea due to its **low-oxygen deep waters** and high organic matter recycling.

- Bacteria and micro zooplankton recycle dissolved organic carbon.
- This loop becomes especially important when classical grazing chains weaken (e.g., after eutrophication events).

This pathway is emphasized in studies of **planktonic trophic transitions**.

2. Jellyfish-Dominated (Gelatinous) Food Chain

During periods of ecological imbalance—especially the 1980s–1990s—**Mnemiopsis leidyi** and other gelatinous species diverted energy away from fish.

- Jellyfish consume zooplankton and fish larvae.
- This creates a **short, inefficient food chain** with reduced fish productivity.

Long-term food-web evaluations document these shifts clearly.

3. Benthic Food Chain (Coastal Shelf)

Less dominant than pelagic chains but still important:

- **Benthic algae and detritus** → benthic invertebrates → demersal fish (turbot, gobies).
- Strongly affected by hypoxia and sedimentation from eutrophication.

How Natural and Human Impacts Altered the Food Chain

Multiple stressors have reshaped the Black Sea ecosystem:

- **Hydrographic and Chemical Pressures (Anoxia and Hydrogen Sulfide):** Over 80% of the deep Black Sea is anoxic (lacking oxygen) and filled with toxic hydrogen sulfide below approx. 150 m, compressing living organisms beside some microorganisms into a thin upper layer.
- **Overfishing** removed apex predators, destabilizing trophic levels.
- **Eutrophication:** Nutrient runoff (nitrogen and phosphorus) from major inflowing rivers (domestic, industrial and agricultural) triggers massive phytoplankton and algal blooms, suffocating bottom-dwelling species from caused hypoxia damaging coastal pelagic and benthic habitats.

- **Chemicals and Heavy Metal Contamination:** Industrial wastewater, agricultural pesticides, and oil residues introduce toxic elements that bioaccumulate in marine flora and fauna.
- **Invasive species** like *Mnemiopsis* disrupted zooplankton and fish recruitment.
- **Marine Litter and Plastics:** Microplastics and litter include discarded physical gear – ghostnets change the substrate properties of coastal and benthic zones.
- **Sea Surface Warming:** Rapid regional temperature increases alter the metabolic rates, reproduction cycles, and migration paths of native pelagic and demersal fish.
- **Coastal Modification:** Dredging, coastal hardening, and engineering projects disrupt natural salinity gradients and shallow-water habitats migration routes.
- **Climate change** further reduce Black Sea ecosystem resilience.

These pressures collectively transformed the food chain from a balanced fish-based system into one periodically dominated by gelatinous organisms.

Types of Ecological Pyramids in the Black Sea

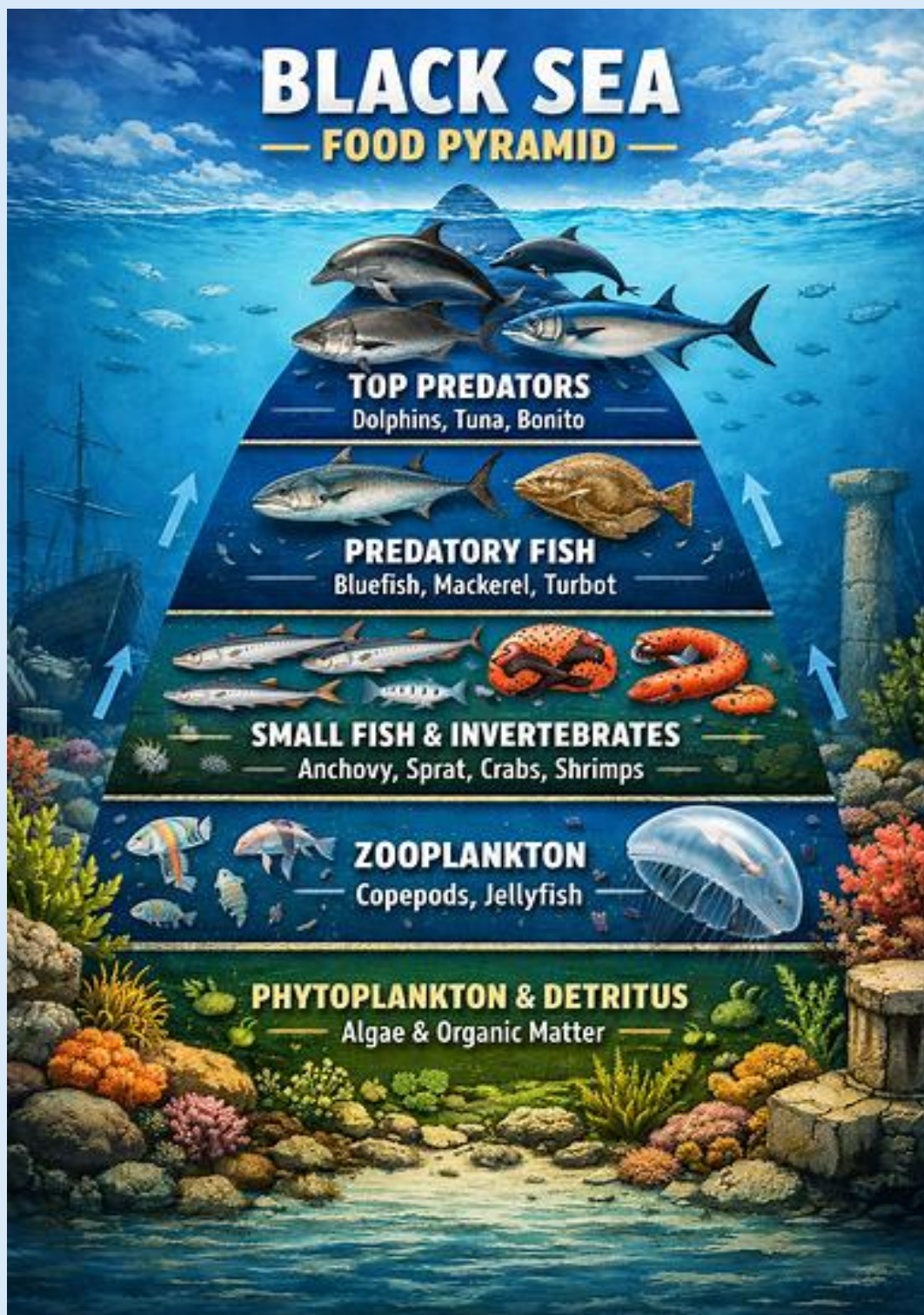


Image: © Slava Dineva

Ecological pyramids describe **biomass**, **numbers**, or **energy** distribution across trophic levels. Black Sea studies and modelling frameworks (including higher-trophic-level models) show the following patterns:

1. Pyramid of Numbers (Often Irregular)

- Extremely high numbers of **phytoplankton and microzooplankton**
- Fewer small pelagic fish
- Very few apex predators due to historical overfishing

This pyramid is often **distorted** because jellyfish blooms can outnumber fish larvae dramatically.

2. Pyramid of Biomass (Sometimes Inverted)

In productive years, biomass is:

- High at the **phytoplankton** level
- Moderate at **zooplankton**
- Lower at **fish and predators**

However, during jellyfish-dominated periods, biomass can become **inverted**, with gelatinous zooplankton outweighing fish biomass.

3. Pyramid of Energy (Always Upright)

Energy flow always decreases upward:

- Most energy at phytoplankton
- Significant losses through microbial recycling and jellyfish consumption
- Least energy reaches top predators

This is consistent with multi-trophic ecosystem modelling for the Black Sea.

4. Species involved at the different levels of food chains

PRIMARY PRODUCERS

Phytoplankton

Species: *Ceratium fusus*

Local name: not applicable

Photo:

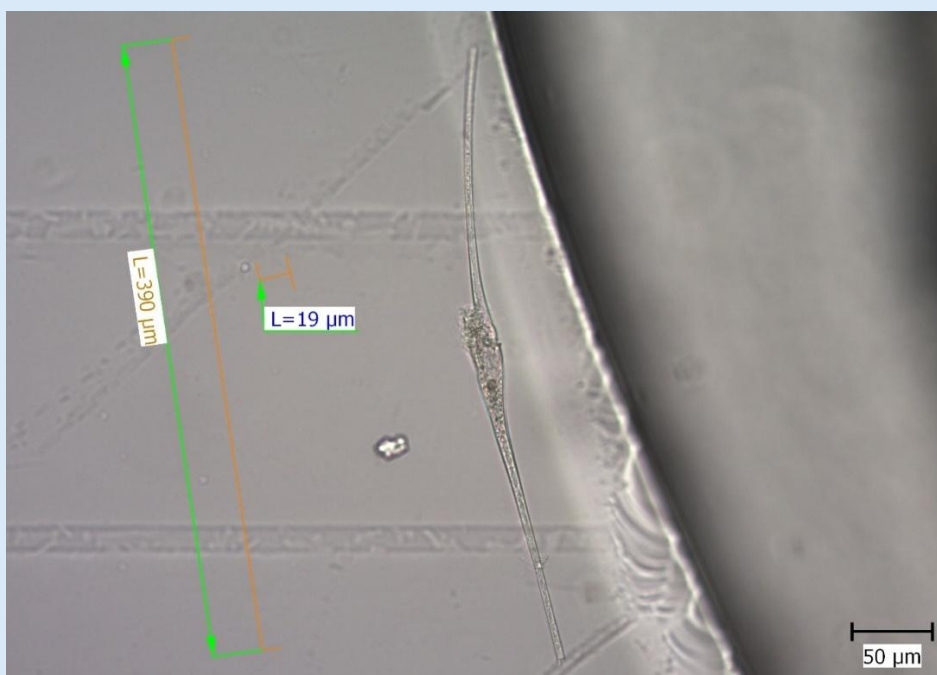


Photo: © Klisarova, D. & Gerdzhikov, D.

Max age: between two and seven days

Biology: *Ceratium fusus* is a phytoplanktonic dinoflagellate species characteristic of temperate and subtropical seas, including the Black Sea. The species is part of the microphytoplankton and is relatively large with an elongated, spindle-shaped body. Its average dimensions are: length 200 µm–540 µm and width 15 µm–30 µm. It is yellow-brown to golden in color and is covered by a theca composed of cellulose plates. It moves using two flagella and is commonly

found in surface water layers. It develops particularly well during summer and autumn. Among the species of this genus occurring along the Bulgarian Black Sea coast, *C. fusus* reaches the highest abundances.

IUCN Red List Category: There is no official status under this classification

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
--------	------------------------	--------------------	---------	-----

Main Threats: The main factors influencing the species are changes in nutrient availability and temperature. Pollution and eutrophication can alter its population dynamics. Climate change affects its seasonality. Competition with other phytoplankton species is also a contributing factor. Hydrological changes in the Black Sea influence its distribution.

Ecological Importance: An important primary producer in marine ecosystems. It participates in the carbon cycle and supports the food web in surface waters. It can contribute to bloom formation. It also serves as a food source for zooplankton.

The main preys: It uses photosynthesis as its main energy source and depends on light and dissolved mineral salts. As an autotroph, it primarily utilizes dissolved nutrients in the water (nitrates, phosphates). However, it can also ingest bacteria and small organic particles (mixotrophy).

The main predators: Primary consumers include zooplankton organisms such as copepods. It is also ingested by filter-feeding organisms. It forms part of the food chain leading to higher trophic levels. Newly hatched fish larvae of anchovy, horse mackerel, and picarel may feed on it.

Species: *Chaetoceros sp.*

Local name: not applicable

Photo:

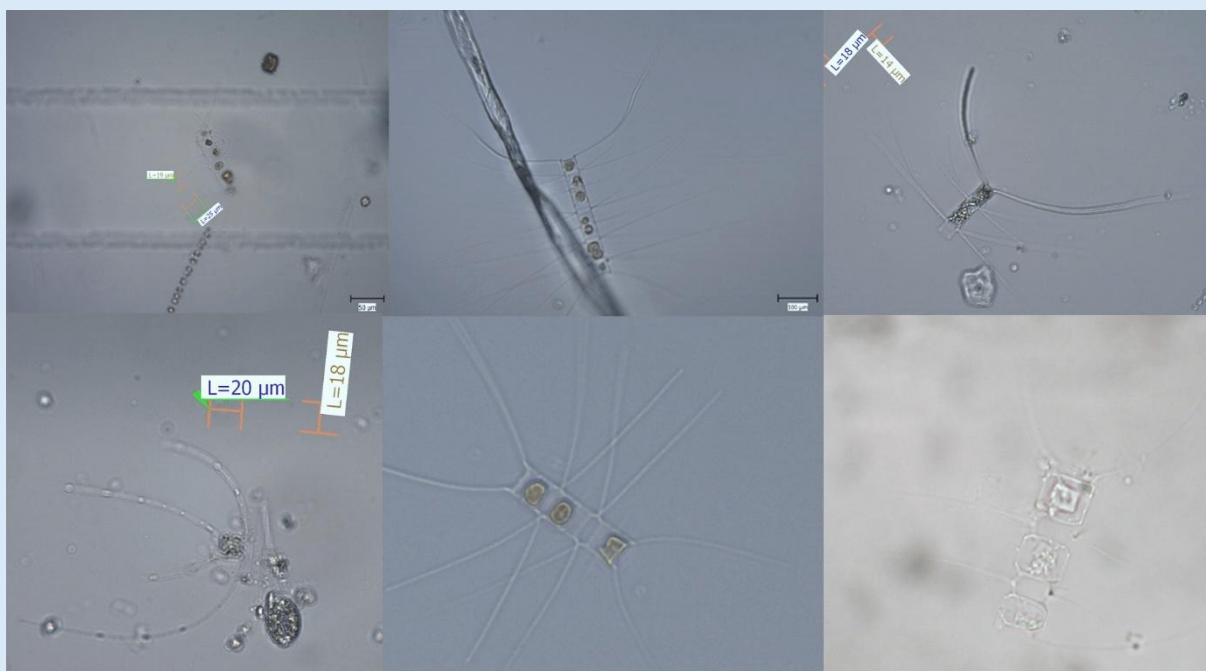


Photo: © Klisarova, D. & Gerdzhikov, D.

Max age: Individual cells live from a few days to about two weeks.

Biology: The genus *Chaetoceros* includes diatoms widely distributed in marine waters. The species are an important part of the phytoplankton in the Black Sea. They are one of the main representatives of the phytoplankton, often dominating in spring and autumn. They can form blooms. Part of the natural ecosystem. They have silica cell walls. The cells are rectangular to cylindrical. They have characteristic long spines. Their coloration is golden-brown. They often form colonies in chain-like structures. They occur massively under favorable nutrient conditions.

IUCN Red List Category: There is no official status under this classification

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
---------------	------------------------	--------------------	---------	-----

Main Threats:

Eutrophication can change the population composition of species from the genus *Chaetoceros*. A shortage of silicon limits growth. Temperature changes affect seasonality. Heavy metal pollution is a potential risk. Changes in water circulation also have an impact.

Ecological Importance:

A major primary producer in marine food webs. The base of the food chain. Participates in the carbon and silicon cycles. Supports zooplankton populations. Plays a key role in the productivity of the Black Sea.

The main preys:

They use dissolved nutrients and light. There is no classic "prey" as they are autotrophic. They can absorb dissolved organic matter to a small extent. Depend on nitrates and phosphates. Require silicon for growth.

The main predators:

Main consumers are copepods and other zooplankton organisms. Microorganisms can decompose them. Part of the food base of pelagic systems. An important element of trophic chains.

Species: *Pseudo-nitzschia* sp.

Local name: not applicable

Photo:

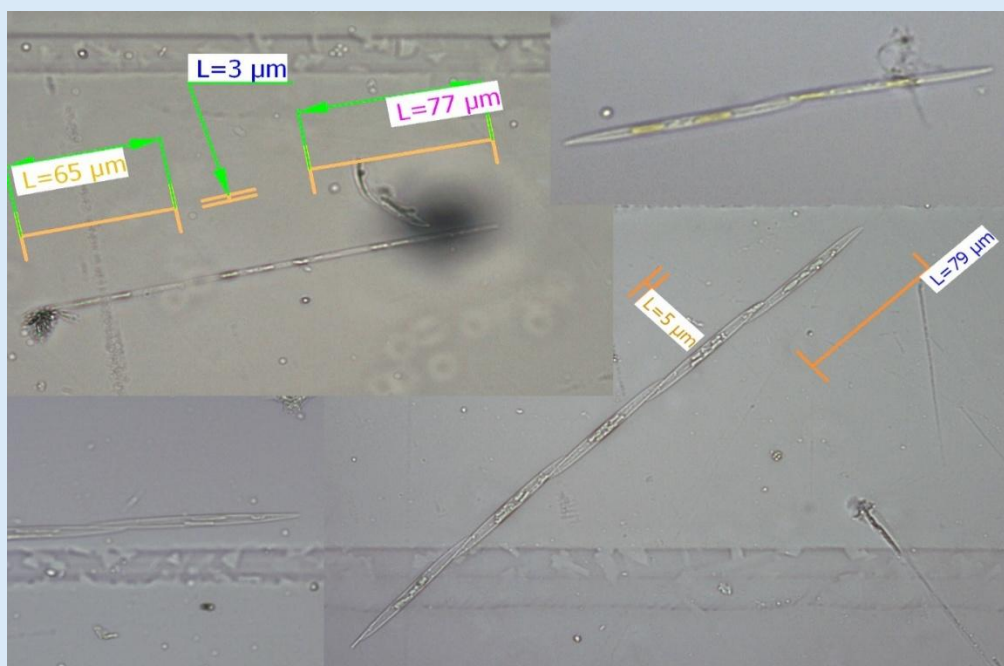


Photo: © Klisarova, D. & Gerdzhikov, D.

Max age: They live from a few days to about two weeks.

Biology:

Pseudo-nitzschia is a genus of marine pennate diatoms, widely distributed in the Black Sea. They have slender, elongated cells that frequently form chains (colonies). They possess very fine silica frustules (shells) and are photosynthetic, with a golden-brown coloration. Some species within the genus are potentially toxic, as they can produce domoic acid. They are found in both coastal and open waters, and certain species can form massive algal blooms.

IUCN Red List Category: There is no official status under this classification

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
---------------	------------------------	--------------------	---------	-----

Main Threats:

Water eutrophication increases the risk of blooms. Climate change affects the toxicity of these species. A shortage or excess of nutrient salts alters the dynamics. Pollution can amplify stress responses. Hydrological changes influence distribution.

Ecological Importance:

It contributes to primary production and constitutes a major part of the diatom component of phytoplankton. It can impact trophic webs through toxin production, while serving as the foundation of the food chain under non-toxic conditions. It plays a key role in biogeochemical cycles.

The main preys:

As an autotroph, it utilizes nitrates, phosphates, and silica. It depends on light for photosynthesis and absorbs dissolved nutrients.

The main predators:

It is consumed by zooplankton (copepods, filter feeders). During toxic blooms, it may be avoided by predators. Fish larvae can ingest it accidentally, and microorganisms decompose it after death. It impacts the food web through its toxicity.

PRIMARY CONSUMERS

Species: *Noctiluca (Noctiluca scintillans)*

English name: Sea Sparkle

Local name: not applicable

Photo:

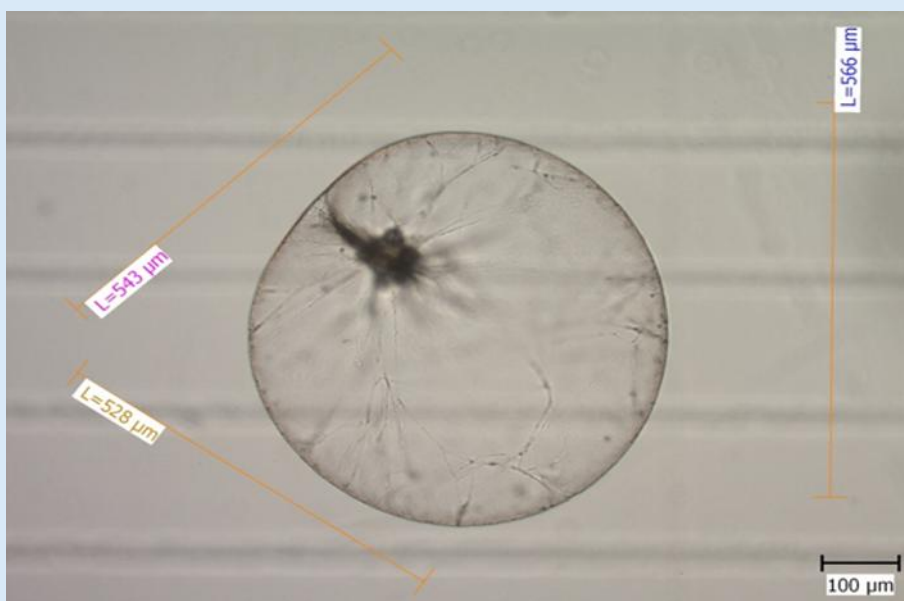


Photo: © Klisarova, D. & Gerdzhikov, D.

Max age: from a few days to a week

Biology:

Noctiluca scintillans is a giant dinoflagellate whose single cell reaches an unusually large size for a unicellular organism, ranging from 0.2 to 2 mm, making it visible to the naked eye. Unlike most dinoflagellates, it lacks chloroplasts and a rigid cell covering, and feeds entirely heterotrophically by engulfing prey captured with its mobile tentacle. Its movement in the water

is predominantly passive. Under favorable environmental conditions, it reproduces rapidly through simple cell division, although it can also undergo sexual reproduction. Its most remarkable characteristic is its ability to produce bioluminescence, emitting a distinctive bright blue light.

IUCN Red List Category: There is no official status under this classification.

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
---------------	------------------------	--------------------	---------	-----

Main Threats:

As a unicellular organism, this species is not threatened with extinction; however, there are several limiting ecological factors that regulate its population dynamics. These include food competition and trophic pressure, as well as climatic anomalies, since abrupt and unusual temperature fluctuations may suppress its life cycle. Changes in salinity, intraspecific competition, and alterations in the structure of bacterial communities may also adversely affect the development and proliferation of the species.

Ecological Importance: *Noctiluca scintillans* is a key marine organism that facilitates energy transfer through the food web by consuming phytoplankton and microzooplankton, while also serving as prey for larger predators. The species is well known for its bioluminescence, which is considered an important indicator of anthropogenic pollution and eutrophication in marine ecosystems. It can sometimes cause harmful blooms. Its massive blooms (commonly referred to as “red tides”) are a clear ecological indicator of anthropogenic pollution and excessive enrichment of the water body with nitrogen and phosphorus compounds.

The main preys: Phytoplankton: microscopic algae (especially diatoms) and other dinoflagellates. Zooplankton and eggs: Copepod and fish eggs, as well as small larvae. Microorganisms: Bacteria, as well as other protozoa (e.g. tinnitis). Detritus: Dead organic matter and "marine snow".

The main predators: Crustaceans (Copepods): Species such as Calanus and Acartia. Jellyfish: jellyfish and predatory worms (Chaetognaths).

ZOOPLANKTON

Species: *Calanus euxinus*

Local name: not applicable

Photo:



Photo: © Elitsa Hineva

Max age: It lives from a few months to about one year. The lifespan depends on temperature and food.

Biology:

Calanus euxinus is a dominant copepod in the Black Sea. It constitutes about 60–80% of the biomass of planktonic crustaceans and is a primary food source for many fish species. The body is elongated, transparent, and segmented. It has long antennae used for movement. The color is slightly reddish or colorless. Females are larger than males. *Calanus euxinus* feeds on phytoplankton through filtration, being one of the main consumers of phytoplankton. It has a complex life cycle with multiple stages (nauplii and copepodites). It reproduces sexually. It represents an important component of the mesozooplankton and has a relatively large size for a planktonic organism. The species prefers cold water and performs diel vertical migrations. It is found mainly in cooler and deeper water layers. It is key to the energy flow in the ecosystem.

IUCN Red List Category: There is no official status under this classification

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
--------	------------------------	--------------------	---------	-----

Main Threats:

Climate change affects the temperature structure of the waters. Pollution can reduce populations. The decline in phytoplankton has a direct impact. Changes in oxygen conditions are critical. Hydrological changes in the Black Sea are important.

Ecological Importance:

In the food chains of the Black Sea, it is a primary mediator between phytoplankton and fish. It is key to the transfer of energy up the food chain. It supports fish populations. It regulates phytoplankton biomass. It is one of the most important zooplankton species.

The main preys:

Its primary food consists of microalgae. It feeds mainly on diatoms and other phytoplankton species. It ingests bacteria and small particles of organic matter. It actively filters water. It depends on the seasonal production of phytoplankton.

The main predators:

It is a primary prey for small and medium-sized fish (anchovy, sprat). Fish larvae also consume it. It is ingested by jellyfish. It is an important element of the diet of pelagic predators.

Species: *Oithona davisae***Local name:** not applicable**Photo:***Photo: © Elitsa Hineva***Max age:** It lives from a few weeks to about 1–2 months.

Biology: *Oithona davisae* is a small invasive crustacean species (a cyclopoid copepod) of Pacific origin, which over the last two decades has become one of the dominant zooplankton species in the Black Sea. Its natural habitat is the coastal waters of Japan and Korea, but it has spread worldwide via ships' ballast waters. It was recorded in the Black Sea for the first time at the beginning of the century, and after 2005, it rapidly expanded throughout the entire basin, including along the Bulgarian coast. It reproduces sexually. It passes through larval stages. It possesses high ecological adaptability.

IUCN Red List Category: There is no official status under this classification**Status in the Black Sea**

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
--------	-------------------------------	--------------------	---------	-----

Main Threats:

It is dependent on the presence of phytoplankton. Climate change affects its reproduction. Pollution and hypoxia can reduce its abundance. Competition with other copepods is also a factor. Changes in the food supply are key.

Ecological Importance:

It is a key component of food chains. It connects bacteria and phytoplankton with larger consumers. It supports energy flow in eutrophic systems. It is important for fish larvae. It regulates microplankton dynamics. This species exhibits exceptionally high abundance in zones with elevated content of nutrients and organic pollutants (eutrophication), such as the Gulf of Varna and the Sevastopol Bay. Its large population in these areas often serves as an indicator of the degree of pollution and changes in the ecosystem's balance.

The main preys:

The species is omnivorous—it feeds on phytoplankton, ciliates, rotifers, and the larvae of other crustaceans, thereby managing to transfer energy from the lowest levels of the food chains (primary producers) to larger predators in the pelagic zone.

The main predators:

Oithona davisae is rapidly becoming a major food source (forage zooplankton) for a number of fish species, their larvae, and larger copepods in the Black Sea. Small jellyfish also consume it.

Species: *Acartia clausi***Local name:** not applicable**Photo:***Photo: © Elitsa Hineva***Max age:** It lives from a few weeks to a few months.**Biology:**

Acartia clausi is one of the most widespread species of marine planktonic crustaceans (order Calanoida), playing a key role in marine food webs and occurring abundantly in coastal waters, including the Black Sea. It feeds on phytoplankton through active filter-feeding and exhibits high ecological plasticity, with a strong tolerance to fluctuating environmental conditions and variations in salinity. The species is considered an important indicator of environmental status. *A. clausi* is characterized by long antennae and a distinctly segmented body, with females generally larger than males. It reproduces sexually, showing intensive reproductive activity during the warm months and often becoming a dominant species in spring and summer. Its development proceeds through several larval stages.

IUCN Red List Category: There is no official status under this classification.**Status in the Black Sea**

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
---------------	------------------------	--------------------	---------	-----

Main Threats:

Temperature changes affect its life cycle, while pollution and eutrophication can significantly alter population abundance. Furthermore, a decrease in phytoplankton biomass has a negative impact, and hypoxia poses a serious risk to the species.

Ecological Importance:

It is a primary consumer of phytoplankton. In food chains, it is intermediate link between primary producers and fish. It is crucial for the food web and supports fish populations. It regulates phytoplankton biomass.

The main preys:

Its primary food source is phytoplankton, particularly diatoms and other microalgae, but also ingests suspended organic particles and actively filters seawater while feeding. The species relies heavily on seasonal patterns of primary production in the marine environment.

The main predators:

Acartia clausi serves as prey for fish species such as anchovy and sprat, as well as for fish larvae and jellyfish. This species is also consumed by larger zooplankton predators. Its role as a trophic intermediary, transferring energy from primary producers to higher trophic levels is very important. It is often a major food source for the pelagic fish species.

Species: *Penilia avirostris*

Local name: not applicable

Photo:



Photo: © Elitsa Hineva

Max age: It lives from a few weeks to about 1 month.

Biology:

Penilia avirostris is a marine cladoceran (water flea) found in the Black Sea. It is an important component of zooplankton in warm seasons. It has a short life cycle and a high reproductive rate. This species often occurs in coastal and eutrophic waters. It can form mass populations. *P. avirostris* is the only representative of the order Ctenopoda, inhabiting entirely saltwater and

brackish basins. The body is laterally flattened. Females are ovoid in shape, while males are more pointed. It is characterized by a long shield (carapace) and a distinct armor around the embryo sac. It reproduces mainly parthenogenetically (without fertilization) during the warm months, producing clones of rapidly developing females. When temperatures drop or conditions deteriorate, the population switches to gametogenetic (sexual) reproduction to create stable resting eggs.

IUCN Red List Category: There is no official status under this classification

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
---------------	------------------------	--------------------	---------	-----

Main Threats:

Temperature changes strongly affect it. Pollution can reduce the number of the species. Hypoxia is a critical factor for its development. Changes in the amount of phytoplankton directly affect it. Climate change is a major risk for the populations of the species.

Ecological Importance:

P. avirostris forms large aggregations, becoming a major food source for pelagic fish. Important filter feeder in coastal waters. Can dominate zooplankton biomass. A key species in summer.

The main preys:

It feeds on phytoplankton and bacteria. It filters organic particles. It depends on microbial production. It is not a predator. Its main food is microscopic plankton.

The main predators:

Fish, especially their juvenile stages. Jellyfish and larger zooplankton predators. Part of the food chain. Important for pelagic ecosystems. Often consumed en masse in high numbers.

Species: Moon jellyfish (*Aurelia aurita*)

Local name: Turkish: Ay denizanası., Bulgarian: *Yuama medyza*, Romanian: Meduză/Aurelia

Photo:

Photo: © Sonya Uzunova

Max age: Up to 2 years for medusa stage

Biology: One of the most common gelatinous species in the Black Sea basin. The population is known to undergo substantial long-term fluctuations and exhibits patchy spatial distribution throughout the water column. It is easily recognized by its translucent, saucer-shaped bell and the four distinct, horseshoe-shaped gonads visible through its top. Life cycle of *Aurelia* is a complex process. The adult form (medusa phase - sexual reproduction) reproduces and the fertilized eggs develop into tiny, free-swimming larvae called planulae (Planula phase). After few days they settle on hard underwater surfaces like rocks, shells etc. and transform into a small, anemone-like tentacled polyp called a scyphistoma. At this stage, the organism can live for decades, reproducing asexually. In winter, when the water is cooler The polyp body

segments horizontally, resembling a stack of plates (Strobila Phase). The last phase is called Ephira and represents the free-swimming juvenile jellyfish. The size of adult Aurelia is heavily regulated by food availability (reaching typically 10 to 40 cm in diameter). Possess a very mild sting that is mostly harmless to humans.

IUCN Red List Category: There is no official status under this classification

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
---------------	------------------------	--------------------	---------	-----

Main Threats: Change in temperature can affect their life cycle development. Food competitors. Coastal Development.

Ecological Importance:

Voracious generalist predator, it regulates zooplankton populations, cycles nutrients through mucus production, and after they die serve as a vital food source for benthic organisms. However, its blooms can drastically alter food webs. They are highly adaptable to changes in temperature, salinity, and dissolved oxygen, their population dynamics often serve as biological indicators of broader human-induced changes to marine ecosystems, such as eutrophication or climate warming.

The main preys:

As an opportunistic predator, it feeds primarily on zooplankton, copepods, and pelagic fish larvae..

The main predators:

Aurelia aurita competes intensely for food with the invasive *Mnemiopsis leidyi* in the Black Sea. They share an identical ecological niche, inhabiting the same water layers around the thermocline and hunting the exact same planktonic food. In the 80's of XX century the invasive species *Mnemiopsis leidyi* outcompeted *Aurelia aurita* and its biomass in the Black Sea to decrease 4-fold in 1990s with comparison to 1980s.

Species: Barrel jellyfish (*Rhizostoma pulmo*)

Local name: Turkish: Deniz ciğeri denizanası, Bulgarian: Белодробна медуза, Romanian: Meduză/ Rhizostoma

Photo:



Photo: © Plamen Mitov

Max age: 4-8 months for the medusa stage

Biology: Their population increase from summer to fall. Due to high temperatures and wind they can produce “blooms”. *Rhizostoma* life cycle pass through 3 stages: Polyp (Scyphistoma) - attached to solid surfaces on the sea floor they can survive through winter, living for several months to over a year, Ephyra - asexual reproduction, Medusa (Adult Jellyfish) - active, free-floating jellyfish typically appear in the spring, grow rapidly, and reach maturity by late summer or autumn before dying. Moderately venomous.

IUCN Red List Category: There is no official status under this classification

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
--------	------------------------	--------------------	---------	-----

Main Threats: Commercial Fishing as trawling activities. Coastal Development, as construction shallow seafloor, destroying the rocky habitats needed by the polyp stage. Marine Pollution: Heavy chemical spills and plastic ingestion damage their complex internal tissues. Climate change- cooling water naturally trigger mass die-offs of the adult medusa population. Strong coastal winds and shifting tidal currents routinely trap thousands on beaches.

Ecological Importance:

Threats apply more to individual survival and specific lifecycle stages rather than species extinction. Populations are highly resilient and often booming due to climate change.

The main preys: Phytoplankton, Zooplankton species and Planktonic Larvae.

The main predators: Food competitors, bigger medusae and some benthic species as anemones, consuming drifting jellyfish that sink to the seafloor, and benthic crabs.

Species: Sea walnut (*Mnemiopsis leidyi*)**Local name:** Turkish: Taraklı medüz, Bulgarian: Мнemiопсис, Romanian: Mnemiopsis**Photo:**

Photo: © Plamen Mitov

Max age: >4 weeks

Biology: Embryo, Cydippid (juvenile), and Lobate (adult). Extremely rapid embryonic development, within 24 h the small juvenile appears. Adults are oval in shape, laterally compressed, transparent and approximately 7–12 cm in length and 2.5 cm in diameter. They have 8 ciliated bands or ‘combs’ (rows of small ‘plates’ made of tiny hair-like cilia) running the length of its body and two large oral lobes on either side which open wide when feeding. Four smaller lobes are situated underneath the oral lobes. Reaching maturity within four weeks, adults feed via mucus-lined lobes and generate feeding currents using rows of cilia. Interesting fact is that under unfavorable conditions (i.e. prolonged starvation or physical stress), mature individuals can undergo ontogeny reversal (Reverse development). They shrink in size, lose their lobes, and slowly regenerate tentacles to revert into the earlier cydippid stage until environmental conditions improve.

IUCN Red List Category: Not assigned.

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
--------	-------------------------------	--------------------	---------	-----

Main Threats: In the Black Sea region, it acts as a voracious predator. It decimates local food webs by consuming massive amounts of zooplankton, pelagic fish eggs, and fish larvae, directly contributing to commercial fishing collapses. This species has been nominated as one of the 100 ‘World's Worst’ invaders (IUCN, 2005).

Ecological Importance:

As a zooplankton feeder it consumes commercially important fish eggs and larvae and can affect local fish production, causing total stock depletion. In fact its role on the Black Sea ecosystem and food pyramid is negative.

The main preys:

Zooplankton, pelagic fish eggs, and fish larvae

The main predators:

The ctenophore *Beroe ovata* is the ultimate predator of *Mnemiopsis leidyi*. It feeds on other comb jellies exclusively. Their introduction to the Black Sea drastically suppressed invasive *Mnemiopsis* populations.

Species: Ovate Comb Jelly (*Beroe ovata*)

Local name: Turkish: Taraklı denizanası, Bulgarian: Бепое, Romanian: Beroe

Photo:



Photo: © Plamen Mitov

Max age: 1-3 months

Biology: As most of jellationous species *Beroe ovata* pass through different stages of development. They are simultaneous hermaphrodites. *Beroe ovata* larvae are born without tentacles (beroid form). Juvenile (Cydippid) Stage is when the larvae transform into a juvenile form (cydippid). Adult Stage - hyper-accelerated growth, allow it to reach sexual maturity and start reproducing within just 30 days of hatching in favorable conditions.

IUCN Red List Category: Not assigned.

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
--------	-------------------------------	--------------------	---------	-----

Main Threats:

Beroe ovata arrived via ship ballast water in 1997. This non-indigenous species has successfully introduced itself and expanded into the Black Sea. It is a natural enemy of the invasive *Mnemiopsis leidyi* and this way indirectly protected native zooplankton populations.

Ecological Importance:

Beroe ovata, acts as a keystone species and natural biocontrol agent. *Beroe ovata* regulates its own population perfectly. When *Mnemiopsis* blooms in late summer, *Beroe* populations multiply exponentially to consume them. Once the prey is depleted, the *Beroe* population naturally crashes without harming other native species.

The main preys:

M. leidyi and other jellyfish species.

The main predators:

They are consumed by larger commercial fish species, moving energy up the food chain.

SECOND LEVEL CONSUMERS

ZOOBENTHOS

Species: Rapa whelk (*Rapana venosa*)

Local name: Turkish: Deniz salyangozu, Bulgarian: Рапан, Romanian: Rapana

Photo:



Photo: © Vesselin Boychev

Max age: 10-12 years

Biology: Rapa whelks is characterised by rapid growth reaching maturity at 1-3 years.

IUCN Red List Category: Not assigned

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
--------	-------------------------------	--------------------	---------	-----

Main Threats:

Overfishing, reduction of populations of its target food groups.

Ecological Importance:

Rapana species are long-lived and highly fecund, they pose a significant threat to cultivated and natural populations of bivalves, such as mussels and oysters, in the Black Sea region. Native oysters populations disappeared because the invasion of this species and populations of black mussel were significantly reduced. It affected significantly the food chains of benthos.

The main preys:

Черни миди (*Mytilus galloprovincialis*), Стриди (*Ostrea edulis* / *Magallana gigas*), sand mussels (*Anadara*, *Donax* species)

The main predators:

Fishery of rapana reduced significantly its populations and size. Rapana has no many natural enemies in Black Sea, but crabs like as *Carcinus aestuari* and the NIS *Callinectes sapidus* can affect junior stages of this species. Some demersal fish (I.e. turbot or can predate on early stage Rapana.

Species: Blue crab (*Callinectes sapidus*)**Local name:** Turkish: Mavi yengeç, Bulgarian: Син рак, Romanian: Crab albastru**Photo:***Foto: © Sonya Uzunova***Max age:** 3-4 years

Biology: Typically reach reproductive maturity at around 12 to 18 months, at which point females stop molting and males continue to grow and molt at a much slower rate. Over their lifespan, blue crabs molt approximately 20 to 25 times. For this reason, is hard to estimate their age. Life cycle of this species passes through 3 stages: Zoea (planktonic), Megalopa (planktonic) and young and adult (free swimming benthos). This way the blue crab uses the advantages of two environments to feed and for distribution.

IUCN Red List Category:

EX	EW	EN	CR	VU	NT	LC	DD	NE
----	----	----	----	----	----	----	----	----

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
--------	-------------------------------	--------------------	---------	-----

Main Threats: In the Black Sea *Callinectes sapidus* has no natural enemies. Potential risks are chemical pollution. Blue crabs are aggressive territorial animals which attack young generation and can regulate their population themselves.

Ecological Importance: For the moment no many information about the impact of this non-indigenous species, but in his native area it affects mussels and other crab populations. It is very probably to play a role of natural regulator of Rapa whelk populations in the future. For the moment this species is established in the Western Black Sea, but is early to be considered as invasive.

The main preys: Bivalvia, gastropods and other crabs.

The main predators: Humans activities.

FISH

Species: Anchovy (*Engraulis encrasicolus*)

Local name: Turkish: Hamsi, Bulgarian: Хамсия, Romanian: Hamsie

Photo:



Photo: © Tihomir Stefanov

Max age: 5 years

Biology: The European anchovy is a small pelagic, schooling fish. It usually reaches 12–15 cm in length and feeds mainly on zooplankton, especially copepods. The species has a short lifespan (about 2–3 years), fast growth, and high reproductive capacity. Anchovy is also one of the most commercially important fish species in the Black Sea fisheries.

IUCN Red List Category:

EX	EW	EN	CR	VU	NT	LC	DD	NE
----	----	----	----	----	----	----	----	----

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
--------	------------------------	--------------------	---------	-----

Main Threats: Overfishing, climate change and sea temperature fluctuations, changes in plankton composition, marine pollution, and ecosystem impacts caused by invasive species.

Ecological Importance: Anchovy is a key species in the Black Sea ecosystem, transferring energy from plankton to higher trophic levels such as larger fish, seabirds, and marine mammals, and it is also one of the most important commercial fish species in the region.

The main preys: Zooplankton, mainly copepods (mostly *Pseudocalanus elongatus*, *Calanus euxinus*, and unidentified Calanoid copepods) and bivalves.

The main predators: Larger predatory fish (*Sarda sarda*, *Pomatomus saltatrix*, etc.), marine mammals (dolphins) and sea birds (*Puffinus yelkouan*, etc.).

Species: Horse mackerel (*Trachurus mediterraneus*)

Local name: Turkish: İstavrit, Bulgarian: Сафрид, Romenian: Stavrid

Photo:



Photo: © Tihomir Stefanov

Max age: 7 years

Biology: The horse mackerel is a small pelagic, schooling fish that typically reaches up to 30 cm in length and feeds mainly on small fish and crustaceans. It inhabits coastal and shelf waters, often forming large aggregations. The species has a relatively short lifespan (usually 3-4 years) and a high reproductive capacity, spawning multiple times during the warm season. Eggs and larvae are pelagic.

IUCN Red List Category:

EX	EW	EN	CR	VU	NT	LC	DD	NE
----	----	----	----	----	----	----	----	----

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
--------	------------------------	--------------------	---------	-----

Main Threats: Overfishing, climate change and associated sea temperature fluctuations, shifts in plankton composition, eutrophication and hypoxia caused by marine pollution, and ecosystem impacts from invasive species.

Ecological Importance: The horse mackerel plays a key role in the Black Sea food web as both predator and prey, transferring energy to higher trophic levels such as larger fish, marine mammals, and seabirds, and is also an important commercial species.

The main preys: Small fish and small crustaceans.

The main predators: Larger predatory fish (*Sarda sarda*, *Pomatomus saltatrix*, etc.), marine mammals (dolphins) and sea birds.

Species: Garfish (*Belone belone*)

Local name: Turkish: Zargana, Bulgarian: Запран, Romanian: Zărgan

Photo:



Photo: © Tihomir Stefanov

Max age: 5 years

Biology: The garfish is a mid-sized, pelagic, schooling species that typically reaches 45 cm in length, although the maximum reported size is 104 cm and 1.4 kg. It inhabits near-surface waters and exhibits seasonal migratory patterns, often approaching coastal areas during the warmer months. It feeds on small fish, particularly clupeids and anchovies (e.g., species of *Engraulis*) in the Black Sea, as well as on small crustaceans.

The species is oviparous spawning occurs in spring and early summer. Eggs are adhesive and may be found attached to floating objects or vegetation by tendrils on their surface.

IUCN Red List Category:

EX	EW	EN	CR	VU	NT	LC	DD	NE
----	----	----	----	----	----	----	----	----

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
--------	------------------------	--------------------	---------	-----

Main Threats: Overfishing, climate change and sea temperature fluctuations, changes in small pelagic fish populations, and marine pollution.

Ecological Importance: The garfish plays a key role in the marine food web as both predator and prey, transferring energy to higher trophic levels such as larger fish, marine mammals, and seabirds, and is also a commercial species in regional fisheries.

The main preys: Small pelagic fish as *Sprattus sprattus*, *Engraulis encrasicolus*, as well as small crustaceans.

The main predators: Primarily marine mammals (dolphins) and large predatory fish, such as *Sarda sarda* and *Thunnus thynnus*.

Species: Pontic shad (*Alosa immaculata*)

Local name: Turkish: Tirsi, Bulgarian: Карагъоз, Romanian: Scrumbia de Dunăre

Photo:



Photo: © Tihomir Stefanov

Max age: 7 years

Biology: The Pontic shad is a pelagic, schooling anadromous fish inhabiting marine, brackish, and freshwater environments. In the Black Sea, it occurs at depths ranging from 5-80 m. Individuals usually reach 20-30 cm in length, although the maximum recorded size is approximately 39 cm. The species migrates upriver to the middle reaches of large rivers for spawning, typically selecting areas with strong currents in the main channel. Spawning usually occurs close to the surface, often at depths of 2-3 m. Most individuals first migrate to spawn at the age of three years, although some mature earlier; only a small proportion spawn more than once. Adults appear along the coast between February and March and begin entering rivers when water temperatures reach approximately 6-9°C, with migration generally peaking in May. Spawning begins when temperatures exceed 12°C. Eggs are pelagic and drift with the current.

After spawning, adults return to the sea to feed. Juveniles inhabit floodplain and shallow riverine habitats during their first summer before migrating to estuarine and marine areas in autumn, where they remain until maturity. At sea, the Pontic shad feeds primarily on zooplankton, especially crustaceans, as well as small fish.

IUCN Red List Category:

EX	EW	EN	CR	VU	NT	LC	DD	NE
----	----	----	----	----	----	----	----	----

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
--------	------------------------	--------------------	---------	-----

Main Threats: Overfishing, climate change and sea temperature fluctuations, construction of dams and river regulation on major spawning rivers, pollution, habitat degradation and ecosystem impacts caused by invasive species.

Ecological Importance: The Pontic shad is an important pelagic forage fish in the Black Sea ecosystem, playing a key role in transferring energy between lower and higher trophic levels. It contributes to the regulation of plankton communities and nutrient cycling within coastal and offshore waters. Serves as an important prey resource for larger predatory fish, marine mammals, and seabirds, supporting the productivity of the Black Sea food web. Through its anadromous migrations between marine and freshwater habitats, contributes to ecological connectivity and nutrient exchange between the Black Sea and its tributary rivers.

The main preys: Zooplankton and small fish (*Engraulis*, *Clupeonella*, *Sprattus*).

The main predators: Larger predatory fish, marine mammals (dolphins) and sea birds.

Species: Red mullet (*Mullus barbatus*)

Local name: Turkish: Barbunya, Bulgarian: Барбуня, Romanian: Barbun

Photo:



Photo: © Tihomir Stefanov

Max age: 4 years

Biology: The red mullet is a small bottom species typically inhabiting gravel, sandy, and muddy substrates on the continental shelf. It commonly attains lengths of 12-15 cm, although the maximum recorded length is 38 cm. The species occurs at depths ranging from 10 to 300 m. It feeds primarily on small benthic invertebrates, including crustaceans, polychaete worms, and mollusks. The lifespan is relatively short, generally around 2–3 years.

IUCN Red List Category:

EX	EW	EN	CR	VU	NT	LC	DD	NE
----	----	----	----	----	----	----	----	----

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
--------	------------------------	--------------------	---------	-----

Main Threats: The dominant threat is overexploitation, amplified by habitat disturbance from bottom trawling. Other factors as pollution, eutrophication and climate change act cumulatively by degrading the benthic ecosystem the species depends on.

Ecological Importance: In the Black Sea, the red mullet functions as a key demersal intermediary, coupling benthic production with higher trophic levels. Through its feeding activity, it contributes to nutrient recycling and sediment turnover, while simultaneously serving as prey for larger predators. Commercially important in the area.

The main preys: Benthic worms, mollusks and crustaceans.

The main predators: Predatory fish such as *Sarda sarda*, *Pomatomus saltatrix*, *Serranus cabrilla*, etc.

Species: Whiting (*Merlangius merlangus*)

Local name: Turkish: Mezgit, Bulgarian: Меджид, Romenian: Bacaliar

Photo:



source: https://www.fishbase.se/images/species/Memer_u6.jpg

Max age: 10 years

Biology: The whiting is a medium-sized benthopelagic species that typically reaches lengths of up to 30 cm, although a maximum size of 92 cm and 3.1 kg has been recorded. It is most commonly found at depths of 30-80 m, primarily over mud and gravel substrates, but also occurs on sand and rocky bottoms. The species feeds on a wide range of prey, including shrimps, crabs, mollusks, polychaete worms, and small fish. Juveniles inhabit more coastal areas and shift towards deeper, open waters after their first year of life. Whiting is oviparous, producing pelagic eggs and spawning in batches. Larvae and juveniles are often associated with jellyfish. A small chin barbel, present in juveniles, disappears upon reaching maturity.

IUCN Red List Category:

EX	EW	EN	CR	VU	NT	LC	DD	NE
----	----	----	----	----	----	----	----	----

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
--------	------------------------	--------------------	---------	-----

Main Threats: Overfishing, habitat degradation, climate change, as well as eutrophication and hypoxia caused by marine pollution.

Ecological Importance: In the Black Sea, whiting functions as a trophic regulator and connector between benthic and pelagic systems, with a central role in transferring energy to higher predators and maintaining the balance of coastal fish communities.

The main preys: small fish, worms, mollusks, pelagic and benthic crustaceans

The main predators: Larger predatory fish (*Acipenser gueldenstaedtii*, *A. stellatus*, *Squalus acanthias*, *Raja clavata*, etc.) and marine mammals (dolphins).

Species: Black scorpionfish (*Scorpaena porcus*)

Local name: Turkish: İskorpit, Bulgarian: Скорпид, Romanian: Scorpie de mare

Photo:



Photo: © Tihomir Stefanov

Max age: 12 years

Biology: The black scorpionfish is a small- to medium-sized marine demersal species commonly associated with rocky substrates and algal habitats. It typically reaches lengths of around 15 cm, although the maximum recorded size is 40 cm and 870 g. The species feeds primarily on small benthic fishes (e.g., gobies, blennies), as well as crustaceans and other invertebrates. The lifespan is relatively moderate, generally reaching up to 10–12 years, although most individuals are younger in natural populations.

IUCN Red List Category:

EX	EW	EN	CR	VU	NT	LC	DD	NE
----	----	----	----	----	----	----	----	----

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
--------	------------------------	--------------------	---------	-----

Main Threats: In the Black Sea, the species is mainly threatened by coastal habitat degradation and declining environmental quality, with fishing playing a secondary but locally important role, especially given its low mobility and strong habitat dependence.

Ecological Importance: In the Black Sea, black scorpionfish functions as a sedentary mesopredator in the coastal benthic communities, with a key role in fine-scale trophic regulation and maintaining the integrity of rocky and algal habitats.

The main preys: Benthic fish, mollusks and crustaceans.

The main predators: Mainly larger predatory fish.

Species: Short-snouted seahorse (*Hippocampus hippocampus*)

Local name: Turkish: Denizati, Bulgarian: Морско конче, Romanian: Căluț de mare

Photo:



Photo: © Tihomir Stefanov

Max age: 5 years

Biology: The short-snouted seahorse is a small, demersal, non-migratory species typically found in coastal habitats on soft bottoms, often associated with rocks, algae, and sparsely vegetated areas. It exhibits effective camouflage, mimicking green or yellow plant coloration, which enhances both prey capture and predator avoidance. The species is characterized by very limited daily movements and small home ranges, although individuals may move to slightly deeper waters during winter. It commonly attains lengths of 7-8 cm, with a maximum recorded length of 15 cm, and occurs at depths from 0 to 30 m. The diet consists mainly of small invertebrates and organic particles. Lifespan is relatively short, generally around 3-4 years. Owing to its short generation time and multiple breeding cycles within a spawning season, the species is considered to have relatively high resilience.

IUCN Red List Category:

EX	EW	EN	CR	VU	NT	LC	DD	NE
----	----	----	----	----	----	----	-----------	----

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
---------------	------------------------	--------------------	---------	-----

Main Threats: In the Black Sea, short-snouted seahorse is most threatened by loss and degradation of coastal habitats, with bycatch and declining environmental quality further reducing population stability, particularly given its low mobility and strong habitat dependence.

Ecological Importance: In the Black Sea, the species functions as a habitat-dependent indicator species, contributing to fine-scale trophic processes and reflecting the ecological integrity of coastal vegetated habitats.

The main preys: Amphipods, copepods, mysids and detritus.

The main predators: Larger demersal fish including gobies, *Scorpaena porcus*, and others.

Species: Round goby (*Neogobius melanostomus*)

Local name: Turkish: Kum kaya balığı, Bulgarian: Стронгил, Romanian: Strunghil

Photo:



Photo: © Tihomir Stefanov

Max age: 6 years

Biology: The round goby is a benthic species typically found in shallow, brackish waters, but it also occurs in freshwater environments such as lagoons, lakes, large rivers, and harbors, inhabiting sandy or rocky substrates. It commonly attains lengths of 10–15 cm, although the maximum recorded length is 35 cm. The species is oviparous, producing demersal, adhesive eggs that are deposited on hard substrates such as stones, shells, and aquatic vegetation. Males usually mature at 3–4 years, while females mature earlier, at 2–3 years. Spawning occurs from April to September, with females capable of multiple spawning events within a season at intervals of approximately 18–20 days. During the breeding season, males develop a characteristic dark (almost black) coloration. Males guard the eggs until hatching and often die after the spawning season. Egg clutches may occasionally be transported on ship hulls, facilitating dispersal to new areas. The round goby is an opportunistic feeder, consuming a wide range of benthic invertebrates and small fish, with a strong preference for mollusks.

IUCN Red List Category:

EX	EW	EN	CR	VU	NT	LC	DD	NE
----	----	----	----	----	----	----	----	----

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
--------	------------------------	--------------------	---------	-----

Main Threats: In the Black Sea, the round goby is a relatively resilient species, with main pressures arising from habitat degradation, pollution, and eutrophication, which affect benthic habitats and prey availability. However, due to its high adaptability, overall vulnerability is comparatively low.

Ecological Importance: In the Black Sea, *Neogobius melanostomus* functions as a dominant benthic feeder and key trophic link, playing a central role in energy transfer, prey regulation, and maintaining ecosystem functioning across a wide range of coastal habitats.

The main preys: Small benthic fish, mollusks and crustaceans.

The main predators: Larger predatory fish including sturgeons, *Scophthalmus maximus* and others, as well as piscivorous birds like cormorants.

THIRD LEVEL CONSUMERS

Species: Turbot (*Scophthalmus maximus*)

Local name: Turkish: Kalkan, Bulgarian: Калкан, Romenian: Calcan

Photo:



source: <https://www.fishbase.se/photos/ThumbnailsSummary.php?ID=1348#>

Max age: 25 years

Biology: The turbot is a large demersal species inhabiting depths of 20-70 m. Adults occur on sandy, rocky, or mixed substrates and are relatively common in brackish waters. It typically reaches 50-70 cm in length, although the maximum reported size exceeds 100 cm and 25 kg. The species feeds primarily on benthic fishes, such as gobies, and to a lesser extent on larger crustaceans and bivalves. Turbot is a batch spawner, with a spawning season extending from April to August, producing pelagic eggs.

IUCN Red List Category:

EX	EW	EN	CR	VU	NT	LC	DD	NE
----	----	----	----	----	----	----	----	----

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
---------------	------------------------	--------------------	---------	-----

Main Threats: intensive fishing pressure, including illegal and unregulated catches; habitat degradation, eutrophication-driven hypoxia, and pollution.

Ecological Importance: In the Black Sea, turbot functions as a top benthic predator and key regulator of demersal fish communities, playing an important role in maintaining ecosystem structure and linking ecological processes with fisheries dynamics.

The main preys: Benthic fish, crustaceans and bivalves.

The main predators: Primarily marine mammals (*dolphins*) and rarely large benthic predatory fish (*Huso huso*, *Squalus acanthias*).

Species: Atlantic bonito (*Sarda sarda*)

Local name: Turkish: Palamut, Bulgarian: Паламуд, Romanian: Pălămidă

Photo:



source: https://www.fishbase.se/images/species/Sasar_u0.jpg

Max age: 5 years

Biology: The Atlantic bonito is a large, epipelagic, neritic, schooling species. It typically reaches 50 cm in length, although the maximum reported size is 91 cm and 11 kg. Adults prey on small schooling fish and invertebrates such as shrimps, and are capable of swallowing relatively large prey. Eggs and larvae are pelagic. The species can tolerate a wide range of environmental conditions, with temperatures between 12-27°C and salinities of 14-39 ppt.

IUCN Red List Category:

EX	EW	EN	CR	VU	NT	LC	DD	NE
----	----	----	----	----	----	----	----	----

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
--------	------------------------	--------------------	---------	-----

Main Threats: Overfishing, climate change and sea temperature fluctuations, changes in small pelagic fish populations, and marine pollution.

Ecological Importance: As a mid-to-upper trophic level predator, *Sarda sarda* plays a key role in the Black Sea ecosystem by regulating populations of small pelagic fish and transferring energy to higher trophic levels.

The main preys: Small pelagic fish as *Sprattus sprattus*, *Engraulis encrasicolus*, *Trachurus* spp., *Spicara smaris*, etc.

The main predators: Primarily marine mammals (*Tursiops truncatus*), known to be cannibalistic.

Species: Bluefish (*Pomatomus saltatrix*)

Local name: Turkish: Lüfer, Bulgarian: Лещер, Romanian: Lufar

Photo:



Photo: © Tihomir Stefanov

Max age: 14 years

Biology: The bluefish is a large pelagic, schooling species inhabiting depths between 0-100 m. Individuals typically reach about 60 cm in length, although the maximum reported size exceeds 130 cm and 14 kg. The species is most commonly associated with surf beaches and rocky coastal areas in clean, high-energy waters, but adults may also occur in estuaries and brackish environments. Juveniles are often found in shallow coastal waters, where they form schools that actively pursue and attack small fish. Adults usually occur in loose groups and are known for their aggressive feeding behavior. The bluefish feeds primarily on fish, although crustaceans may also form part of its diet. It is a highly migratory species, generally moving toward warmer waters during winter and returning to cooler waters during summer.

IUCN Red List Category:

EX	EW	EN	CR	VU	NT	LC	DD	NE
----	----	----	----	----	----	----	----	----

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
--------	------------------------	--------------------	---------	-----

Main Threats: Overfishing, climate change and sea temperature fluctuations, changes in small pelagic fish populations, and marine pollution.

Ecological Importance: As a mid-to-upper trophic level predator, bluefish plays a key role in the Black Sea ecosystem by regulating populations of small pelagic fish and transferring energy to higher trophic levels. As a highly migratory species, the bluefish links different marine habitats across the Black Sea.

The main preys: Small pelagic fish as *Sprattus sprattus*, *Engraulis encrasicolus*, *Trachurus* spp., *Spicara smaris*, etc.

The main predators: Primarily marine mammals (dolphins), juveniles can be prey of other large predatory fish.

Species: Common stingray (*Dasyatis pastinaca*)

Local name: Turkish: İğneli Vatoz, Bulgarian: Морска котка, Romanian: Pistică de mare

Photo:



source: <https://www.fishbase.se/photos/PicturesSummary.php?resultPage=2&ID=2060&what=species>

Max age: 16 years

Biology: The common stingray is a large demersal coastal species that typically inhabits depths of 20-50 m. It occurs on sandy and muddy bottoms, often near rocky reefs, throughout the eastern Atlantic, Mediterranean Sea, and Black Sea. Individuals commonly reach 40-50 cm in disc width, although the maximum reported size exceeds 70 cm and 14 kg. The species feeds primarily on benthic organisms, including bottom-dwelling fish, crustaceans, and mollusks. It is ovoviviparous, with a gestation period of approximately four months, producing litters of 4-7 young. The common stingray can pose a danger to bathers and fishers because of its venomous tail spine. This serrated spine is a modified dermal denticle that may reach up to 35 cm in length. It is periodically shed and replaced.

IUCN Red List Category:

EX	EW	EN	CR	VU	NT	LC	DD	NE
----	----	----	----	----	----	----	----	----

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
--------	------------------------	--------------------	---------	-----

Main Threats: intensive fishing pressure, particularly bycatch in bottom trawl, gillnet, and longline fisheries, as well as coastal habitat degradation caused by dredging, trawling, shoreline development, and seabed disturbance. Also, marine pollution, eutrophication and seasonal hypoxia.

Ecological Importance: Important benthic predator in the Black Sea ecosystem, contributing to the regulation of bottom-dwelling fish, crustacean, and mollusk populations. Through its foraging activity, it influences benthic community structure and nutrient cycling within coastal habitats. As a demersal species sensitive to habitat degradation and pollution, the species can serve as an indicator of the ecological condition of coastal and shelf ecosystems in the Black Sea.

The main preys: Benthic fish, crustaceans and mollusks.

The main predators: No data.

Species: Tub gurnard (*Chelidonichthys lucerna*)

Local name: Turkish: Kırlangıç, Bulgarian: Морска лястовица, Romanian: Rândunica de mare

Photo:



source: <https://www.fishbase.se/photos/ThumbnailsSummary.php?ID=1366#>

Max age: 15 years

Biology: The tub gurnard is a marine demersal species typically inhabiting sandy, muddy-sand, and gravel substrates. It commonly reaches lengths of around 30 cm, although the maximum recorded size is 83 cm and 6.6 kg. The species feeds on a variety of prey, including fish, crustaceans, and mollusks. It is characterized by three free rays on the pectoral fins, which function as tactile “legs” used both for resting on the substrate and for detecting prey within the sediment. The species is oviparous, producing pelagic eggs. Spawning generally occurs during the warmer months, typically spring to summer. The species is a batch spawner, releasing eggs in multiple events over the spawning season. Larvae are planktonic before settling to the bottom as juveniles.

IUCN Red List Category:

EX	EW	EN	CR	VU	NT	LC	DD	NE
----	----	----	----	----	----	----	----	----

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
--------	------------------------	--------------------	---------	-----

Main Threats: In the Black Sea, *Chelidonichthys lucerna* is mainly affected by bycatch and habitat disturbance from bottom trawling, with environmental degradation acting as an additional pressure on its benthic habitat and prey base.

Ecological Importance: In the Black Sea, the species functions as a benthic predator and key link in soft-bottom food webs, contributing to prey regulation, energy transfer, and the ecological functioning of demersal ecosystems.

The main preys: Small demersal fish, bivalves and crustaceans.

The main predators: Larger predatory fish; known also to be cannibalistic.

APEX PREDATORS

Species: Harbour porpoise (*Phocoena phocoena relicta*)

Local name: Turkish: Mutur Yunus, Bulgarian: Морска свиня (муткур), Romanian: Marsuin

Photo:



source: <https://www.ascobans.org/sites/default/files/species/harbour-porpoise.jpg>

Max age: 24 years

Biology: The Black Sea harbour porpoise is a small cetacean that lives in pairs or small groups and is distributed mainly over the continental shelf. It typically reaches up to 1.5 m in length and weighs around 50 kg. It feeds primarily on small schooling fish.

The average lifespan is 10-12 years, although the oldest recorded individual reached 24 years. The species reaches sexual maturity at 2-3 years in both sexes. Gestation lasts approximately 11 months, and females give birth to a single calf every 1-2 years.

IUCN Red List Category:

EX	EW	EN	CR	VU	NT	LC	DD	NE
----	----	----	----	----	----	----	----	----

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
--------	------------------------	--------------------	---------	-----

Main Threats: The biggest threat is incidental capture in gillnets for turbot (bycatch), also reduction of fish resources, marine pollution and different pathogens.

Ecological Importance: As a top predator, the Black Sea harbour porpoise controls the populations of various fish species. Its population is also geographically isolated from *Phocoena phocoena* in the Atlantic Ocean.

The main preys: Mostly small schooling fish as *Sprattus sprattus*, *Engraulis encrasicolus* and various species of gobies.

The main predators: The harbour porpoise has no natural predators in the Black Sea.

Species: Bottlenose dolphin (*Tursiops truncatus ponticus*)

Local name: Turkish: Afalina yunus, Bulgarian: Афала, Romanian: Afalin

Photo:



source: <https://www.fisheries.noaa.gov/species/common-bottlenose-dolphin>

Max age: 45 years

Biology: The Black Sea bottlenose dolphin is a small cetacean that lives in groups ranging from a few individuals to several dozen, and is distributed mainly along the continental shelf. It reaches up to 3 m in length and weighs around 300 kg. It feeds on both pelagic and benthic fish. The average lifespan is about 45 years.

The Black Sea common dolphin reaches sexual maturity at 6-8 years in females and 8-12 years in males. Gestation lasts approximately 12 months, and females give birth to a single calf. Reproduction occurs at intervals of 3-6 years.

IUCN Red List Category:

EX	EW	EN	CR	VU	NT	LC	DD	NE
----	----	----	----	----	----	----	----	----

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
--------	------------------------	--------------------	---------	-----

Main Threats: Incidental catch in fishing nets (bycatch), microbial pollution from untreated sewage in coastal waters, overfishing, noise pollution and different pathogens.

Ecological Importance: The bottlenose dolphin, as an apex predator, plays a key role in regulating fish populations and serves as an indicator of marine biodiversity in the Black Sea.

The main preys: Benthic and pelagic fish species as *Engraulis encrasicolus*, *Merlangius merlangus*, *Mugil cephalus*, etc.

The main predators: The bottlenose dolphin has no known natural predators in the Black Sea.

Species: Common dolphin (*Delphinus delphis ponticus*)

Local name: Turkish: Tırtak, Bulgarian: Обикновен черноморски делфин, Romanian: Delfin comun

Photo:



source: <https://inaturalist-open-data.s3.amazonaws.com/photos/252670730/large.jpeg>

Max age: 30 years

Biology: The Black Sea common dolphin is a small cetacean that lives in large groups and is distributed mainly offshore. It typically reaches up to 1.8 m in length and weighs around 110 kg, feeding primarily on small pelagic fish.

The average lifespan is 20-22 years, although individuals may live up to 30 years. The species reaches sexual maturity at 2-4 years in females and around 3 years in males. Gestation lasts approximately 11 months, and females give birth to a single calf every 1-3 years.

IUCN Red List Category:

EX	EW	EN	CR	VU	NT	LC	DD	NE
----	----	----	----	----	----	----	----	----

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
--------	------------------------	--------------------	---------	-----

Main Threats: Incidental capture in fishing nets (bycatch), overfishing of prey species, marine pollution, noise pollution and pathogens like morbillivirus.

Ecological Importance: As an apex predator, the common dolphin serves as an indicator of marine biodiversity in the Black Sea.

The main preys: Mainly on small pelagic fish as *Sprattus sprattus*, *Alosa immaculata* and *Engraulis encrasicolus*.

The main predators: The common dolphin has no natural predators in the Black Sea.

Species: Piked dogfish (*Squalus acanthias*)

Local name: Turkish: Mahmuzlu Camgöz Köpek Balığı, Buşgarian: Черноморска акула, Romanian: Căine de mare

Photo:



source: https://geerg.ca/wp-content/uploads/2023/06/Squalus_acanthias_1.jpg

Max age: 75 years

Biology: The piked dogfish is a bathydemersal shark species that inhabits a wide range of depths, from surface waters to more than 300 m. It has a circumglobal distribution and is found primarily in temperate waters. Individuals typically reach 100-120 cm in length, although the maximum recorded size exceeds 160 cm and 9 kg. Highly migratory species commonly observed in large foraging schools consisting of hundreds of individuals, usually segregated by size and sex. Fisheries have historically targeted schools of large gravid females. Movements of the species appear to correlate with preferred water temperatures. In the North Atlantic, longevity is estimated at 35-50 years, although most individuals live only 20-24 years. Growth is slow, with males reaching sexual maturity at 60-70 cm and females at 75-90 cm. The species is ovoviviparous, with a gestation period of approximately two years and litters ranging from 1 to 21 pups. Mating occurs during winter. The piked dogfish feeds on a broad range of prey, including jellyfish, numerous fish species, and crustaceans such as shrimp and crabs.

IUCN Red List Category:

EX	EW	EN	CR	VU	NT	LC	DD	NE
----	----	----	----	----	----	----	----	----

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
--------	------------------------	--------------------	---------	-----

Main Threats: Mainly intensive fishing pressure, including illegal and unregulated catches. Additionally, habitat degradation, eutrophication-driven hypoxia, and marine pollution.

Ecological Importance: The piked dogfish plays an important role as a main predator in the Black Sea ecosystem, helping regulate populations of small pelagic and demersal fish and crustaceans. By feeding on a wide variety of prey, it contributes to maintaining trophic balance and ecosystem stability. Declines in its population may lead to shifts in prey abundance and broader ecological imbalances within the marine ecosystem.

The main preys: Benthic fish and crustaceans.

The main predators: Primarily marine mammals (*dolphins*). Juveniles are particularly vulnerable to predation by larger fishes.

Species: Beluga (*Huso huso*)

Local name: Turkish: Mersin Morinası, Bulgarian: Моруна, Romanian: Morun

Photo:



Photo: © Tihomir Stefanov

Max age: 118 years

Biology: The beluga is a large anadromous species inhabiting marine, brackish, and freshwater environments. In the Black Sea, it typically occurs at depths of 20-80 m, although it may also occupy pelagic waters while following prey. Individuals commonly reach 200-250 cm in length, but the maximum reported size exceeds 800 cm and 3000 kg, making it one of the largest freshwater fishes in the world. The species undertakes extensive upriver migrations to major Black Sea rivers for spawning. Reproduction occurs in the main river channels with strong currents over stony or gravel substrates. Juveniles inhabit shallow riverine habitats during their first summer before gradually moving toward estuarine and marine environments. Adult beluga feed primarily on marine fish, while juveniles consume crustaceans, mollusks, mysids, and amphipods.

IUCN Red List Category:

EX	EW	EN	CR	VU	NT	LC	DD	NE
----	----	----	-----------	----	----	----	----	----

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
---------------	------------------------	---------------------------	---------	-----

Main Threats: Overfishing and illegal poaching; construction of dams and river regulation on major spawning rivers; habitat degradation, including river channel modification, sedimentation, dredging, and pollution from industrial and agricultural sources. Additional threats include bycatch in commercial fisheries, reduced prey availability, and the effects of climate change on river flow regimes and coastal ecosystems.

Ecological Importance: The beluga is a key apex predator in the Black Sea ecosystem, playing an important role in regulating populations of fish and other aquatic organisms. Through its migrations between marine, estuarine, and freshwater habitats, the species contributes to ecological connectivity and nutrient transfer within the Black Sea basin and its major rivers. Juveniles and adults occupy different ecological niches, supporting trophic balance across multiple habitats throughout their life cycle. The beluga is also an important indicator of the ecological integrity and connectivity of riverine and coastal ecosystems in the Black Sea region.

The main preys: Variety of benthic fish (adults), crustaceans and mollusks (juveniles).

The main predators: None.

Species: Starry sturgeon (*Acipenser stellatus*)

Local name: Turkish: Sivruşka mersin balığı., Bulgarian: Пъструга, Romanian: Păstrugă

Photo:



Photo: © Tihomir Stefanov

Max age: 29 years

Biology: The starry sturgeon is a medium-sized anadromous species inhabiting marine, brackish, and freshwater environments. In the Black Sea, it typically occurs at depths of 10-80 m, mainly in nearshore areas over sandy and muddy bottoms. The species is primarily benthic during the day but often rises into the water column at night to feed. Individuals commonly reach 80-100 cm in length, although the maximum reported size exceeds 250 cm and 80 kg. The species undertakes extensive upriver migrations to major Black Sea rivers for spawning. Reproduction occurs in the main river channels with strong currents over stony or gravel substrates. Juveniles inhabit shallow riverine habitats during their first summer before gradually moving toward estuarine and marine environments. Adult starry sturgeon feed primarily on fish, while juveniles consume crustaceans, mollusks, and benthic invertebrates such as worms.

IUCN Red List Category:

EX	EW	EN	CR	VU	NT	LC	DD	NE
----	----	----	-----------	----	----	----	----	----

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
---------------	------------------------	---------------------------	---------	-----

Main Threats: overfishing and illegal poaching; construction of dams and river regulation on major spawning rivers; habitat degradation, including river channel modification, sedimentation, dredging, and pollution from industrial and agricultural sources. Additional threats include bycatch in commercial fisheries in the Black Sea, reduced prey availability, and the effects of climate change on river flow regimes and coastal ecosystems.

Ecological Importance: The starry sturgeon is an important migratory predator and benthic feeder within the Black Sea ecosystem and contributes to the regulation of prey populations and the maintenance of trophic balance in coastal and estuarine habitats. Through its migrations between marine, brackish, and freshwater environments, the species supports ecological connectivity between the Black Sea and its major river systems. Different life stages occupy distinct habitats, linking riverine, estuarine, and marine food webs. The starry sturgeon also serves as an important indicator of river connectivity, habitat quality, and the ecological condition of the Black Sea basin and its tributary rivers.

The main preys: Variety of benthic fish (adults), crustaceans, worms and mollusks (juveniles).

The main predators: No data, probably large predatory fish and marine mammals in the Black Sea.

Species: Danube sturgeon (*Acipenser gueldenstaedtii*)

Local name: Turkish: Karaca mersin balığı, Bulgarian: Руска есетра, Romanian: Nisetru

Photo:



Photo: © Tihomir Stefanov

Max age: 46 years

Biology: The Danube sturgeon is an anadromous species inhabiting marine, brackish, and freshwater environments. In the Black Sea, it typically occurs at depths of 10-80 m, primarily in shallow coastal and estuarine areas. Individuals commonly reach 100-140 cm in length, although the maximum reported size exceeds 240 cm and 115 kg. The species undertakes extensive upriver migrations to major Black Sea rivers for spawning. Reproduction occurs in the main river channels with strong currents over stony or gravel substrates. Juveniles inhabit shallow riverine habitats during their first summer before gradually moving toward estuarine and marine environments. Danube sturgeon is generally solitary, although it may aggregate during overwintering periods and spawning migrations. The species feeds mainly on benthic organisms, including mollusks, crustaceans, and small fish.

IUCN Red List Category:

EX	EW	EN	CR	VU	NT	LC	DD	NE
----	----	----	-----------	----	----	----	----	----

Status in the Black Sea

Native	Invasive Alien Species	Threatened Species	Endemic	N/A
---------------	------------------------	---------------------------	---------	-----

Main Threats: overfishing and illegal poaching; construction of dams and river regulation on major spawning rivers; habitat degradation, including river channel modification, sedimentation, dredging, and pollution. Additional threats include bycatch in commercial fisheries in the Black Sea, reduced prey availability, and the effects of climate change on river flow regimes and coastal ecosystems.

Ecological Importance: The Danube sturgeon is an important migratory predator and benthic feeder within the Black Sea ecosystem and contributes to the trophic balance in coastal and estuarine habitats. Through its migrations, the species supports ecological connectivity between the Black Sea and its major river systems. Different life stages occupy distinct habitats, linking riverine, estuarine, and marine food webs. It also serves as an important indicator of river connectivity, habitat quality, and the ecological condition of the Black Sea basin and its tributary rivers.

The main preys: Variety of benthic fish and invertebrates, including mollusks and crustaceans.

The main predators: No data, probably large predatory fish and marine mammals in the Black Sea.

Interreg



Co-funded by
the European Union

NEXT Black Sea Basin



Photo Cover page: © Vesselin Boychev

**PROJECT TITLE: THE RAISING AWARENESS FOR THE BLACK SEA PEOPLE TO
RECOGNIZE AND PROTECT BLACK SEA BIODIVERSITY- BIOBLACK**

Material editor: Institute of Fish Resources – Varna, Bulgaria

Contact details: hacersaglam@yahoo.com; sonyauz@gmail.com

Project website: <https://bioblackinfo.ktu.edu.tr/>; <https://www.ifrvarna.com/>

Publishing date: July 2026

The responsibility for the content of this material is that of the author(s). The content of this material does not necessarily represent the official position of the European Union. Reproduction is authorized, provided the source is acknowledged, and any changes are indicated.

Interreg



Co-funded by
the European Union



NEXT Black Sea Basin

